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THE BUSINESS MAN AND THE CIVIL SERVANT.

BY EUSTACE HARE.

THE term "business man" is so vague and comprehensive that the more one tries to attach a precise meaning to it the denser grows the confusion of ideas. Usually, and therefore, perhaps, wrongly, it is associated with the pursuit and acquisition of wealth; and chief among the followers of this delightful occupation may be cited merchants, manufacturers, stockbrokers, company promoters, shop keepers, and, generically, Fleet Street. Occasional failure to meet liabilities does not, even necessarily imply a spurious claim to the title; because the astute business mind, forseeing disaster, not infrequently arranges matters so that from the ashes of bankruptcy some residual solids may be sifted wherewith to lay the foundation of a new venture. Otherwise he is no more the "business" man than the employee who served him or the creditor who trusted him: a poor creature, reminiscent of the bygone Dombey and Joe Sedley type; to be mentioned by quondam friends with a shoulder shrug in an interval of golf gossip, or at the bridge table between the deals.

Perhaps, however, the most popular conception of the "business man" lies in the ownership of a private commercial concern; the man who has a business of his own, inherited, or built up by his own exertions. An enviable autocrat in his sphere, large or small, with powers of selection and rewards and punishment; at whose nod or whim a wage-earner may become wageless, and who holds in his hands the happiness or misery of dependent households. On the other hand, the interests of employer and employee are mutual, and the reward to the faithful and serviceable is usually generous, partly in recognition of ability and partly from a wise apprehension of the snaring of a valuable ally by an enterprising competitor. For the slacker in a private business there is no room; anyone is welcome to him.

Herein lies some danger to private enterprise in these days of strength in unity. It is often the policy to pay handsomely the one or two at the top and to leave the rest—nowhere; with the result that the youth of wide outlook but scanty parental means seeks employment in the larger concerns, where opportunities are many, rather than await competence and advancement in the prospect of an empty pair of shoes. While in all big businesses there are nooks and corners for jobbed-in idlers, there are also many-runged ladders for the meritorious and efficient. The affair is too large to be affected by a few incompetents: superior minds are always at hand to cover their lapses, in lofty magnanimity, and the failure of one may be the stepping stone of another; stepping stones being useful things, but easily kicked aside when they have served their purpose.

The old-fashioned, plodding shrewd business man of popular imagination is gradually dying out, and from his ashes arise the chairman, board of directors and manager responsible once or twice a year to a proprietary force of shareholders, friendly or critical according to the dividend. The evolution of speed and of easy communication with the corners of the earth has broadened the horizon and enlarged the ideas of the whole world, and no part of it is more susceptible to change than the commercial.

So that, whether he be born in the purple and—with the wholesome bloom of public school influence still upon him, finds his business career surely and distinctly mapped out, or whether he start with nothing to hand but endeavour and a calculating mind,

the commercial novitiate is no longer content to see visions, but advances at once to realisation and gratification, somehow, anyhow; beginning where the last generation finished. There is too much to be done and to be enjoyed in the whirl of current existence to admit of any waiting upon Time.

Therefore he makes his business solid and stable, if he can; if not, showy; which, gulls being ever on the wing, may achieve the same result. Advertisement in any form is recognised to-day as the touchstone of success; in the flaunting crudities of the hoardings, the luminous flappings on the housetops, the issue of specious prospectuses headed by reputable names for the behoof of feverish investors, artful beckonings to the impecunious and subtle invitations to those seeking physical perfection inside or out. Even an expensive establishment, a well-appointed car, a polished manner and well-cut exterior may serve the same purpose, if adequately shop-windowed. Speculating on the weaknesses of mankind is no new phase, but somewhat accentuated in these days, and so far from being deemed a disreputable weapon in the business armoury is regarded rather as a mark of enterprise—a word associated once with lofty aims, but drifting fast into more sordid company.

It was remarkable how the business mind scented, and leaped to the advantages created by the War; from the man (or woman) with a house to sell to the coster with his last barrow-load of bananas; monopolists all. And even the most scrupulous—if such a term be consistent with the situation—could soothe his conscience with the assurance that he was merely following the unerring laws of supply and demand; that Shakespeare who wrote about "a tide in the affairs of all men" was with him, and that what everyone else was doing could not be wrong.

One of the uses of advertisement is fast disappearing; and that is, cheapness—not the cheapness of shoddy, but the possibilities of small profits on large and quick returns. Monopolies created by combination, the compunctionless annihilation of the small trader are displacing competition; so that it is the man who cries his goods the loudest and is most pertinacious in his wall-chalking that commands the widest custom. The fixing of prices is no new thing. To check rapacity it was done in the Middle Ages, but on a more satisfactory—to the consumer—principle; for, whereas a fat capon was not to be sold at *more* than fourpence, the present mode is that it must not be sold at *less* than ten shillings and sixpence, or thereabouts. The more ancient rule still left, be it observed, a loophole for competition.

I do not suggest that the trader or so-called business man of to-day is less scrupulous or fair than he of a bygone time or of any time; only, in the process of development, his views and aims have expanded. If we were all business men and had to depend on our astuteness and acuteness as distinct from knowledge and perseverance, for our livelihood, we should all be very much alike; and if we all lived by taking in each other's washing, the man who washed the best would come atop. The business man can no more change his spots than the leopard; and no one expects him to do so.

But, after all, is the business mind only to be found in the trader or what is known as the "business world"? Turn the phrase "business man" into the "man, or woman, of business," and with one exception—which I shall come to later—he or she is to be found in every path that leads to success. He and she are ubiquitous; the farmer, the lawyer, the doctor, the matron of the hospital, the bishop of the diocese, the head master or mistress of the school are as much dependent on, or chosen for, their business acumen and perception as the man who cuts your clothes or buys your shares.

Even Art and Literature are not immune from the business spirit, from the feverish craving for immediate gain and notoriety; so that in place of good, ennobling work, we get fantastic, startling, artificial rubbish, with the mark of genius here and there distorted or half obliterated, prevented from running its natural course by the lure of self-advertisement and the speculative hope of catching at once the public taste and money. Not such a very difficult achievement in these days when the gaps between the strenuous pursuits of business and games must be filled up by what is amusing, arresting and, perhaps, a little shocking. So the young men and women of brains gain followers by following; and, inverting the old order find ready success, or what is deemed such, in a business path of roses. Later, perhaps, when the limelight begins to pall and money is not the pressing object they may take pause to think; if energy and intellect have not meanwhile become blunted.

Verily, the man of business is in this age popular and his hand acknowledged everywhere except in the Civil Service; for between that enclosure and the outer world there would seem to be a great gulf or wall. No new creed this, for Dickens proclaimed it; made merry over it some seventy-five years ago, and so caricatured it that even now, those of us gifted with a sense of humour, can laugh with our forefathers. Nevertheless, we who have read our "Little Dorrit" may think he would have been well advised to have opposed to the tape-bound Barnacle tribe a more level-headed, practical antagonist than Mr. Meagles, late bank cashier. But Dickens himself was an uncommercial traveller, and was not apparently overmuch enamoured of the commercial character, and with the possible exceptions of the Cheeryble Brothers and Mr. Fezziwig, his puppets of the counting house and office were amusing, but little else. And though type and outlook vary, character changes but little.

The age of Dickens, however, was the halcyon age of the private, one-man business; railway companies, insurance companies, even banking companies were in their infancy and the limited liability concern was practically unknown. Those of us who can remember the ruin wrought by the Glasgow Bank failure of some forty years ago can realise the significance of "limited liability," and be thankful that when we lend our cash for the furtherance of commercial enterprise we now know the worst than can happen to us.

The Civil Servant can be anything else he likes—consistent, of course, with his service to the State—amateur musician, painter, author or a crack marksman at Bisley—but he cannot, shall not, must not be a business man, much as he may desire it. How can it be otherwise when popularly, his whole training leads him at every step to mistrust and adjure the use and practice of one of the most cherished assets of the successful merchant or financier—common (or, unaided) sense, otherwise known as "instinct"? Training of any kind usually leads to habits of caution and the weighing of probabilities, whereas to the man whose mind has to be made up on the spur of the moment or he may miss his opportunity, a quick decision with or without reason, a readiness to take risks and an indifference to consequences are the needful qualities. If he succeed he will lay his riches at the feet of the "common sense" which guided him, while any little failures will be the outcome of those occasions when he disregarded the advice of that ready familiar. And the public having the fortunate ones only before them regard them as typical of a class, a class to whom the virtues of sound judgment and organising ability are regarded as the natural and exclusive heritage.

What the public do not understand or consider is the incentive which moves and energises the man of private business, which makes him take risks—with his own money and sometimes that of others in his keeping—which fills him with anxiety, leads him into doubtful transactions and leaves him no spare time for any but the material enjoyments of life. The incentive is the hope of gain; ever more and more. Take away this incentive, and much of the energy and enthusiasm will evaporate like steam in the air. To the business man of to-day there is not the same interest in work, *qua* work, that there was fifty or a hundred years ago; the interest is centred in how much the work will produce, in the vista of a magnificent income and a large estate. On the other hand, the Civil Servant has no other interest but the work itself, except promotion once or twice in a lifetime, if he prove himself able.

Be it observed, however, that in associating the business man with private profit I am thinking only of the owner of a business. Fundamentally the position of a servant of a railway company or a bank is precisely similar to that of a servant of the Post Office. There is no more business training to be had in any one of them than in any other, except of a specialised order, and, as a rule, the officers and staff in each are acquainted with no other sphere of work but their own. The work of the majority is to keep books and to write letters, the ordinary routine work of an office, in which by practice and experience, and by that alone as in every other occupation, their services become valuable. For the minor number, those who have proved their special fitness, there are other responsibilities, the organising, the administration, the vigilant eye, the general discipline, the summing-up of results, the warding off of danger or disaster; a host of cares and difficulties, of which the outer world has no conception. Each concern I have mentioned has, of course, in addition its peculiar technicalities; the railway company its time-tables and the public safety, the bank its scales and scoop, and the Post Office its letter-sorting and telephone exchanges. You may call all this "service" or "public utility," what you will; but if it is not "business" and business of a very high order, there is no meaning in the term.

Howbeit, there is always a danger of flagging enterprise and stunted development in the absence of competition. Strangely enough, notwithstanding the constant attacks that have been made upon the telephone service from its inception, it is far in advance of some other aids—of greater antiquity—to the public welfare and comfort. I have occasionally stayed near a mining district in the Forest of Dean and it seems hardly credible that in this twentieth century the miners (above all other workers) have no water laid on in their cottages and have no encouragement for acquiring the hot bath habit, except from the beckoning of a kettle of boiling water. But, the village has its telephones, and where there are coal mines there must be a railway.

Again, I lived for three years in a village on a main line, only twenty-three miles from the General Post Office. Here there were telephones, a telegraph office, a good postal service, but not a gas or an electric lamp in the place, and even the railway station was lighted, and is still lighted, with oil. Verily, the business man knows better than to volunteer capital when there is no immediate prospect of a return. And as for the red-tape legend, what Government department has ever perpetrated such an inflexible regulation as that which has produced the season-ticket nuisance? Although my nightly train home has a clear run without a stop, and all tickets have to be shown at the London terminus, they must again be scanned at the other end by two officials, blocking egress; with the result that it takes five minutes to clear the platform, notwithstanding the unseemly scramble of young blood whose time is so valuable after they are loosed from business cares. Incidentally the outlet at this station has not been enlarged in the memory of the oldest inhabitant of a place which has blossomed from rurality to a suburb during the last 25 years. This may sound and possibly is trivial; but it would not be counted trivial if a Government department were concerned. As it is, no one complains, no one writes to the papers or to his "member" about it; there is no competition to compel action and, therefore, says the commercial traveller, why should you expect a business company to jeopardise the profits of its shareholders by an outlay for the benefit only of its customers. Absurd!

(To be continued.)

PRESENTATION, BLACKBURN.

MR. S. J. PHARO, Traffic Superintendent, Class II, was transferred to Birmingham on July 1. He was presented by his friends and colleagues with a handsome case of cutlery, spoons, forks, &c.

The District Manager, in making the presentation, conveyed the good wishes of the staff to Mr. Pharo, and referred to his studies in photography, microscopy, also to his jovial disposition and his kindly disposed way of dealing with difficult questions which help so much in the smooth running of work. He has been succeeded by Mr. Morgan, Traffic Superintendent, Class II, who was transferred from Dublin, and the staff extend a hearty welcome to Mr. Morgan and wish him the best possible success.

THE ROMANCE OF THE TELEGRAPH.

BY J. SKINNER (*Brighton*).

IN these days of the rapid development of the telephone, when an eagle-eyed press correspondent at the remote hamlet known as Rookem-on-the-Mud can 'phone his news editor in London a full account of the latest outbreak of mixed bathing within a few minutes of the atrocity, a brief survey of that now sadly neglected and partially eclipsed means of communication known as the telegraph service may be of some interest to our readers.

It is not our purpose here to attempt an explanation of the term "sadly neglected and partially eclipsed," but rather to touch on the romantic side of the telegraph and of that unique body of men known as telegraphists, from the days when the single telegraph wire, winding its solitary way through the wildernesses of the world, was often the chief link in the chain of civilization, down to the present dispensation of wireless and other wonders.

Romance is not generally associated with commercial pursuits, but all of those engaged in the telegraph service for a number of years know something of the joys, sorrows, comedies and tragedies connected with the humble telegram.

The telegraph has accomplished wonders. It has united the scattered inhabitants of our great Empire in such a manner that the pioneer on the very outpost realises that the slender wire, running back through bush and desert, keeps him in touch with all that he holds dear; and the thought strengthens him and gives him courage to endure. The telegraph brings the nations of the world into close contact one with the other, and, metaphorically speaking, places them face to face. International misunderstandings are often promptly cleared away by its agency, for friendly "antagonists" can say: "Come, let us reason together," and, lo! the faithful telegraph flashes the words that make for reconciliation. The free and prompt exchange of opinions, so essential to the world's welfare, is made possible by telegraphy, wired or wireless, and the establishment and maintenance of peace is assisted in no small measure by the familiar telegraph. It is possible that the telephone will soon be a formidable rival to the telegraph in covering long distances—indeed, the remarkable development of the thermionic valve makes it probable—but the debt the world owes to the telegraph will never be forgotten whilst history remains.

In war the service has played its part nobly, and many, many unsung heroes of the Signal Service sleep peacefully in distant lands, having given their all in the service of their country. The craft is for ever ennobled by the devotion to duty of those humble and faithful servants who, in times of greatest peril, anxiety and hardship, just "carried on." Marcus Aurelius said: "I do my duty, that is enough," and our fallen colleagues needed no exhortation to be faithful to their trust.

ITS HEROES.

Yes, the telegraph service has its heroes and heroines, many of whom are unknown to fame. One of the most touching sights the writer saw when on active service was that of a young Indian telegraphist kneeling dead beside his telegraph instrument on the ground, and with his hand still grasping the key. Killed instantaneously in the act of sending his message and doing his duty to the King Emperor. Faithful unto death!

During the Franco-German war a young girl of 18, Juliette Dodu, was in charge of the telegraph office at Pithiviers when the Prussians captured the place, and took possession of the office. She managed to tap the wire which passed through her bedroom upstairs, and was able to secretly forward valuable messages to the sub-prefect who conveyed them across the Prussian lines to the French commander. She was detected, and on being questioned by the military authorities as to her motive, bravely replied: "Je suis Francaise." Sentence of death was duly passed, but fortunately news of the armistice arrived, and the heroine was saved. Subsequently she was decorated with the Legion of Honour by Marshal Macmahon.

Charles Todd, in charge of the telegraph office at Delhi during the Indian Mutiny, fell in the terrible massacre there, but not before news of the outbreak had been safely signalled. It is stated that the last message from the Delhi office led to the prompt disarming of the native regiments in Lahore and Peshawar. Mr. Montgomery, the Judicial Commissioner, declared that the electric telegraph had saved India!

One of the saddest uses to which a telegraph line has been put is recorded by John Fraser in *The Romance of Electricity*. James L. Stapleton was in charge of the telegraph office at Barrow's Creek, Australia, in 1874, when the natives made a sudden attack on the place, killing the linesmen and severely wounding both Stapleton and his assistant, Mr. Flint. The blacks were driven off and it was found that Stapleton's wound was mortal. A telegram was sent to Adelaide describing the nature of his injuries and asking for medical advice. This was done by Flint, although he was bed-ridden and suffering intense pain. "When Stapleton was sinking fast, his wife came to the telegraph office at South Adelaide to communicate with her dying husband, who, on his part whispered his last wishes to the wounded operator at Barrow's Creek; and thus, although separated by twelve hundred miles of scrub and desert, these two exchanged a solemn and sad farewell."

THE "OLD TIMERS."

It would be something of a revelation to the majority of the staid telegraph officials of the present day could Mr. H. G. Well's "Time Machine" be set to work on their behalf, and a trip into the past be undertaken. The "old timer" was often a Bohemian, a happy-go-lucky fellow but a hard worker, and infinitely proud of his calling. The writer remembers an occasion nearly 30 years ago when one of these gentlemen was in charge of a telegraph counter on a Sunday night. This official was always stylishly attired, and usually adorned with several rings and other articles of jewellery. His indignation can perhaps be imagined when a man came into the office and placed a parcel on the counter. The man and his parcel were completely ignored by the august personage who calmly proceeded to balance his accounts. Getting impatient, the man pushed the parcel forward, saying: "Come on, I'm in a hurry." Angrily raising his fist, the outraged official swept the parcel from the counter to the ground and thundered: "Do you take this for a —— pawn-shop, mister?" The man left without a word—it is probable that in those pre-war days he could not think of anything suitable for such an occasion.

This same official had an unfortunate weakness—not an uncommon one in those days—and too often filled "the cup that clears to-day of past regrets and future fears." But when quite incoherent and otherwise *hors de combat*, he could sit at a circuit for almost any length of time and receive message after message with accuracy and in beautiful writing. He has, long since, gone the way of all flesh.

At that period it was usual for a telegraphist to give busy stations a signal which indicated permission to send a long batch of telegrams without waiting for the usual acknowledgment at the end of each, repetitions being rare in those days of expert morse working. On one occasion a certain worthy came on duty after unduly looking upon the wine whilst it was red. Sitting down at a busy circuit, he gave the usual "batch" signal, and then promptly went off to sleep! After sending steadily for about half an hour, the distant station asked how things were going, and on getting no reply, commenced to call vigorously. Attention was eventually drawn to the circuit and we will draw the veil over the rest of the proceedings.

AN OLD DIARY.

Fifty years ago interesting events were happening in the telegraph service as they have been ever since. We have been privileged to see the private diary, commenced in 1871 by a former telegraph superintendent, who died in the early eighties. We propose to give a few extracts from the book, and readers will note amongst other items that telegraphists travelled extensively in those days.

Oct. 2.—Mr. C. to Tonbridge to test.

Nov. 4.—The two D's to go to TS on Monday for a few weeks.

Dec. 6.—Messengers C. and W. caught wrestling with a pot boy in their lobby.

Dec. 7 *and* 9.—Eight clerks to TS.

(Similar entries regarding men going to and returning from TS are numerous. Later in the book we find records of telegraphists journeying to Redhill, Gravesend, Epsom, St. Leonards, and Glasgow.)

Sept. 22, 1872.—Learners C. S. and G. appointed 6th Class Clerks.

Oct. 9.—I——playing at marbles in the street while on duty. Wrote his father.

Further entries read: "Mr. C. allowed off at 3 p.m. to enable him to take certain medicines!"

"Queen's Speech containing 811 words received on two sounders by C. and N.: begun 2.13 p.m., finished 2.24 p.m."

Quite a lot of space in the book is occupied by notes of sick absences, ascribed to bilious attacks, and the staffs at that period must have been particularly "liverish!" Before leaving this interesting old record, we will give one more extract:

May 19, 1873.—"Mr. C. not arrived at 10 a.m. and no information of his whereabouts. Sent up to his house at 11 a.m. but not at home (?). Soon afterwards word came that he was ill and could not attend."

Being referred to as Mr. C. he was presumably above the 6th Class, and could perhaps conveniently take a day off without difficulty, as there is no further entry of any enquiry into the matter

MISSING.

A young telegraphist, very able and steady, unfortunately failed to pass the medical examination for appointment. He left home one morning, taking his latch-key as usual, but was never heard of afterwards. Years later, he became heir to some property, and an application was made to the Judge at the local County Court to presume death. It was then stated that, although every enquiry had been made, no information regarding the missing heir could be obtained, He had, indeed, completely vanished!

Nothing was ever heard of him again and his fate will probably remain a mystery. Perhaps he went to join his brethren in the United States where, in those days, telegraphists often had almost as nomadic an existence as the gipsies.

A YANKEE OPERATOR.

Writing in the American *Saturday Evening Post* recently, an old-time telegraphist said that there was no section in that country where he had not worked. This same operator told some very interesting experiences. On one occasion when a small messenger boy, he was called to an old New York tenement occupied by foreign Jews, and taken into a room in which rested the body of a member of the family who had just died. The little fellow was naturally terrified and tried to leave, but the head of the family insisted that it was his duty to remain, and finally offered him five dollars to stay. The boy sat by the corpse until the morning and says that he earned every cent. of his money! Later on, when an operator, he was out west in charge of a small office during a time of strikes and considerable disorders. One night a rough-looking man, with a revolver in each hand, entered his cabin and asked him to "do him a favour!" The visitor proved to be a reporter and the "favour" was to send a long Press report, but this was contrary to rule, the office being owned and operated by the railway for railway business only. It is perhaps unnecessary to mention that the Press message was despatched without a great deal of discussion regarding the regulations. Later on, our hero was suspended for two weeks for going to sleep on duty (he worked 14 hours a day) so he searched out the reporter whom he had befriended, and this gentleman was able to obtain a post for him in a commercial office.

SOME SPEED!

Readers will not be surprised to learn that America claims the record for the fastest reception by sound. James Francis Leonard, champion telegraphist, was born at Frankfort, Kentucky, in 1834, and it is claimed for him that in the summer of 1848 he received by sound at the rate of 55 words per minute (writing the messages down, of course), a record which has probably never been beaten. The sender on this occasion was Joseph Fisher at Nashville, Tennessee, and the feat is said to be established beyond a doubt. The fame of Leonard spread far and wide, and it is stated that the showman Barnum wanted him to join his world-renowned "show." It is asserted that this expert could read a message as it was signalled from a distant office, while transmitting another, and afterwards write down the telegram so received. This accomplishment is vouched for by several well-known Americans. It is interesting to note than in 1885 the American telegraphists raised funds and erected a monument at Frankfort, Kentucky, to the memory of this grand "old timer."

A RELIABLE ALARM.

Before leaving the Americans, perhaps readers will be interested to hear of the unfortunate night operator at a little railway office, whose duty it was to signal the passing trains. It was the custom for the operators before going to sleep (an irregular proceeding) to tie a string across the track from a telegraph post, pass it through the key-hole in the door, and fix it to a piece of wood placed on the table; the train, catching the string, pulling the wood on to the floor and thus making sufficient noise to arouse the heavy sleeper. On one occasion, the operator came on duty at 8 p.m., very tired, and proceeded to fix up the alarm. He could not find the string and so used a stout piece of bell-cord, fastening the end to the leg of his chair. He soon fell asleep, but was aroused later by being violently thrown to the ground, fearful crashes following. To his horror, he found the room partly wrecked, whilst the chair had completely disappeared. The cord had proved stout indeed, for the chair had been wrenched clean through the glass door by the passing train.

In due course the operator sent an elaborate report to his superintendent, detailing how a mad bull pursued him to the office and how he had heroically beaten the animal off. Alas, the superintendent knew something of the ways of operators—probably he had worked the string alarm himself years before—and the ingenious young man was "fired."

TELEGRAPHISTS' ACHIEVEMENTS.

Readers who are not telegraphists must kindly pardon us if we now sound our trumpet rather loudly, for we are proud to remember the achievements of some of our colleagues. More than one engineer-in-chief to the Post Office commenced as a dispenser of dots and dashes. The marvellous career of a former telegraphist, Major E. A. Sturman, C.B.E., Postmaster-General of the Union of South Africa, has already been outlined in the TELEGRAPH AND TELEPHONE JOURNAL. Edison was once a telegraph messenger and later an operator, and so was Andrew Carnegie. Many other American telegraphists who forsook their early calling went into business and prospered, some even joining the select body of millionaires.

It is a fact that all our national intelligence is not confined to those wonderful men who so conscientiously "mould" public opinion through the daily Press, and edit the weekly comic papers in their spare time. The Post Office can surely claim a little of the "brains," especially if these be measured by the quality of the "reasoned opinion" poured out to order daily in the newspapers, like so much rain water running off a roof!

Many plodding students in the service have employed their leisure to advantage, and we have heard of a sorting clerk and telegraphist becoming LL.D., at an Irish University. Others have graduated in Arts or taken diplomas in music. Numbers are accomplished musicians and are organists and choirmasters at various churches. Some interest themselves in literature, art and science, and it is on record that at least one former telegraphist is a Fellow of the Royal Astronomical Society. And so we could go on and fill up more valuable space than is desirable. Before leaving the subject of

telegraphists' achievements, perhaps we may be permitted to recall with pride that the present distinguished Controller of the Central Telegraph Office, Mr. John Lee, M.A., B.Com., had first-hand experience of the wonderful organisation he now so ably directs, and that he, too, was once a telegraphist,

THEN.

Yes, the service has had, and still possesses its romance. In the early days of the telegraph its first use in connexion with a case of murder led to the arrest of the criminal, and aroused considerable interest. Mr. Jermy, the Recorder of Norwich and Yarmouth, and his son, were brutally done to death by a man named Rush in 1848. The local telegraphist, Mr. Ellis Kerry, was roused from bed to send the telegram announcing the fact to the Chief Constable of Norwich, and the culprit was promptly apprehended. Rush, by the way, was a particularly callous murderer, and when his trial was over, remarked: "Give me my slippers and *The Times* newspaper."

Years afterwards, another sensational arrest of a murderer was effected by the aid of telegraphy—wireless this time—when the disguised Dr. Crippen, fleeing from justice, was brought to bay in mid-ocean.

And did we not read in the daily Press but a few days ago that several rebels rushed into the Central Telegraph Office, Dublin, and presenting revolvers at the men on duty, ordered them to put up their hands. The miscreants then attempted to destroy the apparatus, and left after sprinkling petrol on the floors and igniting it. Romantic, but decidedly unpleasant!

For many years all important news matter was telegraphed, special staffs of telegraphists often travelling to the town or villages where leading politicians made speeches, or where events of public interest were taking place. It was rather an enjoyable life for the men on the whole, but frequently the work was extremely heavy, and its prompt despatch was only made possible by the well-known *esprit de corps* of the officers of the telegraph service.

Of course, it is only natural that some mistakes should occur in handling large quantities of Press work. Mr. Albert M. Hyamson quotes two amusing instances in his interesting book, *The Humour of the Post Office*. In the course of an important speech the late Mr. Gladstone once said, referring to a member of the House, "Such is the modesty of my noble friend that he shakes his head." The last four words of the sentence were, however, telegraphed as "he shaves his head," and a leading Birmingham paper actually printed it thus. Mr. W. E. Foster, when making a speech on education, had to use the word "children" frequently, and the telegraphist tiring of the continual use of the word, substituted "kids" in one instance, thinking that his colleague at the other end of the wire would put matters right. Alas, the word "kids" was duly written as signalled, the sub-editor overlooked it, and it actually appeared in the columns of *The Times* on the following day.

It sometimes happened that members of the special staff had lively times. On the occasion of the 5th of November celebrations at Lewes 50 years ago, a Brighton telegraphist was sent to the Lewes Post Office to despatch Press telegrams to London. The crowd, observing his labours, commenced bombarding him with fireworks, with the result that half his time was spent in quenching the fires caused by the mob!

AND NOW.

Are the days of the telegraph as an instrument of public utility over? Emphatically no! As we pointed out in a previous article, the great majority of people in this country, in all probability, can never afford the luxury of a telephone installation, and they must, therefore, rely upon the telegraph for the transmission of their urgent messages. The business man, too, often wants something more tangible than a few words spoken over the "'phone," for *verba volant, scripta manent*. This being the case, and the necessity admitted, telegraph men look with something akin to envy at their fortunate brethren in the sister branch enjoying such improved "lines of communication," and a "no delay" service as make their mouths water. They are also aiming at what is, practically, a "no delay" service, for there is no efficiency without promptness, and the purpose of a telegram is usually defeated if it is delayed. This happy consummation, we suggest, is within reach if spare lines are alloted to provincial telegraph offices in the manner indicated later on.

THE CENTRAL TELEGRAPH OFFICE.

The editors of this JOURNAL welcome honest criticism, and will perhaps not be offended if we touch on a delicate subject—the Central Telegraph Office. We are all proud of TS and its wonderful record, but the majority of telegraph men—outside the C.T.O.—are at least agreed on one subject, and that is, that the largest telegraph office in the world has outgrown its strength. As the elephant cannot compete with the horse in the matter of agility, so this great institution cannot adequately respond to the calls daily made upon its vitality and resources, and overcome the inertia inseparable from its size. In a few words, it is too large—much too large—to consistently and efficiently handle the vast amount of traffic poured into it daily for transmission, by the thousand and one offices with which it is now in direct communication. Its very proportions prohibit anything approaching the speed of message transit, circulation and despatch attained at smaller offices.

The reader may naturally ask what remedy is proposed, assuming, quite properly, that the writer in a respectable journal would not entertain any idea involving bombs and arson!

Our suggestion, briefly, is this. Do not allow this wonderful institution to grow any larger, and reduce its "food supply" wherever possible, always remembering its heavy "overhead" charges and costly site. Extend the admirable Zone System, and give the larger offices the use of the spare wires, now lying idle as the result of the extension of machine telegraphy, for intercommunication purposes. This will obviate thousands of expensive transactions in the C.T.O. daily, and will be a good step towards every telegraph man's goal—the "no delay" service.

CONCLUSION.

Telegraph men throughout the country offer their respectful and sincere congratulations to Mr. R. A. Dalzell, C.B.E., on his appointment to the post of Director of Telegraphs and Telephones. They are gratified and much encouraged to read his kindly message of greeting in the TELEGRAPH AND TELEPHONE JOURNAL, and beg to assure him of their loyal support in every effort made to maintain the highest traditions of the finest telegraph service in the world.

HOW THE TELEPHONE WORKS.

BY A. CROTCH.

I.

WE shall attempt in these short articles to show, in simple language, how the speech uttered before a telephone is reproduced at a distance in a listener's ear before another telephone, the two instruments being some miles apart. As a preliminary, however, it is necessary to consider a few elementary facts of the sciences of magnetism and electricity in order to appreciate the functions of the various component parts of the telephone.

Magnetism.—The peculiar property of a magnet is that its ends have a great attraction for iron or steel; dipped in a quantity of iron tacks or filings, for instance, and then raised, a magnet will bring up a cluster sticking all round its ends. The magnet itself is a simple slip or bar of hard steel, properly magnetised, either kept straight, as a "bar-magnet," or bent round to the familiar horse-shoe shape. In the first case the ends are as far apart as is possible, in the second they are relatively close together. Each end of a bar-magnet, in turn, and the pair of the horse-shoe magnet, have the same effect on the filings, but there is a subtle difference between the two ends. To distinguish one end from the other, one is generally stamped N or otherwise marked. This is the marked end or N pole and the other the unmarked end or corresponding S pole. If we hold two horseshoe magnets of approximately the same strength near each other, the N pole of one facing the S pole of the other, but separated by half-an-inch or so, a powerful pull will be felt, and if allowed to do so the magnets will move towards each other, come in contact and stick to each other with great tenacity. If, however, we reverse one of them, so that the N pole faces the N pole of the other (and similarly with the other two poles), a new effect is manifest. Not only has the attractive force ceased between them but it has been reversed, and if the two magnets are free to move, they will push each other apart. Similar effects can be seen with a pair or more bar-magnets; the marked end of one will attract the unmarked end of another, but the marked end will repel all other marked ends, and an unmarked all unmarked ones. This is conveniently summed up in the textbooks as "unlike poles attract, like poles repel, each other."

But between either pole and soft iron we invariably get attraction only, never repulsion. The reason is as follows: As soon as a magnet approaches a piece of soft iron the latter becomes magnetised. As soon as the magnet is removed the iron loses its magnetism. This effect is termed "induction," and the iron so acted on becomes an induced magnet, entire and complete, with an N and an S pole. The best way to see this is to use a bar-magnet and a smaller bar of iron. When the N pole of the magnet is brought near the iron (not touching) an S pole will be produced at the near end and an N at the far end of the latter. Two unlike poles thus facing each other, attraction follows. When the magnet is removed, the iron reverts to its original state. If now the S magnet pole

be brought near the bar the latter will again be magnetised, but in an opposite sense, *i.e.*, an N pole will be formed at the near end and an S at the far end. Two unlike poles therefore again face each other and attraction ensues. Hence the reason for the constant attraction of iron by either pole is that opposite polarity is always set up by the inducing magnet.

If we use a small bar of very hard steel instead of soft iron, it is but little affected by the presence of a magnet. That is, it will not respond, except in a very slight degree. But whatever effect has been produced will remain when the magnet has been removed. By suitably stroking or rubbing the steel with a magnet the bar can be magnetised, and this magnetism will remain and the steel will become, in its degree, a magnet.

Magnetism is inherent in iron and steel. The softest iron responds at once to a magnetising force, but immediately returns to its inert state when that force is removed. That is, the magnetic effects are temporary. To evoke the magnetism of hard steel is difficult, but once evoked, it remains. For making permanent magnets, then, the hardest steel is used, but for temporary ones the softest iron.

Electro-Magnetism.—Whenever an electric current flows, magnetism is always set up. Perhaps the simplest manifestation of this is to wind a length of, say, copper wire round a soft iron bar. The wire must of course be covered with enamel, silk or other insulating material to prevent metallic contact between the turns. When a current of suitable strength is passed through the wire, the bar becomes a magnet, one end an N and the other an S pole. If the direction of the current be reversed, the polarity will likewise be reversed, and when the current is cut off, the magnetism disappears. This constitutes an electro-magnet. A simple illustration of this is seen in the ordinary electric (trembler) bell. Here we have an electro-magnet consisting of two cylindrical soft iron "cores," surrounded with insulated wire. At one end the cores are connected together by a yoke of soft iron, together forming a horseshoe electro-magnet. A soft iron armature is hinged over the free ends (poles) of the electro-magnet and is normally kept off them and against a contact screw by means of a spring. When the circuit is completed by the depression of the press button, the current flows through the coils, magnetising the cores and attracting the armature. This movement of the armature breaks the circuit at the contact screw, the magnetism dies out of the cores and the armature, ceasing to be attracted, returns to the contact screw, re-establishing the circuit, when the cycle is gone through again.

Electricity.—One of the most familiar sources of electricity is the common Leclanché battery of one or more cells. A plate of carbon is placed in a cylinder of unglazed earthenware (the "porous

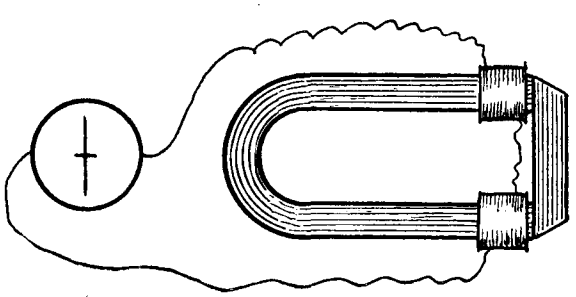

FIG. 1.

pot") and surrounded with broken carbon and manganese dioxide—in recent practice these two materials are reduced to powder and well rammed down in the pot. Outside the pot a cylinder or rod of zinc stands in a solution of sal-ammoniac, and the whole enclosed in a glass or stoneware jar. A brass screw on the carbon and the bare end of the connecting wire on the zinc form the terminals of the cell, and when these are joined together by a conducting wire chemical action is set up, the sal-ammoniac eats away the zinc and hydrogen is set free at the carbon plate. The manganese dioxide is rich in oxygen and this engages with the hydrogen, forming water. This chemical action causes a current of electricity to pass through the wire which connects together the terminals of the cell.

The dry cell now in such common use is practically a Leclanché—having the materials of the cell made up in a moist paste instead of liquid form.

When the terminals of the cell are connected together by conducting wire there is set up a "circuit," round which the current flows. The latter is assumed to pass from the terminal on the carbon, round the circuit, and back to the zinc terminal. In practice the circuit consists of the coils of instruments, the line wire, &c., and this must be complete before the current can pass. If it is severed, even by the slightest break, the current ceases.

The current passing through the circuit will be large or small as the path open to it gives greater or smaller facilities. That is, if we use a copper wire, six inches long, the current will be greater than if we use a similar copper wire a thousand yards long. The current will have greater difficulty in "getting through" the long

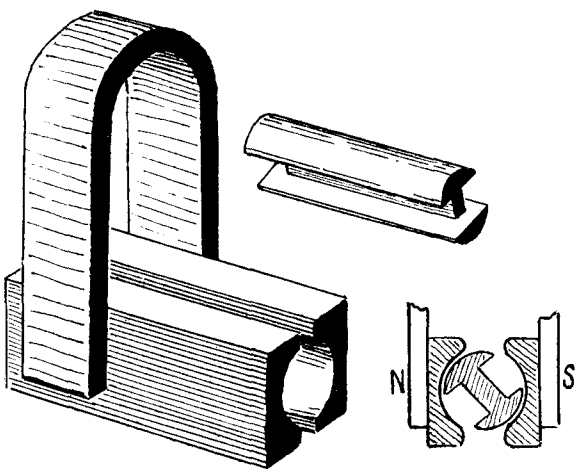

FIG. 2.

wire than through the short. In text book language we say that the "resistance" of the short wire is less than that of the long. We speak of the metals as good conductors; this means that their resistance is very low. Also of silk, gutta percha, &c., as good insulators: in other words their resistance is exceedingly high.

Magneto-Electricity.—We have seen that magnetism can be produced by electricity—by passing an electric current through a coil of wire wound over a soft iron bar. The converse is also true, that electricity can be produced by means of magnets. Imagine a horseshoe permanent magnet, with its keeper or armature lying across the poles. The lines-of-force of the magnet pass from one pole to the other through the mass of the keeper. If we pull the keeper off, the lines have to pass through the air in the journey from pole to pole. In taking off the keeper and putting it on we cause a rearrangement, a fresh distribution of the lines, and this rearrangement, under suitable conditions, will set up short, momentary currents. Imagine a coil of fine insulated wire to be wound over each of the poles and connected up to a suitable galvanometer, as in Fig. 1. If the keeper be wrenched off quickly—the sharper the better—the lines-of-force, in rearranging themselves, "cut" the wires of the coils and a momentary "flick" of current passes through the circuit thus set up. On sharply replacing the keeper, the lines are again disturbed, and another flick of current traverses the circuit in the opposite direction to the first, as will be seen by the deflection of the galvanometer. In small "medical" machines an armature is revolved across the pole pieces of a permanent magnet thus furnished with coils and this sets up a stream of momentary currents in alternate directions.

The principle, thus illustrated, of magneto-electricity, or the production of electricity by means of magnets, is of great importance.

The generator, so universally employed in "ringing up" is based on this principle, as indicated in Fig. 2. Two long pole-pieces of soft iron form a kind of tunnel and on their outer surfaces several

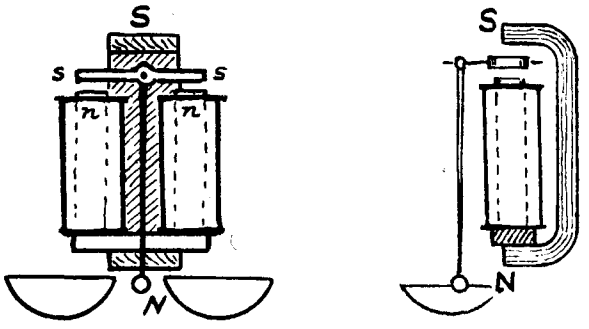

FIG. 3.

permanent magnets are fixed (one only of which is shown) so that between the inner faces of the incomplete tunnel there is a strong magnetic field. Running in this is the well-known shuttle armature, which would be a solid cylinder but for the deep channel cut quite round it. In this channel the wire is wound and the ends brought out by suitable means. When the armature is lying across the field —the position it naturally takes up when left to itself—it may be regarded as equivalent to a magnet with keeper *on*; when at right angles to this, as having the keeper *off*. Any change results in a redistribution of the lines of force and the generation of a momentary current or impulse.

The bell rung by these alternating currents is a polarised one, its general arrangement being as shown in Fig. 3. A permanent magnet is so placed that one pole is fastened to the yoke of the electro-magnet, thus making both poles of the latter N poles. The other end is near the centre of the armature thus inducing S polarity in both its ends. When a pulsation of current in one direction passes through the coils the existing polarity of one pole of the electro-magnet is increased in strength while the other is diminished or reversed and the armature moves in one direction. The next impulse being in the opposite direction, opposite polarity is produced and the movement of the armature is reversed. The trembler bell previously referred to is a non-polarised instrument, it being quite immaterial what polarity is developed by the current. Any reversal of the latter results in the attraction of the armature as before.

(To be continued.)

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE number of telephone stations, exchange and private, on the Post Office system at July 31, 1922, was 994,103 (these figures, of course, exclude the 19,000 telephones transferred to the Irish Free State), the number of stations added during July being 3,362 (net). These stations were connected with 3,083 exchanges and there were in addition 30 purely Trunk Exchanges. The number of public call offices in use at the end of July was 15,667, the rate of growth being nearly 100 a month. Considerable progress is being made with the construction of street kiosks, the total number now installed being 317 as compared with 227 in March last year. The use of rural party lines is extending rapidly, the total number of subscribers at the end of July being 4,671 or nearly double the number connected a year ago.

The local traffic (calling rate) during the first four months of the current financial year has been practically the same as during the corresponding period of last year, and the latest returns show no sign of an immediate improvement. The London figures by themselves show a slight increase and the Provinces a decrease.

The use of the Trunk system steadily but slowly increased between December and May last when the number of calls made reached high-water mark since the new charges came into force. Since then the traffic has fallen off slightly. The reduced charges for afternoon calls which came into operation on July 1 do not appear to have affected the number of calls made or the incidence of the traffic to any appreciable extent at present.

Since April 1 of this year considerable progress has been made in development of the local exchange system. Among the more important new exchanges opened are the following:—

London Area.—Maryland (Stratford), Tottenham, Sidcup, Wembley, Barnet, Maida Vale (Kilburn).

Provinces.—Giffnock (Glasgow), Falkirk, Cambuslang, Canterbury, Fleetwood (Automatic), Dunfermline.

The following important exchanges have been extended:—

London Area.—Streatham, Bromley, East Ham, Walthamstow, East, Richmond, Romford, Hop, Ilford.

Provinces.—Glasgow Central, Blackpool, Stockport, Nottingham, Birmingham, Victoria.

Considerable additions to the main underground Trunk system have been completed and brought into use as follows:—

Underground cable between London and Manchester.
" " " Cardiff and Port Talbot.
" " " Widnes and Runcorn.
" " " Preston and Blackpool.
" " " Paisley and Greenock.
" " " Hunton Bridge and Berkhamsted.
" " " London and Watford.
" " " London, Colchester and Ipswich.
" " " London, Hatfield and Welwyn.

Submarine cable between England and Holland, affording communication between London, The Hague, Amsterdam, and Rotterdam.

In addition to the foregoing, 41 new overhead Trunk circuits have been completed and brought into use during the current financial year.

TELEGRAPHS.

The telegraph traffic during the three months ended June 30 last amounted to 18,733,000 messages as compared with 18,837,000 messages during the corresponding period last year. Last year's figures, however, include the traffic in that part of Ireland which has since become the Irish Free State. No particulars are available to show the precise amount of this traffic, but, if reasonable allowance is made for it, there is evidence of a satisfactory increase in the traffic in Great Britain and Northern Ireland as compared with last year.

Noteworthy progress has been made recently with "Baudot" working, the following inland circuits having been equipped for Baudot working since January, 1922:—

Circuits.

1. London to Southend.
2. Liverpool to Blackpool.
3. Liverpool to Belfast.
4. London to Bradford (shortly to be extended to Newcastle-on-Tyne).
5. Liverpool to Douglas (Isle of Man).
6. Hastings—London—Tunbridge Wells.
7. Glasgow to Belfast.
8. London to Eastbourne.
9. London—Exeter—Plymouth.

Prior to the Hastings—London—Tunbridge Wells installation (item 6) the Manchester—Leeds—Newcastle-on-Tyne route was the only route equipped for "divided" Baudot working. Considerable development is anticipated in this method of working.

There are now 49 Inland Baudot circuits and 40 of these have been installed since August 1917.

The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. OCTOBER, 1922. No. 91.

THE TELEGRAPH ZONE SYSTEM.

AN agricultural expert asked by the United States Government to give a report on the harvest in Eastern Europe has declared that owing to the break up of the large estates into small farms there has been a notable decline in the use of agricultural machinery. This has affected the efficiency of the harvest as a whole, but it is to be remembered, says the expert, that the remunerative use of costly machinery cannot be secured on a small scale. We are reminded of this report by reading Mr. Skinner's admirable article which appears in this issue. We do not set out to controvert that article, but there are some points which we can put in rather a different light. At the outset the whole telegraph position in this country is changed by the fact that eight channels, and in some cases ten and even twelve channels, each of them much more productive than the simple single Morse channel, can be equipped on one wire. In earlier days with uniform Morse working it always seemed to be sound to perform transmissions at the smallest offices possible. The Morse operation at the small office corresponded closely to the Morse operation at the large office, and as the various costs were less it was more economic to have many cross-country wires and to perform the act of transmission at the smaller office. With the newer machines the whole outlook has changed. The transmission of telegrams at intermediate points, so far as plant is concerned, becomes a by-product and it fits in with the traffic strictly appropriate to a heavy route, in itself insufficient to fill one of these great multiplexes. Thus as regards plant at any rate the advantage is obvious. As regards the labour of transmission, without going into very precise figures, it is equally obvious that the output is so much more than Morse that the cost of individual transmission is very perceptibly reduced. It is on this basis that the zone system finds its place. There is less necessity for many routes; there is less necessity for cross-country routes. Wires which in themselves carry less than the potential load of a full Multiplex are difficult to justify.

And then there is the question of London. It should always be remembered that London is the capital of this country in an inclusive sense which applies to no other capital. It is the legal, the legislative, the shipping, the engineering, the commercial, the financial, the social, the literary and the artistic capital of the whole country. If there are large Multiplexes anywhere they will have to be to London. Whether we like it or not, of its essence the telegraph system will be a radial system having London as its centre. Other countries have attempted by strictly legal means to prevent this state of affairs from happening. Washington was founded with the direct object of preventing the financial capital from also being the legislative capital; we apprehend that Boston would regard itself as the literary and artistic capital; that Chicago would pride itself on being the food-stuff capital; that Detroit has its own claims as regards motor cars. The centralisation of Paris, just as we write, is the subject of grave concern to some economic writers in France who are urging that a deliberate policy should be adopted under a guise of local government to encourage Marseilles on the one hand, and Lille on the other hand, to have local powers for the development of their predominant characteristics. The arguments as regards a capital for Australia will be fresh in all people's minds. Coming back to London we are face to face with an accomplished fact. Having in mind the narrower realm of telegraphs let us say that the amount of transmitted traffic in London after all is but a small proportion of the traffic which is to and from London itself. As far as we are aware, therefore, there is no intention whatever of inflating the Central Telegraph Office. Mr. Skinner is unnecessarily anxious and he must not think for a moment that his criticism is resented. He does well in urging arguments from his own point of view, for it is only by that means that ultimate wisdom can be assured.

Someday the inter-connexion of channels of multiplexes to provide direct transit will change the problem again. When that day comes it must find us all equally as open-minded to change, for it will resolve itself into an issue between the extension of multiplex channels, with the consequent narrowing of the range of the remaining multiplex channels on the one hand and transmission at a distant point on the other hand, and it may be that present policies will be modified. There is always a subtle misunderstanding ready to assail us. It is to mistake improvement for finality. The truth is that we have to make the very best of the possibilities of science as they have been given to us, always keeping ourselves ready for still further advances. A no-delay service is a healthy ideal, but some of us, while yielding to no one in a desire for promptness, are not disposed to forget that if we can do something to make the telegraph service in the eyes of England more nearly remunerative we are conferring the best of all favours on the telegraph service of the present and future.

HIC ET UBIQUE.

THE total number of telephones in the British Isles is at present (July 31) 1,029,500. At the beginning of this year the United States had 13,975,000 telephones, Germany 1,948,624, and Great Britain and Ireland 997,805. Canada would come next on the list, but figures are not yet available, followed by France with 488,818 and Sweden with 387,337. These are the six largest telephone systems in the world. Amongst cities, New York had 979,534 telephones, Chicago 605,495, Greater Berlin 347,735, the London Telephone area 345,797, Boston 313,295, Philadelphia 233,122 (Bell system only), and Paris 173,000; then follow San Francisco, Los Angeles, Detroit and Cleveland each with over 150,000 telephones.

IN May last Lady Ozanne opened a new switchboard at St. Sampsons, Guernsey, the second largest exchange in the island. At that time the States system comprised 2,816 telephones or one to every 13.2 people, and to every 6.4 males. It is hoped to reach a figure of 3,000 stations by the end of the year.

THE Exchange Telegraph states that the telephone tariff in Copenhagen is being reduced by about 10 per cent., from 150 kroner to 136 kroner per annum for 1,000 calls, and 300 kroner to 270 kroner for the unlimited service. In the provincial towns of Zealand the charge is reduced from 100 kroner to 90, and in rural areas from 90 to 70 kroner. Distance charges are also reduced proportionately. We presume that by "unlimited service" is intended the rate including 5,500 free outward calls.

WE have received the report of the Posts and Telegraphs Department of the Federated Malay States for 1921, showing that there were 2,389 miles of telegraph and telephone line at that date, and 16,369 miles of wire. There were 2,898 telephones, including extensions.

FROM an American journal:

"As a result of caring for the 500,000 pound 40-year bond issue of the Jutland Telephone Co., English interests are slated to get the first crack at the equipment needs of the Jutland company, for which the bond money is to be spent."

We don't care for the English of the above, but if any reader gets first crack at an accurate translation, we shan't slate him.

THE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

PROGRAMME, 1922-23.

THE meetings will be held at the Institute of Electrical Engineers, Victoria Embankment, and the following papers will be read:—

Date.	*Subject.*
Oct. 16, 1922.—	"Some Remarks on Technique," by Sir Henry Bunbury, K.C.B.
Nov. 20, 1922.—	"Whitleyism and Control," by Mr. J. W. Bowen.
Dec. 18, 1922.—	"The Anglo-Continental Telegraph Service since the War," by Mr. J. J. Tyrrell.
Jan. 15, 1923.—	"Some Aspects of the Communication Act," by Mr. F. Gill.
Feb. 19, 1923.—	"The Great Slump in Prices: its causes, its course and its limits," by Mr. G. F. Mansbridge.
Mar. 19, 1923.—	"Studies in Financial Administration," by Mr. F. C. Cook.
April 16, 1923.—	"Progress in Wireless," by Mr. S. E. J. Burrow.

The meetings commence at 5.30 p.m.

TELEGRAPHIC MEMORABILIA.

THE C.T.O. has again been favoured with a visit from yet another foreign delegation in the persons of the highly-placed body appointed by the Italian Telegraph Administration to examine the various wireless and submarine cable systems as mentioned in this column last month. The delegation was headed by *Direttore* Angelini and was represented by both administrative and technical experts. All were much interested in the many evidences of good orgnisation and the desire to test-out the most modern telegraph inventions available. One is so used to the constant adverse criticism of our compatriots, who fear to flatter lest we should slacken in endeavour, that it comes as a refresher to listen to the kindly comments of distinguished colleagues from abroad who visit us from time to time. Making due allowance for the usual international courtesies on such occasions, it is gratifying to find that there is still a genuine admiration of the British telegraph system. The writer has recently had the good fortune to come into very close contact with expert representatives from three continental countries. The members of all three spontaneously expressed the freedom with which every item that could possibly help or instruct was laid before them, and the pains taken to give exact data. Two of these delegations specially remarked on the "magnificent organisation," both used the same term, and both emphasised the impression which a prolonged stay in the C.T.O. had made upon them, that, "everything moves and works smoothly without excitement!"

Coming on top of these tributes has recently arrived the crowning glory in a most generous appreciation of the work of the C.T.O., and Leafield Wireless by certain American newspaper proprietors, who, through their secretary, have brought blushes to the cheeks of all concerned by their praise of the C.T.O.—Leafield—Halifax radio service. We cannot, however, accept the whole of this welcome appreciation without reverting to the excellent co-operation received from the Canadian side day after day, without which our utmost efforts would be of no avail.

It appears that I have omitted to make any mention of the establishment, some time ago of the wireless communication between Norway and the United States. The radio post in the former country is at Stavanger and that in the latter is situated near New York. Both posts have been erected by the Radio Corporation of New York.

The same Corporation has also received the contract from the Swedish Telegraph Board for the delivery of wireless equipment for a large station to be erected on the West Coast of Sweden. The *Daily Telegraph* adds to the above information, furnished by Reuter's agency, the interesting detail that one transmitting and one receiving station is to be erected, the former at some point between Varberg and Falkenberg and the latter near Kungsbacka. They are to be finished during next year. It is apparently expected that the rates will be considerably lower than the present charges *via* Norway.

According to the *Financial Times* the Portuguese Government has or is about to sign a contract with the Marconi Company for the exclusive right to establish wireless stations in Lisbon, Madeira, the Portuguese African Colonies and the Azores for a period of 40 years.

The following paragraph lifted in its entirety from the *Electrical Review* on "International Progress in *Wireless Telegraphy*" signalises the wireless international developments of the last thirteen years:—

> "The progress of international wireless telegraphy is shown by the fact that, since June, 1908, the date of the formation of the Union Radiotélégraphique, the number of shore stations has risen from 76 to 977, and other stations from 246 to 12,622. All the countries of the world are now signatories of the Union Convention save Argentina, Persia, and Turkey. Among the signatories are Czecho-Slovakia and Venezuela (in 1920), Serbia, Croatia and Slovakia (in 1919), the Republics of Ecuador and China (in 1920), and Poland and Dantzig (in 1921). Albania has this year announced its adherence."

On the recent occasion when at a joint meeting of the Institute of Radio Engineers and the New York section of the A.I.E.E., Senatore Marconi was presented with the Medal of Honour of the first-named society as "a pioneer of pre-eminent standing in the radio field," the well-known inventor gave a paper on "Radio Telegraphy," from which the following is culled from among many other interesting items and will doubtless interest many of our readers. The results obtained at receiving observation points situated in various parts of the world far distant show that it has been ascertained that "radio signals arriving from high-power stations situated at or near the antipodes of the observation stations, reach the receivers by various ways around the earth, not always following the shortest great circle route, and also that at such places the electric waves coming round by different ways do in certain cases increase this effect on the receivers whilst in others interfere with each other. Apparently transmission is easier from west to east than from east to west, and it may be necessary to modify somewhat the transmission formula for long distances. It has also been ascertained that the most troublesome atmospheric disturbances or static usually come from the continents, and not from the oceans."

Direct wireless communication between France and New York was established at midnight on Aug. 6 by means of the wireless station at Saint-Assise. The new station is situated near Melun, not far from the Forest of Fontainebleau. The installation is 50 per cent. more powerful than that of Bordeaux. Three new sets of apparatus are shortly to be erected at

the Saint-Assise station, which will then be four times more powerful than the Bordeaux station and 35 times more powerful than the Eiffel Tower station. This station will in future carry on all wireless communication between France and America, and is worked from Paris by means of the long-distance control system. Direct communication has already been established with Argentina and China. Another development of wireless telegraphy in France is the inauguration of direct communication between Bordeaux and Saigon, with a tariff over 2 fr. a word cheaper than the ordinary cable rates. The next step is to be the equipment of six colonial stations for transmission, which at present can only *receive* messages, at Martinique, Guinea, Rufisque, in West Africa, Djibouti, in East Africa, Brazzaville, in Equatorial Africa, and Tananarivo, in Meridional Africa. This work completed, it is proposed to construct, probably in 1926, two stations in the Pacific, which will complete the chain of communication linking up France and her colonies.

The *Shanghai British Chamber of Commerce Journal* states that the new wireless station at Liushutun (across the bay to the north of Dairen), the construction of which was commenced last year, was to be opened for public use last month. The total cost has been about £30,000. The installation consists of three steel masts, each 300 feet high. The method of transmission adopted is that of the Tokio Teishinsho (Department of Communications) and consists of a quenched-spark converter of 7 kilowatts, and an arc converter of 35 kilowatts. By using the latter it is stated that it will be possible to converse direct with Europe and the United States. The power is to be supplied by the new South Manchuria Railway Co.'s power house near Dairen, but as this is not quite ready some of the power is being obtained from Chinchow for the time being.

The steam trials of the New German cable steamer *Norderney* were carried out during the month of August at Wilhelmshaven and according to the *Taegliche Rundschau* were quite successful. Her displacement is 2,000 tons, speed 10 knots and her cable-carrying capacity about 1,000 tons. She is of course fitted with wireless apparatus and also apparatus for submarine signalling, and was built to replace one of the cable steamers surrendered to the Allies. It will be seen that the *Norderney* is considerably smaller than the *Stephan*, the German cable ship which laid the Mundesley-Norderney cable in 1913, which was with the exception of the British C.S. *Faraday*, the largest cable steamer in the world. The *Stephan*, named after the first Postmaster-General of Germany, could carry in her four cable-tanks no less than 5,000 tons of submarine cable.

During the month of August an event occurred in the telegraph world which appears to have failed to strike the imagination of Fleet Street reporters. Who would have imagined in 1903 the establishment of telegraphic communication between "The Forbidden City" and India? An ever watchful correspondent of mine *à propos* of the opening of the Lhassa-Simla telegraph circuit reminds us of the message of the Dalai Lama of Tibet to the Younghusband Mission in that year, "We cannot accept letters; we cannot write letters; we cannot let you into our zone." Contrast with this the message of greeting and thanks which the present Lama signalled over this line at its inauguration. The construction was carried out by the staff of the Indian Post Office, the whole distance between Gyangste and Lhassa being completed under two months.

The forecast that the Miami cable dispute showed signs of coming to a satisfactory termination has proved correct. Following on the signing of a decree by President Harding authorising the Western Union Telegraph Co. to operate the Miami-Bahamas cable, which will thus give direct connexion between the Western Telegraph line with the United States, the Western Telegraph Co. on the seventh of last month opened a new direct cable route between Brazil and the U.S.A.

A recapitulation of the history of this two years' controversy may not be out of place. In as condensed a form as possible it is that the Western Telegraph Co, a British company, not to be confused with the Western Union Telegraph Co., held a monopoly of inter-port telegraph communication in Brazil and preferential rights in the Argentine. The all-America Cables, Incorporated, had a monopoly of privileges on the west coast of South America. In 1921 the U.S. Government refused to allow the Western Union Telegraph Co., to land a cable at Miami, Florida, from the Bahamas, on the ground that cable traffic from the United States could be sent by way of the Bahamas and Barbados over the British monopoly cable to South America.

The State Department at Washington then proposed that the monopolies held by the British and American companies on the east and west coasts of South America respectively should be waived, on condition that acquiescence of the South American Governments concerned should be obtained. This was agreed to some time during the month of August, and with commendable promptitude presidential action set its seal thereto.

The Spanish Government have recently laid the following new cables to the Balearic Islands:—

(1) Single conductor, 10 nauts from Punta Salinas, Mallorca, to Cala Gandus, Cabrera Is.

(2) Single conductor, 34 nauts from Plana de Salinas, Ibiza Is., to Playa de la Sabina, Formentera.

The Western Telegraph Co. announces the laying and re-allocation of cables as follows:—

New cables.—Single conductor, 1,792 km. Pernambuco to Maranham. Single conductor, 326 km. Pernambuco to Maceio and a third cable of 377 km. between Santos and Rio de Janeiro.

Re-allocations.—The two old direct cables between Bahia and Rio de Janeiro have been divided, and the four ends landed at Victoria (Brazil), forming Bahia-Victoria (Nos. 1 and 2) and Rio de Janeiro-Victoria (Nos. 1 and 2), giving average lengths on the two respective sections of 946 and 351 kilometres.

As showing the world-wide activities of submarine cable developments, one need only add the following few items to complete this month's story. The Eastern Telegraph Co. proposes to lay submarine cables between Aden and Seychelles Islands and between the Seychelles and Colombo, continuing the connexion by another section from Colombo to Singapore. A sixth cable will also be laid very shortly between Malta and Alexandria and an additional Red Sea cable between Suez-Port Sudan and Aden.

As programmed the All-America Cables has opened a new cable for public traffic between Colon and Port Limon, and the Commercial Cable Co. has acquired the cable between Canso, Nova Scotia, and Port-aux-Basques, Newfoundland.

Hearty congratulations to Mr. Offord upon his appointment as Assistant Controller, C.T.O., and to the various other gentlemen, whose names appeared in the recent C.T.O. lists (Inland and Foreign) under their respective headings of Superintendents (H. and L.), Assistant Superintendents and Overseers.

The New Series of the *Cable Room Monthly* is keeping up the high standard promised in No. 1. and even apart from matters of purely local interest is well worth the money. The historic article, "Lead on Signals!" deserves a wider audience than the C.R.M. could possibly be expected to give.

It is reported that the following worthy pensioners have been seen in or near G.P.O. West, anyway within 12 miles of Charing Cross, and that quite recently, and all looked wonderfully well.

Sir William Slingo, Sir Alexander King, Mr. A. Tapley, Mr. H. Vandermeulen, Mr. McEwan, and Mr. Harry Crofts.

We regret to note that Mr. West, late Superintendent of the Cable Room, passed away about the middle of August after a short illness. It seems only a short time ago that he quitted the Service on pension apparently with every prospect of a lengthy retirement. He will best be remembered by his wonderful vivacity and his keen sense of the humorous. R.I.P.

Although it is something like fifteen years since Mr. H. Blandford, Assistant Superintendent, retired from the Foreign Telegraphs, his many friends will learn with the keenest sympathy for those whom he has left behind, that he too has passed over. Few probably even of those who were intimately acquainted with "Harry," were aware of the stormy and stressful periods of his life, so well did he hide his troubles behind a cheerful disposition. A devoted husband, father and friend, bereavement, sickness and finally, the war wore down even his buoyant nature.

A personal word of regret is due from the writer for failure to detect a misprint in the reproduction of the article on the North Walsham Repeater Office last month where the name of the officer in charge there appeared as Farrow instead of Farrar. Mr. Farrar's name is so well known that there is really no excuse which could legitimately be submitted in my defence.

At the end of July a letter was received from a correspondent in the C.T.O. and has only quite recently been placed in my hands. The signature is not easily decipherable, and is apparently written by a lady. It is in bantering tone but with not the slightest trace of bitterness or unkindliness. Its theme is a comparison of telephone supervisors with telegraph supervisors, and if only for its happy manner of voicing a grievance we should much have liked to publish it *in extenso*, but find that the subject is scarcely within the scope of this JOURNAL's mission. In these days of journalistic specialisation it is found that trespasses into other preserves are by no means appreciated.

Colour and the Artist.—The finer the eye for colour the less it will require to gratify it intensely. But that little must be supremely good and pure as the finest notes of a great singer which are so near to silence. And a great colourist will make even the absence of colour lovely, as the fading of the perfect voice makes silence sacred.—*Ruskin.*

J. J. T.

ROCHDALE TELEPHONE DISTRICT.

A TENNIS and a bowling tournament for prizes offered by the District Manager, Mr. J. T. Whitelaw, was concluded on Sept. 8, when the District Manager, before a gathering of the whole of the staffs, presented the prizes to the successful competitors.

The tennis tournament was confined to the lady members of the staff and was won by Miss E. M. Collins of the Trunk Fees Section, her opponent in the final being Miss J. E. Eckersley of the same department. Mr. S. P. Wilson, Contract Office, was successful in the bowling handicap, defeating Mr. R. Cleland of the Accounting Section. The prizes were much appreciated by the recipients and in the course of the proceedings, Mr. Audsley, Traffic Superintendent, spoke of the beneficial results accruing to the staff by this friendly rivalry in games.

LONDON ENGINEERING DISTRICT NOTES.

New Cable to Watford.

THE completion has just been effected of a new cable connecting Watford to the Toll and Trunk Exchanges. The cable contains 160 pairs of wires, each wire weighing 40 lbs. per mile. The cable has loading coils inserted at intervals of 1.6 miles, the added inductance amounting to 175 millihenries per mile. Every pair of wires has been carefully balanced for electro-static capacity against other pairs, and there should be a minimum of cross-talk on the physical and superposed circuits The whole of the work of cabling, *jointing and balancing and testing was carried out by the London District* staff.

Barnet New Exchange.

On Aug. 31 a new exchange of the C.B. No. 1 type was opened at Barnet in replacement of a board of the No. 9 type which existed on the same site. In order to accommodate the new exchange it was necessary to enlarge the building. The new exchange has a multiple capacity of 1,700, and is equipped for 1,600 lines.

At the transfer the number of working subscribers' lines was 798 and the junctions numbered 118.

New Wembley Exchange.

The new Wembley Exchange was opened on Aug. 16, with 285 lines and 95 junctions. The exchange is situated in a new building which has been specially constructed for the purpose in the telephone centre of Wembley. Before the opening of the new exchange the subscribers had been accommodated on a suite of sections in the Willesden Exchange, and the cable plant, which had been provided between Wembley and Willesden was used to its full capacity for the purpose of giving service to subscribers. As this plant was required to provide junctions for the new exchange, considerable ingenuity and careful arrangement was required on the part of the external and internal engineers to ensure that a continuous service should be provided during the period of transfer.

The equipment consists of :—

7 "A" positions.
3 jack-ended junction positions.
3 plug-ended junction positions.
1 testing operator's position.
1,200 multipled jacks.
1,100 local jacks.

together with the usual accessories.

The exchange was opened quite free from faults.

Maida Vale Exchange.

This exchange which was opened early in September has been provided *primarily in order to give much needed relief to the Hampstead* Exchange. It is of the No. 10 type and is situated in a building which was originally the Kilburn Fire Brigade Station. All the installation work has been carried out by the Sectional Engineer with his own staff and the workmanship will compare favourably with that in any other London Exchange. The installation was effected under many difficulties, owing to the occurrence of strikes at manufacturers' works which caused delay in the supply of material, but nevertheless by making suitable arrangements it was possible to keep to the time table. The total number of subscribers transferred from other exchanges is 846, and the number of junctions provided is 162. The nominal capacity of the exchange is for 2,000 subscribers. Sufficient space is available at the rear of the existing building to enable a larger exchange to be erected in due course.

Toll Exchange.

The radius served by the Toll Exchange has been increased and 97 circuits serving towns as far away as Brighton, Chelmsford, Guildford, Tunbridge Wells, &c., are now being diverted to this exchange. This has involved the provision of an additional junction cable to Gerrard, which is now proceeding.

Lighting of Post Office Buildings.

Some interesting experiments are being carried out by the National Physical Laboratory Committee on the lighting of public buildings. An experimental building has been erected at Teddington and will be used for investigating the various problems in connexion with the lighting of public offices including Post Offices. The Post Office Engineering Department is represented on this Committee.

Telegraph Improvements.

It is the writer's privilege from time to time to meet, on the bowling *greens around London, certain hale and hearty veterans of the C.T.O.*, who were giants in the days when practically all telegraph messages were signalled in Morse characters by hand, with occasional resort to Wheatstone working. If any of these gentlemen ever visit the scenes of their former labours, they must feel some astonishment at the rapidity with which changes are being effected. For instance, during the last financial year two Morse keyboard perforators of the Gell type, each capable of producing four slips simultaneously were installed. A newly-designed electrically-driven Creed set was placed on trial, the chief advantage of the new set being the replacement of pneumatic by electric power.

Considerable extensions have been made in the use of Baudot sets. Quadruplex duplex sets were fitted on circuits to important provincial towns, and the total number of circuits of this type was thus brought up to 61, giving 432 channels. A number of triplex duplex and double duplex sets were fitted on foreign circuits working to Amsterdam, Marseilles, Berlin, Hamburg, Frankfurt, Rotterdam and Brussels.

A few of the other innovations to be found working are the Baudot keyboard perforators of the Booth-Willmot pattern ; the Baudot re-transmitters ; a device for printing automatically a heading to the messages received on the Western Electric Multiplex ; the addition of Western Electric keyboard perforators and transmitters to the Murray duplex multiplex apparatus, thus making uniform the method of transmission ; the replacement of Baudot receivers by Kleinschmit printers, thus giving page form reception ; the addition of devices to the Siemens high-speed apparatus which has increased the rate of working by 50 per cent. ; the Morkrum Teletype, described by our American friends as the "Ford" of machine telegraphs, and the extended use of vibrating relays.

New devices have also been applied to the Imperial Cable with a consequent increase in the speed of working, and means have been found for converting the syphon recorder signals into printed characters. The list might be extended, but sufficient indication has been given of the advances that are being made.

A close examination of the improvements just referred to shows a marvellous adaptation of the most recent discoveries in science. For instance, the three-electrode valve had hardly emerged from the laboratory before it was seized upon by the telegraph engineer as a possible means of reinforcing the weak signals received over a long cable. One is tempted to enthuse over the subject, but is sobered by the reflection that Miss Dorothy Turner and her friends will point the finger of scorn at this column and say "Those technical fiends just drive us crazy.". Well, we will refrain, but we should like to assure them that those who write notes on technical subjects are not altogether as dry as dust. We have other moods when we enjoy the things that they enjoy, and therefore we are looking forward with great pleasure to the notes that the Editress supplies each month. We hope Miss Turner's colleagues will respond to her appeal and give us dainty fare.

Amateur Wireless.

The tide of enthusiasm among the London Engineering District staff is still rising and is now getting beyond a joke. There was a time when it was possible to get away from technical matters for half an hour, and to talk about ordinary daily affairs during the luncheon interval. Now, however, the conversation is monopolised by the wireless terror who describes in detail the apparatus made out of a clothes-post, fencing wire, seven hairpins, a garter, a bell coil and a Brasso tin. Mouthfuls of food are impatiently bolted in order to tell a bigger one about the message received from Paris, or the heavenly music heard on the preceding evening. In many instances, the only justification for the use of the word "heavenly" is that the noise is certainly unearthly. Serious consideration is being given to a suggestion that in addition to a tax for the benefit of the broadcasting firms, the Postmaster-General shall be asked to put a tax on wireless gossip, the proceeds to be given to the Children's Country Holiday Fund.

It is noted with regret that the series of articles on Wireless Telegraphy has now come to an end. The thanks of readers are due to Mr. Addey for employing his valuable time in setting out so clearly the principles and practice relating to this fascinating subject. Mr. Addey will be glad to know that *his articles have been eagerly read by many members of the London* Engineering District staff.

Age Ripeneth Experience.

The late Engineer-in-Chief on several occasions expressed the view that in the early years of his career, an engineer should have a high percentage of technical knowledge and that as he progressed in years and position other *qualifications would, of necessity, rank first in importance. In light of Sir W.* Noble's expression of opinion, the following extract from Rose Macauley's book, *Dangerous Ages*, is interesting :—

> "If you have broken off your studies at the age of 21, and resume them at 43, you will find them a considerable tougher job than you found them 22 years before. Youth is the time to read for examinations; youth is used to such foolishness and takes it lightly in its stride. At 30, you may be and probably are *much cleverer than you were at* 20; you will have more ideas and better ones and infinitely more power of original and creative thought, but you will not probably find it easy to grip and retain knowledge out of books and reproduce it to order. So the world has ordained that youth shall spend laborious days in doing this and that middle age shall, in the main, put away these childish things and act and work on, or in spite of, the information thus acquired."

The winter session will begin shortly at the London Polytechnics and the younger members of the staff are reminded of the advantages to be gained by making use of the facilities afforded for gaining technical knowledge which is bound to stand them in good stead in their official lives.

Telephone Engineers to the Fore.

Attention has already been drawn to the election of Mr. Frank Gill as President of the Institution of Electrical Engineers, and now comes the news that Mr. Frank B. Jewett, one of the leading telephone men in the States

has been appointed President of the American Institute of Electrical Engineers. It is fitting that men connected with one of the most active branches of Electrical Engineering should control, for a time, the destinies of the two sister Institutions.

More Uses for the Telephone.

Many are the uses to which the telephone is now being put, and some of these have been chronicled in these notes. One of the latest suggestions is to use the telephone circuit as a silent burglar alarm. The inventor claims that when his apparatus is used the entry of a burglar into a house will give a distinctive signal at the exchange without apprising the visitor that the signal has been given. The first intimation received by the burglar will be the descent of a policeman's truncheon upon his cranium. If the midnight visitor happens to be a telephone officer "who has been detained late on business" and has forgotten his key this new system may not become very popular.

CABLE BALANCING STAFF OUTING.

On July 1 the members of the London Cable Balancing staff who have been engaged on the London-Watford cable went to Burnham-on-Crouch by char-a-banc for a day's outing. The party which numbered twenty-five included four friends. After a delightful ride through pretty country scenery, dinner was partaken of at the White Hart Hotel. The inner man having been refreshed, adjournment was made to the cricket field where the long outstanding challenge of the Jointing staff to the Testing staff was fought out. Who won is a secret! There may be reprisals. After the match and a visit to the chemist for sundry repairs, a walk was taken along the river bank. A photo of the group was then taken. Tea was followed by a few songs at the piano and the return journey commenced at 7 o'clock. Everyone arrived home feeling better and happier for the day's outing. The event marked the approach of the successful completion of the work on which all have worked well and in perfect harmony. The outing was initiated by the men who invited the "others" to join them. Messrs. F. J. Langford and W. G. Boultwood organised the trip and carried out everything according to plan—a very commendable performance, for which they were thanked.

PHOTOGRAPHS OF THE CENTRAL TELEGRAPH OFFICE.

IN connexion with the bazaar which is being held in November, arrangements have been made for a very complete photograph album of the different Galleries of the Central Telegraph Office to be produced. The proofs of the album have been seen, and it may be said that the photographs are wonderfully clear, and show the size of the Galleries and the different types of apparatus installed there. Care also has been taken that that portion of the Galleries where the larger provincial centres are connected has been put well in the foreground in its own particular photograph. It seems to be quite modest to describe the album as a true example of the photographers' art and at the same time a useful link between widely sundered bodies of men and women. Specimens will be sent to the larger offices as soon as they are available. If it should happen that any officer in the provinces would care to have copies, they may be obtained for 2*s.* 6*d.* post free by applying to Mr. C. P. Burch, "F," Division, Central Telegraph Office, London, E.C.1.

EXTENSION OF THE LONDON TOLL AREA.

THE London Toll Exchange has been working for just over a year and the experience which has been gained has shown that the toll system is an economical and expeditious method of handling the shorter distance trunk traffic. Approximately 95 per cent. of the traffic which has been received during the 24 hours of the day has been dealt with on demand, while even during the busy hour itself 85 per cent. has been disposed of at once.

The traffic has increased steadily since the opening of the exchange, and the present figures show an increase of 30 per cent. on those for the corresponding period last year. During the month of June the daily traffic increased to a figure practically double that of the previous September. It was, however, disposed of without difficulty and the only delays which approximated to half an hour were experienced on routes known to be short of lines, viz., Dorking, Leatherhead and Gravesend. It is expected that the cables to each of these towns will be completed before next summer.

The capacity of the London Toll Exchange will permit of an increase in traffic without prejudicing future development and on Sept. 30 next the area served by the exchange will be extended to include the places at present obtained over the trunk routes between London and the following towns :—

Brighton, Chelmsford, Crawley, East Grinstead, Guildford, Leighton Buzzard, Tonbridge, Tunbridge Wells.

These number 62 exchanges and 27 rural call offices. It is expected that the extension will result in a 20 per cent. increase in traffic.

The number of trunk lines serving the towns involved in the extension amounts to 97, of which 40 are outgoing from, and 57 incoming to London.

In deciding upon the towns to be included in the extension of the area, regard has been paid to community of interest with London, to the adequacy of the lines to carry the traffic on a no-delay basis and to the possibility of increasing the number of lines in the near future.

THE INSTITUTE OF PUBLIC ADMINISTRATION.

THE Institute of Public Administration which has just been founded on the initiative of the Society of Civil Servants, is the outcome of a movement amongst those engaged in the public services, national or local, to secure a fuller recognition by the public and by the services themselves of their status as a professional body with great ideals and traditions and with the common purpose of studying and improving the mechanism of administration. Of the need for such an institution there can be no doubt, that it has awakened the closest interest in all those interested in the corporate life of the service is proved by the fact that men like Mr. Stuart Bunning, Mr. J. W. Bowen, Mr. Levi Hill (of N.A.L.G.O.), Mr. Shayler, Mr. W. G. Boys and Mr. Alefounder sit on the interim council side by side with such well-known Civil Service and local government officials as Sir Stanley Leathes, Sir Cecil Harcourt Smith, Sir Henry Bunbury, Sir Homewood Crawford, Sir Robert Fox, Mr. E. F. Wise, Mr. John Lee and Mr. Montagu Cox and such administrative experts as Sir William Beveridge and Mr. Harold Laski. Lord Haldane has consented to become the first President and Sir James Bird the Clerk to the London County Council, one of the vice-presidents.

The promoters have set forth an ambitious programme of aims and objects amongst which the most prominent seems to be the study of (i) the vocational or professional practice of public administration ; (ii) the machinery necessary for the efficient day-by-day practice of public administration ; and (iii) the principles of historical, economic and political science with special reference to public administration. The Institute will encourage the comparative study of administration in this and other countries, promote good relations and social intercourse between the different branches of the public service and publish a quarterly journal, the first number of which will be ready in January. This journal will contain authoritative articles from the pens of leading administrators and will be issued free to all members and associates. Lectures and discussions will take a prominent place in the programme, and amongst those who have already promised to read papers during the coming session are Sir Oswyn Murray of the Admiralty, Sir W. H. Clarke of the Department of Overseas Trade, Sir John Pedder of the Home Office, Sir Sidney Olivier, Sir Josiah Stamp, Mr. S. P. Vivian, and representatives of the French and Dutch Civil Services.

The Institute will not concern itself with "trade union" questions, neither will it express or discuss political opinions. Its business will be to perfect the machinery set up to administer the laws, and its motto will be those wise words of the "most rational and keen-sighted of old Englishmen of the world"—

For forms of government let fools contest ;
Whate'er is best administered is best.

No movement could be of greater interest and importance to those readers of this JOURNAL who, in however humble a capacity, are assisting in the work of administering the telegraph and telephone services at present so much in the limelight. All are invited to associate themselves with it, those engaged in an administrative or executive capacity as members, others as associates. The subscription for members will be £2 2*s.* 0*d.* ; for associates 10*s.* 6*d.* Fuller particulars and forms of application can be obtained from the Honorary Secretary, Mr. H. G. Corner, 17, Russell Square, W.C.1.

"TALK OF MANY THINGS."

THE all-absorbing topic this month is the Competition, to which we made preliminary reference in our last issue. We hope those allusions have piqued our readers' curiosity to such an extent that they are eager for details and will hasten to take part in it.

It is very simple. Almost every telephonist has encountered some extremely amusing happening in the course of her work. Let us all enjoy the laugh together! We want our readers to write the story of the really most humorous incident which has happened in the course of a telephone career. Literary ability does not count so much—the funniest and most original stories will be awarded the prizes. Yes, indeed, there *are* prizes. Quite piquant ones too, which, we hope, will prove a great incentive. Here they are:—

1*st Prize.*—A really serviceable, self-contained black "switching" apron.

2*nd Prize.*—A year's copies of the TELEGRAPH AND TELEPHONE JOURNAL *free.*

3*rd Prize.*—A neat little mirror to hang inside the locker door.

The story must not be longer than 500 words, written on one side of the paper only. Competitors may send as many contributions as they wish.

Most cordially we invite efforts from our Provincial colleagues.

Contributions should be posted to the address given at the end of this column and marked "Competition."

Details as to closing date, &c., will be given in the JOURNAL next month.

Telephonists will want to thank Mr. Niblock for the decoration which adds so much to the attraction of our column. He has certainly represented us as beings of great loveliness, and the scroll of powder puffs and hairpins leaves no doubt as to the feminine nature of matters thereunder.

To-Day's Great Thought.

Shakespeare—like Sir James *Cantlie.*

Oh, what men can do! What men *may* do. What men daily do, *not knowing what they do*!

Parlez-vous Francais?

Verily pride goeth before a fall. One day the chief sent for me to come to her desk as she wanted to speak to me. I endured the usual conscience prickings and fearful anticipations *en route*, "I want you to be the holiday relief at the Pall Mall Hotel," she said. "I have chosen you, because I understand that you speak French a little, and this hotel is so cosmopolitan, you are likely to find your knowledge of French very useful."

I felt distinctly "bucked"—there is no other word to describe it. Had I not passed a fairly difficult exam. with honours in French? Never before had I been able to properly air my learning, and I was truly elated at the prospect of being able to speak with visitors from the Continent. I was immediately despatched to the P.B.X. in question, in order to "listen in" and get some ground work of local knowledge.

Being strange to the ways of hotels, I had no idea that employees were expected to enter by a dark little doorway in a side street, so I made my entrance through the princely and imposing front doors which were reserved for guests and visitors. I found myself in a vast, richly carpeted, much be-palmed lounge, and instantly felt most hatefully small and insignificant. I was miserably aware that my hat had seen more than two previous summers and that my blue serge skirt was reflecting the brass fern pots and gleaming stair rods in the surface of its shining seat!

However, gathering the remnants of my dignity to me, I looked around for a minion that I might haughtily demand the whereabouts of the telephone room. A little way from me was a youth in well-worn tweeds and a general air of disreputableness. I said, "Could you direct me to the switchroom, please?" He gazed at me vacantly, slowly produced a monocle, fixed it, regarded me again, and finally drawled, "My dear old thing, I haven't the foggiest."

"Bad shot," I reflected, as I bowed and turned away. An immaculate personage, who could have passed for Beau Brummel of to-day (and whom I afterwards discovered was a reception clerk) contemptuously waved me to a wide stairway opposite and murmured something about the switchroom being in the basement.

I descended the stairs and found myself in a labyrinth of pillars and doorways. A tall, smart-looking lady in black was crossing the open space in front of me, so I approached and said, "Could you please tell me where is the telephone room?" She beamed upon me in a friendly fashion, and said something which I understood to be, "Je ne comprends pas!" A spasm of joy seized me! Already had the opportunity arrived when I could converse with a native. Beaming, I returned, "Pardon, Madame, mais voulez-vous me dire où est le ——" and then I stopped short. For the life of me I could not think what in all the world was French for "telephone room!" I racked my brains whilst the smart-looking lady regarded me expectantly. Finally, giving it up in despair, I resorted to the much-tried, universal language of gesture. Placing one hand to my ear, as if I was holding a receiver, I held the other to my lips and went through the pantomime of speaking on the telephone.

A light broke over the countenance of the lady in black. "Ah, oui!" she exclaimed, in ecstatic comprehension. "Manger!" she added to my surprise, and taking me by the arm, she propelled me in front of her, and opening a door marked "Courier" she pushed me in the room. I turned to discover myself in the presence of many people very busily eating. Truly this was not the proper place for me. I hastily opened the door and stepped outside. There was the lady in black waiting by the door and beaming benevolently upon me. Red in the face, I again went through the performance of speaking on the telephone. Before I was aware of her intention she again seized my arm and pushed me into the room marked "Courier." This time, the occupants of the room left their lunch to look interestly at the disturbers of their peace, wondering what could be happening.

I waited for a moment, then cautiously wriggling round the door, endeavoured to escape from the lady in black and take my chances. With the most benevolent intentions she was still waiting for me and as I saw her move to grasp my arm again, I ejaculated in desperate despair, "Non, non manger," and relapsing into my mother tongue in my extremity, I said, "I don't want anything to eat, thank you, I only want to speak on the telephone." To my utter surprise, the tall distinguished foreign lady said in perfect English, "Oh, you want the telephone, I'll show you where it is!"

Thankfully slinking into the sanctuary of the switchroom, I hid my diminished head beneath the yoke of my instrument and said not a word of my downfall to my colleagues.

Yes, verily pride goeth before a fall!

DOROTHY TURNER.

* * * *

Several contributions to this column have been received during the absence of the Editress on leave. They are held over for future issues.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

PRESENTATION, ST. ALBANS.

ON Friday, Aug. 11, a presentation was made to Mr. E. J. THOMPSON Assistant Traffic Superintendent, St. Albans, on the occasion of his transfer to the Hull Trunk Exchange.

Mr. J. H. Wilson, District Manager, in a short speech referred to Mr. Thompson's good work in the St. Albans district, and said that the district was losing a conscientious officer, who, in his 14 years' service, had an excellent knowledge of the district, so essential to Traffic work. It was with feelings of regret that he saw him leave, and he wished him success, on behalf of the staff, in his new sphere. Mr. Wilson then called upon Capt. H. E. Parry, Traffic Superintendent, to make the presentation, which consisted of an aneroid barometer, pipe and tobacco pouch, and an illuminated address (with over 100 names thereon). Capt. Parry in a few well-chosen words, spoke highly of Mr. Thompson's work in the Traffic Department, and also of his friendship with him. It was with feelings of regret that he saw him go. That he would meet with success in his new venture was certain. Mr. Collins, Chief Clerk, also spoke, and referred to Mr. Thompson's good work, and wished him every success. Miss Whitmore spoke on behalf of the ladies.

Mr. Thompson, in a neat speech, suitably replied.

ANOTHER BRAIN WAVE.

WE quote the following extract from the *Sheffield Telegraph* of Sept. 12 about a discourse on wireless telephony before the Sheffield Rotary Club on the preceding day :—

"Mr. Lloyd, turning to another phase of the subject, said that he thought the greatest benefit that wireless would bring to mankind was that it would endow us with the ability to read thought. He thought everyone had had personal experience of some degree of telepathy. The essentials for the occurrence of this phenomenon were that action (thought) in the brain of one person should produce re-action (similar thought) in the brain of another at some distance away. Sir William Crookes recognised this force and rightly described it as a form of wave motion, at that time undetectable by any existing instruments, but closely akin to that form of wave motion they knew as wireless waves. He submitted that the next step was inevitable, and it would be the detection of those waves of thought. If this came about, the human race would benefit by the ability to read thought, for it would be necessary for all to discipline their thoughts, an exercise that would surely reduce crime. He felt it would also be useful in adjusting the difficulties and differences between capital and labour, by permitting each side to read the thoughts of the other, and so to realise that their intentions were honest."

Can you imagine anything more horrible ? Not content in recent years with the discomfiture of our corporeal bodies by flame throwers, thermite, poison gases, and such abominations, our scientists propose to add yet another tragedy to existence by exposing our innermost thoughts to the public gaze. We wonder if there be a man or woman alive—even a scientist—who can contemplate such a possibility with equanimity. Carlyle in that ponderous satire of his "Sartor Resartus" draws a vivid picture of the social collapse which would follow the loss of our clothes. But the new theory would have for its object the complete dissection of the individual body and soul, an object which would not only destroy the social fabric as we now know it, but would make it practically impossible to build up another based on mutual liking and trust.

But no poison is discovered without its antidote so that we may be sure that another inventor would be prepared with a thought-proof screen for those who could afford such a luxury. Business men and women would then go forth to their accustomed battle of wits fully equipped like knights of old with armour for the fray. Civil Servants would not of course require such appliances, as the critics say they never have any brain waves.

"IF——"

A PARODY.

To Miss X (*Telephonist*).

(*With profound apologies to* Mr. RUDYARD KIPLING.)

If you can keep your head when subs about you
Are losing their's and blaming it on you ;
If you can trust yourself when supers doubt you,
But make allowance for their doubting too ;
If you can "call" and not be tired by "calling,"
Or being lied about, don't deal in lies ;
Or being bawled at, don't give way to bawling ;
And yet don't look too good nor talk too wise.

If you can have a friend and still expect her,
After a row, to treat you just the same ;
If you can meet with super and inspector,
And treat those two impostors both the same ;
If you can bear to read the *truth* you've spoken,
Twisted by scribes to make a trap for fools ;
Or watch the things you gave your life to broken ;
Or spend your days in learning worn-out rules.

If you can make one list of all your rises
And write them down upon a penny stamp,
And smile : yet "Be Prepared" for all surprises,
And journey on towards the supers' camp ;
If you can force your heart, and voice, and sinew
To "call up" subs. long after they have gone,
And so keep working when there's nothing in you
Except the voice which says to them "Hold on !"

If you can talk with traffic superintendent
Or walk with Kings—nor lose the common touch ;
If you can call yourself an "independent,"
Yet all men stay with you, but none too much ;
If you can fill that final half-a-minute
With thirty seconds' worth of honest toil,
Yours is the earth and everything that's in it,
And—which is more—you'll be *a Super-Girl.*

C. V. LONG (*Gerrard Exchange*).

TRIAL BY JURY.

OR A MUCH-NEEDED ASPECT OF THE TELEPHONE SERVICE.

Scene : *A Court Room.*

Characters :—A Prisoner at the Bar.
A Judge.
Prosecuting Counsel.
Counsel for the Defence.
Witnesses.
Jury of 12 Operators.
Supervisors.
Usher.

JUDGE (*addressing the prisoner*) :
The Court is met to-day, you know,
For each to have his say, you know,
Before this Jury good and true,
To see what shall be done with you :
And if your guilt is proved, d'you see,
Our mind shall not be moved, d'you see,
From stern resolve, at this grave time,
To make the punishment fit the crime.

JURY :
His stern resolve at this grave time,
Is to make the punishment fit the crime.

JUDGE (*resuming*) :
So when the charge is read to you,
Just listen what is said to you.
And if the charge you can refute,
I prithee do not stand there mute.
But if no refutation can
Put forward be by any man ;
Why, then, 'twill be my task sublime,
To make the punishment fit the crime.

JURY :
This, then, will be his task sublime,
To make the punishment fit the crime.

JUDGE :
Let no more be said,
Till the charge is read.

JURY :
He says that we must say no more,
Until the charge is pondered o'er.

WITNESS FOR THE PROSECUTION (*starting up*) :
Many doleful crimes and deeds he has done
And of more to sow the seeds has begun,
He's committed sins in plenty.
Fourteen, sixteen, eighteen, twenty ;
One by one.
And the Prosecution thought
It was right,
That a Jury should be sought—
Unbiassed quite !
So that Prisoner for the deeds,
That he sows as thick as weeds,
They can sentence with unparalleled delight.

JURY (*singing to tune of "Twelfth Night"—or "What you will"*) :
He's for ever sowing troubles,
Sowing troubles all the way,
Telling the Press,
Fibs more or less,
Giving them "copy" from day to day,
Now we're going to try him,
See his guilty air,
He's for ever sowing troubles,
Sowing troubles, everywhere.

JUDGE (*to Jury*) :
Silence, my gentle Jury,
Restrain awhile your fury.

JURY :
He says we must our wrath subdue,
I think he's rather sweet, don't you.

JUDGE :
Now, prisoner, hist, while Counsel reads
A list of your dark and daring deeds,
A list of the scurvy, stealthy tricks,
That you have done if your guilt we fix.
And if you can't your guile retain,
This Jury good and true
Will sentence you—that's plain.

JURY :
And if his guile he can't retain,
This Jury good and true,
Will sentence him—that's plain.

JUDGE :
Now, Prisoner, hush, the while the facts
Are told of your grim and guilty acts.
Oh, hist ! once more, though Counsel shirks
To read the whole of your woeful works.
And if you're wise, you'll humbly own
That you have spoken Treason of the Telephone.

JURY: And if he's wise, he'll humbly own,
That he has spoken Treason of the Telephone.

JUDGE: Proceed, proceed,
With each murky deed.

COUNSEL FOR THE PROSECUTION:
The prisoner, I must relate,
Though much indebted to the State,
Has railed against his lawful rate,
Demanded, too, a large rebate,
Or else an advance of his rental date.
He's tried to hold, in long debate,
The girls whose most unhappy fate,
It is upon his calls to wait.
And next to pressmen, small or great,
Included them in each day's "hate,"
And then with treachery innate,
His own misdeeds he'd adumbrate.

JURY: And then, with treachery innate,
His own misdeeds he'd adumbrate.

PROSECUTING COUNSEL:
The second charge reads thus, in *re*
The prisoner we all can see,
The allegation is that he
Refuses to consult the free
Fair preface to Directory.
His "five" and "nine" he doth decree,
Mistaken each for each shall be,
Nor will he use a rising key
Nor listen to one earnest plea
To clear connexions rapidly;
And graver still, let all agree
He *will* not roll the "r" in three.

JURY: Oh, graver still, we all agree,
This failure to roll "r" in three.

JUDGE: Now, call the witness for defence,
For, hush, the silence is intense.

WITNESS: May I address my words so few
To *one* of the jury good and true.

JUDGE: You may, you may;
Start straight away.

WITNESS (*singing*):
A little telephonist sat on a chair,
Singing "Number, please, number, please" daily.
So I said, "Oh, Telephonist, what do you there
Singing 'Number, please, number, please' daily,
Do you do it because it's a marvellous feat,
Or because the subscribers are pleasant and sweet,
Oh, I wish I knew why you so often repeat
That 'Number, please, number, please' daily."

TELEPHONIST:
She said, "I'm off duty, and so I can stop
Singing, 'Number, please, number, please' daily,
And I'll tell you at once, e'er my headgear I drop
Why I *love* to sing 'Number, please,' daily,
Though sometimes subscribers are rather irate,
And sometimes we're tired, and the calls will not wait,
We do not mind that, for we're serving the State,
Singing, 'Number, please, number, please,'" daily."

WITNESS (*with emotion*):
Of the prisoner's guilt I am assured,
In a deep, dark cell he should be immured.

JUDGE (*to Witness*):
We did not ask you here, young man,
For your powers of elocution.
You must not interfere, young man,
With the rights of the Prosecution.

WITNESS: Very true,
I'm with you,
In your view.
But for hopes he has marred,
He deserves ten years' hard.
Or a fine of five thousand in lieu.

JUDGE (*to Witness*):
Silence, knave.
Desist, behave!

(*to Prisoner*):
Now, prisoner at the Bar, expound.
For hark, the silence is profound.

PRISONER: The long indictment I have heard
Is, let me say it, too absurd,
And I can prove it, in a word
To each's one satisfaction.
One charge that you have read to me
Can very soon refuted be,
I *cannot* roll the "r" in three—
I'm not of Scotch extraction.

JURY: The long indictment he has heard,
Is, let us say it, *not* absurd;
And we can prove it in a word
To each one's satisfaction.
One charge that he has made, d'you see,
Can very soon refuted be,
We each can roll the "r" in thrrreee
Though *not* of Scotch extraction.

JUDGE: Jury, good and true, your verdict tell to me.
(Oh, but they're wrathful, sing Willow, Waley.)

JURY: As your Lordship knows, cut off the man should be.
(Sing Willow, Waley, Oh!)
So our hearts we'll harden
Till he asks our pardon,
(Sing Willow, Waley, Oh!)

JURY (*addressing Prisoner*):
Prisoner at the Bar, oh, have you aught to say?
(Oh, but he's doleful, sing Willow, Waley).

PRISONER: Nothing, Ladies twelve, oh, sentence me I pray.
(Sing Willow, Waley, Oh!)

JURY: When your crimes displeased us,
You should not have teased us.
(Sing Willow, Waley, Oh!)

PRISONER: Jurywomen, twelve, your pardon sweet I crave.
(Oh, they're relenting, sing Willow, Waley.)

JURY: Do you then repent the trouble that you gave.
(Sing Willow, Waley, Oh!)

PRISONER: Oh, I do regret it,
Won't you please forget it.
(Sing Willow, Waley, Oh!)

JURY: Prisoner at the Bar, will you in future strive.
(Oh, but he's doleful, sing Willow, Waley.)

PRISONER: I will do my best to—roll the "r" in five.
(Sing Willow, Waley, Oh!)

JURY: See his sad condition.
This is true contrition.
(Sing Willow, Waley, Oh!)
[*Three Supervisors enter.*]

JUDGE (*waving to them*):
There you are, then;
There you are.

USHER: H'sh, M'Lud,
You go too far.

SUPERVISORS (*timidly*):
Oh, will you please excuse us,
We hope you won't refuse us,
But may we say
Our business, eh?
For sternly the prisoner views us.

JUDGE: There you are, then,
There you are.
Eloquence your
Guilding star.
But lest tears my joy should mar,
Tell us, tell us, who you are.

JURY: But lest tears our joy should mar,
Tell us, tell us, who you are.

SUPERVISORS:
Three little Supervisors walking,
Heard in this Court loud voices talking,
So to the door like mice came stalking,
Finding it left ajar.
Then to our ears came prisoner's moaning,
As at the Bar he wilted, groaning,
None could resist such sad intoning.

JUDGE (*delighted*):
Really! So, *there* you are.

USHER: M'Lud, enough.
This is sorry stuff.

JUDGE (*wrathful*):
I'll clear the Court
Of you, Old Sport.

JURY (*to Supervisors*):
We welcome you.
We welcome you.

SUPERVISORS:
We know it's true.
We know it's true.

JUDGE (*to Supervisors*):
Although your entrance was in perfect taste,
The time of the Court you must not waste,
So I'll ask you to listen to a verse or so
Before I tell the prisoner he may go.
So listen, please, while I relate
The reason I became a famous Advocate.

USHER: A Magistrate ?

JUDGE: *NO* ! An Advocate.

JUDGE: When I was a lad of twenty-one,
I used to leave ere my work was done,
And make my way to Carter Lane,
Where every girl has teeth of pearl
—And none are plain.
And while for Her I used to wait,
I planned how I'd become a famous Advocate.

JURY: And while for *me* he used to wait,
He planned how he'd become a famous Advocate.

USHER: The story you're telling the Court, M'Lud,
Has nothing to do with the case,
It's wasting our time, and in short, M'Lud,
It's nothing to do with the case.
I'll be hanged, I expect, for a sheep or a lamb,
But I'm hoping to capture a twopenny tram ;
If I miss it, the Jury will hear a loud—slam !
Which has nothing to do with the case.

JURY: If you miss it, we'll hear a word rhyming with tram.
Which has nothing to do with the case.

JUDGE: Prisoner, you may go,
But don't ingratitude show
By any disaffection.
And, whether soon or late,
Always co-operate.
(*Plus* a rising inflection).
And if you cannot capture,
That first fine careless rapture,
Of "r's" rolled roguishly,
The Court will make an order
To take you o'er the Border,
Where many "r's" there be.

PRISONER: Some major irregularities
I know I have committed.
Oh, never before this day was I
To be a subscriber fitted.

JURY: Hear ! hear !
We cheer
And a tear let drop.

JUDGE: And I,
A sigh.
What next, old top ?

USHER (*gloomily*):
All hope is o'er
It's five to four.

JUDGE: Usher, clear the Court,
And catch forsooth your tram.
(Oh, but he's speedy, sing Willow, Waley).

PRISONER: Let me say, M'Lud, it's grateful that I am.
(Sing Willow, Waley, Oh !)

JURY: He has bent the knee then.

JUDGE: Will you dine with me, then ?

ALL: (Sing Willow, Waley, Oh !)

J. M. McMILLAN.

TELEPHONE PROGRESS IN INDIA.

WE learn from the daily press that the Indian Government proposes to establish a telephone service between Calcutta and Bombay this year and automatic exchanges at Lyallpur, Amritsar, Lahore, Cawnpore, and Allahabad. Delhi is the centre of the northern system now approaching completion. Eventually Rangoon will be linked to Calcutta.

LONDON TELEPHONE SERVICE NOTES.

Re-organisation of Clerical Staff.

THE Controller's Office and the outlying Contract Offices have been excited and very much interested in the recent announcement in connexion with appointments arising out of the re-organisation.

The following have been appointed to higher executive posts :—

Messrs. R. Bryson, J. Leslie, C. W. Muirhead, M. Larkins, E. H. Barnes, G. E. Nicholls, J. R. Salter, J. F. Page, J. Hinshelwood and L. J. Lee.

There are many appointments to higher clerical or executive posts. Space does not permit the full list being given.

L.T.S. Success at P.O. Fete.

The ladies' team representing the L.T.S.S.A. in the Championship of the Post Office, were successful in gaining the honour, winning comfortably by about 20 yards. The race was over a distance of 240 yards, teams of six competing. The members of the team were :—

Misses Amos, Phipps and Williams (Regent), Amos and Fenn (Victoria), and McBinney (Western). The winning smile is much in evidence in the photograph reproduced on this page.

Miss Williams was also successful in winning the Individual Championship for ladies of the Post Office.

L.T.S. SWIMMING ASSOCIATION TEAM.
Winners of P.O. Championship.
Miss McBIRNEY. Miss PHIPPS, Miss WILLIAMS,
Miss AMOS (VI), Miss FENN, Miss AMOS (RE.)

London Telephonists' Society.

It is hoped that there will be a good attendance at the Y.M.C.A. Lecture Hall, 186, Aldersgate Street, E.C.4, on Friday, Oct. 13, when Mr. G. Buckeridge will read his Presidential address. The title of the address, "Where are we going ?" *sounds quite intriguing, and those who wish to know the answer* to the question must put in an appearance at 6.30 p.m. on the day and at the place mentioned above.

L.T.S. Swimming Association.

The first of the two galas arranged for this season took place on Friday, Sept. 15, at the Pitfield Street Baths, Hoxton. The affair was extremely well organised, the time table being followed very closely. The M.C. was Mr. E. A. Pounds and the various officials were representatives from the Southern Counties A.S.A.

The principal results were :—

LEARNERS' RACE (1 width).

Miss Riches (Trunk)	1
Miss Aylett (Hammersmith)	2
Miss Hodder (Paddington)	3

CHAMPIONSHIP OF L.T.S. (100 yards).

Miss Williams (Regent)	1
Miss Fenn (Victoria)	2
Miss Amos (Victoria)	3

There were three heats and the final, all of which were strenuously contested.

INTER-BRANCH TEAM RACE (*men*) (120 yards).

Traffic Branch (Messrs. Gregory, North, Pettigrew and Beck) ...	1
Accounts Branch (Messrs. Smith, Thompson, Teed and Frier) ...	2
Contracts Branch (Messrs. Skelton, Davey, King and Jenkins) ...	3

This was the first contest for the Lotos Challenge Shield presented by the Lotos Swimming Club for competition between the branches of the Controller's Office.

SUPERVISORS' RACE (33 yards).

Miss Birchenough (Mayfair)	1
Miss J. Davies (Trunk)	2

NOVELTY PUNT RACE.

Winners—Messrs. J. D. Pettigrew and T. A. Beck.

The competitors in addition to propelling punts for a length of the bath had to engage in combat with mops. The event provided a lot of fun.

WHERE TO STAY.

The attention of our Readers is directed to the following list of Boarding and Apartment Houses.

BOURNEMOUTH.—"Glen Cora" Boarding House, Hawkwood Road, Boscombe. Superior and Comfortable "home from home." Central and few minutes from sea. Liberal table. Highly recommended. Stamp for tariff. Mr. and Mrs. Halliday.

BRIGHTON.—Rusthall Boarding Establishment, 11-12, Cannon Place Central. One minute West Pier. From 2 guineas weekly.

BEDROOM and Sitting Room, or Bed-Sitting Room, suit one or two ladies or gents. Board if required, moderate terms.—33, Prospect Hill, Walthamstow.

LADIES' HANDICAP (33 yards).

Miss Malyon (New Cross)	1
Miss McMillan (Minories)	2
Miss Willmott (Avenue)	3

INVITATION TEAM RACE (Ladies).

Money Order Dept. (Naiad S.C.)	1
Post Office Savings Bank (Isis S.C.)	2
Central Telegraph (Centels S.C.)	3

The teams were of six members each, the winners getting home comfortably due to some fine "crawl" swimming.

GRACEFUL SWIMMING.

Miss Stansfield (Avenue)	1
Miss Curnow (Holborn)	2
Miss H. Davies (Gerrard)	3

The standard was very high and the ladies who were placed swam beautifully.

In addition to the items mentioned above there was a very fine display of high and fancy diving by three ladies from the Amateur Diving Association and a water-polo match between the Polytechnic and the Star Athletic, the event being the semi-final of the Junior Water Polo Competition of London.

The second gala will take place on Oct. 6 at the same baths.

Culled from the Exchanges.

Gerrard Exchange.

On Sept. 9, the Gerrard staff again entertained the patients at Sidcup Hospital. The men (about 400) were supplied with a high tea and a whist drive and dance. Later in the evening ices and lemonade were served, when our friends contributed some excellent music. We were very pleased to see the Colonel back again and we were warmly welcomed by the new Matron, the Chaplain and Mr. Baker, the sports master. If any of our colleagues at other exchanges would care to visit Frognal with us we shall be very glad to welcome them in the New Year. Many of the men are terrible sufferers and one feels it to be a great privilege to brighten their lives by anything that kindly interest can do. It might be mentioned that the Gerrard staff has raised nearly £300 for this hospital alone during the past three years.

Park Exchange.

On Saturday, July 22, a char-a-banc ride to Dorking was arranged by the staff of Park Exchange.

Punctually at 2 p.m. a very merry party started on what proved to be a really delightful excursion. The sun was surprisingly brilliant and the ride down fulfilled all previous expectations. Tea served in the garden of a Dorking hotel awaited the party, and needless to remark was much appreciated. Following tea someone made the happy suggestion of music and dancing, which was eagerly accepted by all. Later the party dissolved itself into various groups—some for a ramble into the woods, others to see the view from Deepdene, while a few preferred to remain in the garden. It was arranged for all to meet again in the garden at 7.30 p.m., where refreshments were served before the return journey home.

Snapshots obtained by several members of the party are souvenirs to remind us always of a most enjoyable day.

Regent Exchange (during August).

The month has had its ups and downs,
With Fortune's meed of smiles and frowns;
When something bad has come our way,
There's something good another day.

We've been on leave and had our fling
Of bathing, dancing, laughtering;
And now we view as in a dream
Those days, so far away they seem.

Our wages are reduced again;
Our anguished protests are in vain;
So now we exercise the mind,
Some new economies to find.

The sausage, succulent and cheap,
(Long bags of mystery dark and deep)
Must form the mainstay of our lunch;
For tea, a "roll and pat" we munch.

Yet we can e'en forget this woe,
To sit upon the fence and crow;
(O pardon us, we beg in haste,
Indeed, we know 'tis shocking taste!)

But then, we can't help being proud,
We feel we must cry out aloud
To laud each modest heroine
Of matters sporting and marine.

'Tis not the girls themselves who cry,
But we who chair them shoulder high
In grateful triumph. On our lips
The names of Amos, Williams, Phipps.*

DOROTHY TURNER.

* The success of these ladies at the P.O. Fete is remarked upon earlier in these notes.

PERSONALIA.

LONDON TRAFFIC STAFF.

Resignations due to approaching marriage :—

Assistant Supervisors, Class II.

Miss M. A. KILBURN, London Wall School.
Miss E. E. L. GARDNER, Trunk.
Miss E. M. HALLETT, Western.
Miss L. G. JACKSON, Victoria.
Miss H. LISSENDEN, Victoria.

Telephonists.

Miss E. E. DAVIS, Avenue.
Miss E. PRESTON, Avenue.
Miss N. E. DIFFEY, Observation Office.
Miss E. M. MUMMERY, Central.
Miss R. E. C. HOWELLS, Central.
Miss F. J. MAJOR, Central.
Miss M. E. MARRIOTT, City.
Miss M. A. BIDWELL, City.
Miss A. M. BROWNLIE, Hammersmith.
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Miss L. B. STEARMAN, Sydenham.
Miss D. F. PURDON, Sydenham.
Miss E. GOATER, Trunk.
Miss G. E. PENFOL[illegible]k
Miss M. WALLACE, Trunk.
Miss S. F. DOLDER, Trunk.
Miss J. YOUNG, Trunk.
Miss G. SPRIGGS, Trunk.
Miss E. VINER, Trunk.
Miss G. E. SMITH, Trunk.
Miss P. J. GREENGRASS, Toll.
Miss E. C. MURDOCK, Toll.
Miss M. I. LANE, Victoria.
Miss A. M. PARTRIDGE, Victoria.
Miss J. C. MURPHY, Woolwich.
Miss W. G. WIGNALL, Woolwich.

ST. ALBANS.

Mr. E. J. THOMPSON, Assistant Traffic Superintendent, St. Albans, to be Assistant Traffic Superintendent, Hull Trunk Exchange.

Mr. H. R. JONES, S.C. & T. (T.), Cardiff, to be Assistant Traffic Superintendent, St. Albans.

MANCHESTER.

Miss B. WEBSTER, Assistant Supervisor, Class II, Eccles Exchange, resigned on her approaching marriage.

The following Writing Assistants resigned on account of their approaching marriage :—

Miss M. WATERHOUSE.
Miss A. C. F. COLQUHOUN.
Miss F. L. MASSEY.
Miss E. D. DOWNES.
Miss E. CHIPPERFIELD.

A varied and choice assortment of gifts were subscribed for each officer prior to her leaving the Service.

LAWN TENNIS.

CIVIL SERVICE CHAMPIONSHIPS.

THESE were played at the Army Sports Ground, Leyton, on Sept. 6.

The Doubles were won by A. C. Belgrave and T. E. Hanson (Secretary's Office, G.P.O.) beating A. D. Stocks and E. B. Shine (Ministry of Agriculture) 6—4, 9—7, 6—4.

The Singles (English Championship) were won by A. C. Belgrave (Secretary's Office, G.P.O.) beating W. J. Whittaker (Royal Mint) 7—5, 6—4, 4—6, 6—4.

Mr. Belgrave subsequently beat the Scots champion, R. Kenyon-Letts (Inland Revenue), 7—5, 6—4, 1—6, 6—0, for the championship of the whole Service.

THE

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CONTENTS.

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THE BUSINESS MAN AND THE CIVIL SERVANT.

BY EUSTACE HARE.

(*Continued from page* 3.)

I can claim to speak with some knowledge of my subject, because in the progress of forty-two years it has been my fortune to pass from a private business to a company's ramifications and thence to the service of the State; and for ease and freedom from worry give me the company first and the private concern next.

It would be an absurd affectation to suggest that service in the National Telephone Company or in the United Telephone Company which preceded it, was a bed of roses. Every one in this country or any other who has knowledge of telephone administration and organisation would laugh at the idea; but of the United Company I could recount tales which would astonish its directorate of business men and shareholders, if any still survive—a happy band, who, in the last year of the company's separate existence, received a dividend of 15 per cent., and for each share in the "United" were allotted two and a half shares in the company which arose from its ashes. Not that this handsome return was undeserved, for the recipients were pioneers of a then uncertain enterprise in a conservative business world; and the missionary effort among the old-fashioned firms of the day was uphill work.

Nevertheless I can safely say this, that, speaking of the parent company, which I joined in 1883, success was not due to sound and competent management, but to the instrinsic value of the invention and to the possession of patent rights. The same acumen that moved the unbusiness-like Post Office to safeguard its monopoly on behalf of the taxpayer actuated the business-like "United" Company to exact royalty from selected subsidiary companies on behalf of its shareholders.

It was not until the year 1893, some thirteen years after the inauguration of the system, that real development and enlightened management on a scientific basis became the order of the day; and this was due to the introduction of a general manager who, at the outset, had no more knowledge of the intricacies of a telephone system than a post office man has of running a draper's shop. And what was he? Not a captain of industry nor what is commonly known as a business man, but a lawyer, a town clerk, with the lawyer's trained and reasoning mind. True he had escaped the blight of a Civil Service examination and, I believe, of a University course, but for all that, a course of legal study as of any study is not inimical to the attainment of a vigorous understanding and of lucidity of reasoning, and these qualities applied to any business are not without their uses.

But, strange to say, as the telephone developed under his auspices, the liveliness—for the service has ever been a topic for humour—began. Before his time the atmosphere at headquarters was comparatively a monastic calm; we were as a cloistered community—but ambling along in a fool's paradise, shortly to be ruffled by the march of events. The easy-going £20 a year for an unlimited service was a boon to the large user and the wealthy, and complaints were comparatively scarce. But there arose a clamour for cheapness; so, side by side with that subscription, the lower message rate was introduced; with the result that the large user clung to his flat rate and the small user claimed the lower charge. Highly unsatisfactory when a dividend had to be earned; and profits dwindled. What then? The next step was to inaugurate a measured rate for all comers, unoptional, except in London where the Post Office was in competition; and the Post

Office, mark you, not the Telephone Company, saved the situation for many years for the large user. And little thanks it got for it.

Those of us among the staff of the National Telephone Company who had come into contact with officials of the Post Office prior to the transfer of the undertaking to the State were under no delusion as to the business capabilities of our future masters and colleagues. From my earliest days in the company I was accustomed to hear of Post Office officials—some of whose names are now to be found only in dusty files—spoken of without rancour, as able men defending, not their own positions, but the broad interests of the State, honestly and squarely against what was, popularly, becoming to be regarded as the encroachments of a gigantic private monopoly. They may have been mistaken, but if so the public were with them—and by the public I mean chiefly the commercial world. If, as has been frequently asserted the Post Office was in the earlier days a stumbling-block to telephonic progress, it was ably supported by other public, local and private bodies who were in no haste to grant facilities for development except at their own price. To those who have memories, the conduct of the negotiation of the transfer of the business to the State before and during the final arbitration in 1912, bore ample testimony to the disinterestedness and untiring industry of the men of this particular branch of the Civil Service.

And when we, reputed men and pupils of business came over to the service of the State, what did we find ? In a word, that a far higher standard of work was expected of us for the same pay ! I am not exaggerating ; for, at all events among us on the clerical side, it was common talk. Our cares and responsibilities were multiplied, and we found ourselves side by side in competition with colleagues who, at the least, and at the outset, had given some indication of their general ability by the test of a stiff examination.

There were other differences, too, which made the parting of the ways a matter of some regret. For I had reached a stage where a daily free luncheon was, at once, a privilege and an obligation—a useful institution whereby the head official circle were enabled to exchange views and discuss subjects of general or high import. Another wistful memory is that of the recuperating week-end recess unknown to the Civil Servant in its full blessedness ; the arrangement being that my immediate chief and myself were free from official attendance every alternate Saturday ; no uncommon proceeding in the business world. Think of it ! A similar arrangement in the Post Office would mean a twenty-six day cut out of the annual leave ; to say nothing of other days off to bury relations or visit the dentist.

Again, " subsistence allowance " was a term unknown in those generous days. On one occasion I was sent to Stockholm on a commission of enquiry. Before leaving I hinted, delicately, at the question of expenses. With confidence in my rectitude the general manager dismissed the subject by opining that I should know how much money I set out with and how much I brought back, and that a calculation of the difference was not beyond my arithmetical powers. But I have no desire to lacerate the feelings of my present colleagues with further attractive samples of business management ; they are first-hand, however, and therefore reliable.

At a moment, I, on my entrance into the Post Office service, at all events, found myself in the public eye ; for within a week or so of my translation, I was confronted with the apparition of my name in full at the foot of an innocent letter in a column of a daily newspaper. Such a thing had never happened to me before, and my first feeling was one of dismay.

For, consider what this means. The ordinary business man may write or sign fifty letters a day in the sure confidence that, acceptable or not, they will be scanned by none but the intended recipients. Were it otherwise : did he imagine that any one of his letters might become public property, might even be the subject of a question in Parliament, with what care would he not only marshal his facts but express them, and how much the more would he be exacting in the selection of his staff ? This early incident of the published letter was both a warning and a lesson—a warning to exercise caution in all my doings and the lesson of the high grade of work the public demands, and demanding, gets. And if it does not get it : if, for example, among the half-million telephone accounts despatched quarterly a frail human is caught tripping, the chances are all in favour of his lapse being brought home to him in a way unknown in any private concern.

Complaint of the telephone service was not born in the Post Office ; it came into it full grown. For sixteen years it has been my province to investigate and explain and diagnose the ills to which the telephone user is heir : some real, some imaginary, and some incurable—for, so long as human impatience endures it is destined to be provoked by a system which calls for individual effort every time it is put in motion. And to pretend that all was peace in this connexion in the days of the Telephone Company is ridiculous. Relatively, in proportion to numbers of subscribers, complaints of inefficiency were as frequent then as they are now ; in fact the company was so unpopular that I have a distinct recollection of a shyness to identify myself with it, and yearned for the millennium which subscribers assured me seriously was due on Jan. 1, 1912.

Personal feeling was unknown to me in the company's service, but I have not been free from evidence of it in the Post Office, and I have even been threatened with a subpœna to answer for my misdeeds in a court of law—which to my disappointment never matured. In one or two instances letters have come to me addressed thus : " E. Hare, for the Secretary, General Post Office," but except for its originality the humour of this manner makes no impression. Forty years of telephones is a blunting experience and makes for philosophy ; and were it otherwise, the end necessarily for me is not many years ahead.

But there are others still in the stage and of the age of sensitiveness, and among them there stands out the vast army of telephone operators, or as they are now known, telephonists. They are ever in the first line of attack : from the coarse bully who overflows with abuse whenever he is checked in getting at once what he wants, to the titled personage who vents his or her displeasure in refined sarcasm or indignant remonstrance ; as, for example, a case I remember in which a subscriber complained that the telephonist refused to address her as " My Lady."

Telephone operators were as much targets for spleen from the individual and for ridicule in the comic press in the day of the National Telephone Company as they are now ; but what they endure is endured in sensible silence. Rest-rooms were not invented by the company merely as playgrounds for the relief of exuberant spirits, but mainly for the calming of nerves wrought to a pitch of uncontrollability by accumulated attacks from the irritated and ill-humoured. But those who succumb even temporarily are very few ; and this is only to be expected from the type of girl who, in War time, traversed the streets during air-raids to take her post at the switchboard, while men made bee-lines for dug-outs.

We are all blackened with the same brush ; indifference, indolence, incompetence, and (in the telephone service) even dishonesty ; inasmuch as I have more than once been moved to ask a libeller at whose instigation he supposed he was overcharged in his telephone account and did he suppose that our sense of duty to the taxpayer so obsessed us that we were not above collecting fictitious fees on their behalf ? And yet I am not conscious that any great change in character or temperament has worked within me since the day on which I left the service of a commercial company ; nor have I observed any marked metamorphosis in the virtues and faults of old colleagues. The twenty thousand or so of us who came over in company, are, generally, still responsible each in his or her degree for the well-being of the telephone service ; and it is scarcely imaginable that this army of workers of varying types, the zealous, the luke-warm, the conscientious and the careless can have been so influenced by new surroundings as to change entirely their habits and outlook.

Moreover, as I came to know my new chiefs and colleagues, I could discover no great difference between us. Without disparagement of or disloyalty to the company the Civil Servant struck me in an average sense as taking his work a thought more seriously and earnestly than is the custom outside. That is to say, while in an ordinary business concern the higher the post the greater is the sense of duty and responsibility, expected and existent, this sense was noticeable to me as a newcomer to the Post Office in every grade from top to bottom—a higher level throughout, in fact. And I attributed it largely to the training and reasoning of the mind which the necessary preparation for examination incumbent on the Civil Servant involves.

And the common training and competitive system have another excellent result foreign to conditions under which entry into a business concern is effected by influence or haphazard introduction. It promotes an atmosphere of mutual confidence and equality—the main dividing factor being experience—it diminishes the formal distance between the chief and the capable subordinate, and encourages the expression of opinion, without timidity, in the certain knowledge that at least it will not be ignored. The method by which the veriest junior is able to append his initials to any document of which he is the originator is a distinct advantage to him if he is intelligent, and to the administration if he is not! It would have been far easier to suppress rising talent or to pick the brains of the reticent and self-diffident in the Telephone Company than it is in the Post Office.

The popular picture of a servant of the State lounging to his work at mid-day and leaving it in time for a stroll in the park, is as obsolete as any Victorian fashion plate. Fifty or sixty years ago when places could be bought or secured by favour there was doubtless some truth in this libel; otherwise the observant Dickens would not have exercised his humour upon it. Were Dickens alive to-day he would probably have striven to correct his impressions, as he did of the Americans on his second visit to the United States after a gap of many years. But Dickens is still read, and any tale, no matter how grotesque and exaggerated, penned by such a convincing genius, may survive the ages. Incidentally, Thackeray with his "Tape and Sealing Wax Office" toyed delightfully with the subject, but with a lighter touch; while with Balzac the French system was a minute study—tragedy and comedy alternating and commingling.

It was a new experience for me to hear of a man absent from work by reason of a nervous breakdown. I can remember no such case in all my years of service in the company. There were, of course, many enthusiastic men there who lived for their work and almost for that alone; but their way was comparatively smooth and their interest unenforced, and there were goals to be reached undreamt of in the Civil Service. The work of the telephonist in an exchange would seem to be typical of that of the earnest Civil Servant, a life of continual tension, strain and distraction, and unfortunately it is usually the best men who suffer most in this respect; for from nervous disorder the careless and the incompetent are happily immune.

There is no very high reward to be gained by this incessant and laborious grind at the official mill; there is no chance, for example, of buying a new motor-car on the proceeds of the satisfactory issue of a difficult and complicated piece of business; the Civil Servant can hope financially for no more than that he may live without undue anxiety, give his children an education at least equal to his own, and thus perpetuate a class which for high principles and unassailable integrity is unrivalled throughout the world. He is not called upon like the ordinary business man to drive bargains or to go on "Change" or to float companies, but to perform services for the public quietly, patiently and impartially, without fear or favour.

In writing this article for our JOURNAL—contemplated long before the Civil Service was the subject of widespread attention, and certainly with no reference thereto—I have had but one object in view; to indicate, however imperfectly some of the differences between and the similarities of State and private service, as they present themselves to me, and incidentally to take the opportunity of placing on record some acknowledgment and appreciation of the courteous and friendly welcome with which we of the National Telephone Company, an outside body, were received by our future colleagues (who had nothing to gain from our irruption) in the Post Office some ten years ago; of the easy assimilation which then took place and of the mutual good feeling which has since prevailed, I have left much unsaid, for the subject is exhaustless.

For what they are worth I have merely put on paper the outcome of my independent observations. I have no axe to grind and nothing to gain from doing so; for, as I have already hinted, my telephone career is drawing to its close and my part in the future development of the service must be a small and a short one.

But, after all, there may be much ado about nothing; for if we were all stripped, Civil Servant, business man, doctor or bishop, we should no doubt be found to be very much alike.

MR. MORTEN'S COLLECTION OF HISTORICAL POSTAL ITEMS.

MR. W. V. MORTEN, District Manager of Telephones at Nottingham, retires at the end of the year. As many of our readers are aware, he is the possessor of a unique collection of historical documents, pictures, seals, stamps, and other items illustrating the gradual development of the post and other modes of communication. An exhaustive article which he published under the title of "Communication" in the old *National Telephone Journal* will be still fresh in the minds of many subscribers to that journal who are also subscribers to this. It was a mine of curious and interesting information, much of it first hand and drawn from Mr. Morten's exclusive store of knowledge.

A bare recital of some of the principal treasures in the collection will give some idea of its valuable nature.

It comprises many early documents, for instance a list of fees paid by Lord Thurlow, who was a Postmaster-General, for his release from prison; the receipt for the repayment of the money borrowed by King Charles on the Crown Jewels from Philip Berlimachi. Berlimachi was given the Post Office as part remuneration. It comprises also the accounts of Queen Elizabeth's Sub-Postmaster for riding with her letters; and a cover of a letter from the Conway papers from Queen Elizabeth with her Tudor Rose seal unbroken.

On Postal agitation, Mr. Morten has numerous contemporary pamphlets, caricatures, broadsides and literature; the autographs and portraits of a great number of the earlier Postmaster-Generals from the 1600's; and a Royal Black Letter Proclamation "for quieting the Postmaster-General in his office," of which only three are known, Mr. Morten's copy being from the Earl of Crawford's collection.

Of road books and maps, the collection includes that issued by Cromwell for the use of his army; an earlier one which enables anyone to "coast all about England," and one for about every ten years to the present time, which in sequence illustrate the alterations of the routes and the roads throughout the British Isles.

The collection could illustrate with coloured prints, broadsides, &c., a journey from London to Paris, and through the Mt. Cenis tunnel to Brindisi, with various items—for instance, the original account book of the Dover Coach, showing the passengers and goods carried (in some cases of the former marked "ran away"). It contains the Visitors' Book of the Hotel de L'Europe, Abbeville, just after the Battle of Waterloo, with the signatures of the Duke of Wellington, Kings, Dukes, Isaac Disraeli, Mrs. Fitzherbert, and hundreds of other well-known people; a large volume of Mail Coach way bills written up by the Inspector, Thos. Hasker, for Lord Chichester, the Postmaster-General, with Hasker's autograph remarks on the working of the coaches; the Log of the Seagull Post Office Packet during the American War; and the original large oil painting by Samuel Drummond, A.R.A., of Capt. William Rogers fighting on board the Windsor Castle Post Office Packet.

The items relating to each of the Post Office Departments are arranged together and in sequence. In most cases a *precis* has been written.

Mr. Morten also possesses lectures and numerous lantern slides, hundreds of other coloured prints, and blocks made ready to illustrate the various histories, which, without further labour, would fill a magazine for years.

Lastly, in Criminology, the collection is particularly strong.

The collection would form a very usual nucleus of a Post Office Museum, concerning which we have recently heard various suggestions.

HOW THE TELEPHONE WORKS.

BY A. CROTCH.

II.

THE natural sequence of matters now brings us to the receiver. It is so well known that a description is almost superfluous. Briefly, it is a horse-shoe magnet with a pair of soft-iron pole-pieces, on each of which is wound a coil of insulated wire. It is directly comparable with the magnet shown in Fig. 1. The armature or keeper, however, consists of a diaphragm or thin disc of soft iron. Imagine the earcup to be removed: we can slide-off and replace this disc, and these movements are directly equivalent to the taking off and putting on of the more robust armature of Fig. 1. Further, with the coils joined up to a suitable galvanometer (the horizontal uni-pivot instrument used with the Wheatstone Bridge is highly suitable) we can repeat the experiment. If we slip-off the disc as sharply as possible, a momentary current will pass through the circuit and deflect the galvanometer needle to one side. If we put the disc *on*, again as sharply as possible, another flick of current, in the opposite direction, will be indicated by the galvanometer.

Further, without actually removing the disc, we can show that a to and fro movement of its central portion will result in pulsations of current. The disc is very near, but does not touch, the pole-pieces—touching would be fatal. It is subject to the powerful pull of the magnet but has sufficient room to move towards the magnet. If we give the disc a smart (but not ungentle) pressure with the end of the finger, the galvanometer needle is affected and in the same direction as that produced by the putting on of the disc. If now we allow it to move outward, a pulsation in the opposite direction will be generated. The currents due to these movements can just be detected by the instrument mentioned.

Now let us imagine our receiver to be firmly fixed and that in front of the disc a tuning fork is sounding. The movements of the latter consist in alternate approach of the prongs to each other and their receding apart. This means that when the prongs move outward, away from each other, the air particles in the vicinity receive a push or are jammed together—if one may speak thus of such a delicate movement. When the prongs approach each other this pressure is relieved and the air particles have a "little more room" than normal and move in the opposite sense. Thus, whenever a sound is being produced, a series of "condensations and rarefactions" is set up. Also, depending upon the pitch of the fork these vibrations will succeed each other at a definite rate. With a fork of low note the number of vibrations set up in a given time will be less than that set up by a fork of higher note.

These alternate pushes and recessions are communicated by the air to the disc and the latter is pushed in and out in obedience to them. That is, the disc moves in and out at a similar rate to that of the fork. In its movements it sets up a corresponding series of impulses in alternate directions. The rate, however, at which they succeed each other is much too high to allow the galvanometer needle to follow them.

But, instead of a galvanometer, imagine a second receiver to be placed in circuit, with the connecting wires long enough to allow it to be out of direct hearing—say in another room. If now we pull off the disc of the first, the pulsation of current set up in its coils will traverse the coils of the second receiver. Imagine the direction of this current to be such that it augments or strengthens (while it lasts) the magnet of the receiver: then the second disc will be drawn closer to its magnet, *i.e.*, it will move inwards, owing to the increased attraction, returning to normal as the impulse dies away. If the first disc be sharply replaced, a pulsation in the opposite direction will be set up and this will weaken the pull of the second receiver on its disc. The latter, by virtue of its own elasticity, will move outwards. It is easily seen that if the excited tuning fork be placed before the first disc, the currents set up and passing round the coils of the second will cause the latter to vibrate and to emit the same note. If a higher note be used, the rate of vibration will be increased, the number of pulsations generated will be increased, and finally, the rate of vibration of the second disc will be increased.

On a microscopic scale, then, the first receiver becomes a magneto-electric generator: we supply it with mechanical energy in the shape of sound, which energy the apparatus transforms into alternating currents of electricity. These currents passing through the second receiver are transformed into mechanical energy and given out in the form of sound. The second thus becomes, on the same delicate scale, an electric motor.

But the fork may be vibrating gently or violently, giving out a soft or a loud sound, but of the same pitch. This means that the first disc will vibrate with a certain moderate amplitude or with a more extended one. These differences will result in currents, of lesser or greater strength and these, in their turn, will cause the second disc to vibrate over a smaller or larger arc and thus give out a softer or louder note. The pitch, of course, remains the same with the same fork. Thus we see that sounds of different pitch and of different strength can be reproduced, and by apparatus so

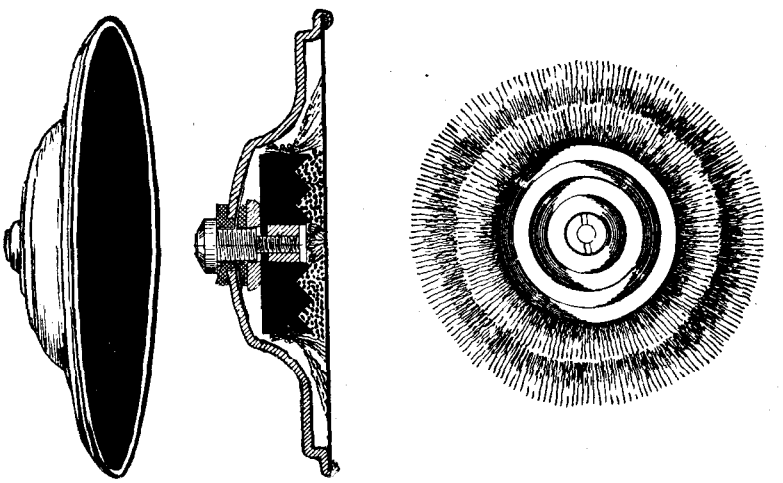

FIG. 4.

essentially simple. In the light of this, it will not appear much more wonderful that the delicate differences of the quality of sound should also be reproduced, and finally, human speech.

In these little experiments, the first "receiver" is of course acting as a sender or transmitter; the second is performing its usual function. But this is the order in which the successive discoveries were made.

Transmitter.—It will easily be seen that the energy given out by the sending disc, in the form of currents, is a fixed quantity and that very small. Hence as soon as the connecting wires become of any great length and the resistance of the circuit rises, the currents set up become too feeble to actuate the receiving disc. It is as if we were making some exquisite photographs on a very small scale, too small for the naked eye, so that a magnifying glass becomes necessary. The transmitter and its accompanying apparatus serve the purpose of this magnifying glass.

It is the peculiar property of carbon that its resistance varies with pressure. If two pieces of metal, say, are in contact with each other, the contact is either a good or a bad one. But with two pieces of carbon in contact, the resistance of that contact will vary between very wide limits as the pressure keeping them together is varied. The microphone of Professor Hughes is the classic example of this. A simple pencil of carbon bridged a pair of carbon blocks, the two ends lying loosely on the blocks. The whole was mounted

on a thin board or diaphragm and the slightest disturbance, due to a fly walking across the board, or to a sound uttered near it, was sufficient to cause an alteration in the resistance of the combination. This gave way to a number of pencils, offering a multiplicity of contacts and at the present time the pencils have been entirely replaced by a quantity of carbon granules offering an almost infinite number of contacts.

As the transmitter is a piece of apparatus not usually get-at-able, Figs. 4 and 5 illustrate the two principal forms in use.

Fig. 4 shows the form usually employed on primary or separate battery circuits. It is made up in this " capsule " form so as to be readily replaceable when faulty. A box of thin brass is shaped as shown and its front is formed by a thin disc of carbon secured into the box by being spun over. At the back, or deeper part of the box, a circular block of carbon with front shaped as shown, is fixed and provided with an insulated lead through the back to a kind of terminal button. Round the edges of the carbon block a fringe of woollen material is fixed and this forms the sides of an inner receptacle whose back is the carbon block and whose front is the carbon disc. Between the two latter a quantity of the carbon granules are placed. The complete capsule is placed so that the disc faces the speaker. Under a compression the disc moves inward

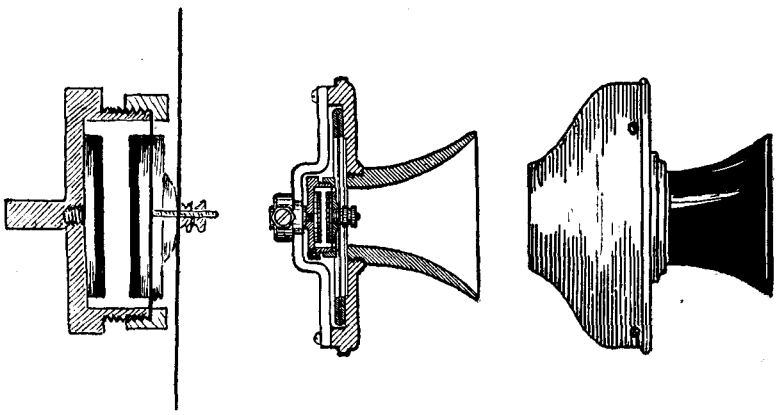

FIG. 5.

and sets up a tighter packing of the granules, thus lessening the resistance between disc and back block. The movement due to a rarefaction allows the disc to move outwards, thus lessening the pressure and causing the resistance to rise. These movements, of course, vary in their rate and amplitude of motion and also in their character.

The function, then, of the transmitter is to set up variations of resistance in a circuit. With a fixed EMF, as furnished by an ordinary battery, the current in such a circuit will vary inversely with the variations of resistance. These variations will have the greatest relative effect when the transmitter itself is the only resistance in circuit. Hence the resistance of the circuit in which it is placed is kept as low as possible, as we shall see.

The transmitter shown in Fig. 5 is that used for common battery working. The complete instrument with its mouthpiece is shown to the right, a section of the essential parts in the centre and on the left an enlarged view of the latter.

A circular brass box has for its cover a disc of mica, clamped in position by a ring. On each side of the mica a circular brass plate is securely fixed, the outer one terminating in a threaded pin. On the inner side the brass plate is faced with carbon and a similar plate, similarly faced, is screwed to the bottom of the box. These two carbon surfaces, highly polished, face each other and between them is a quantity of polished carbon granules. The circular sides of the box are covered with paper so that the electrical passage through the box is entirely from one plate to the other *via* the granules. By means of the threaded pin and a couple of tiny nuts the outer combination is secured to the front diaphragm. When the latter vibrates, the outer plate moves with it and thus takes up the maximum movement, *i.e.*, that at the centre of the diaphragm.

Induction Coil.—This is based on the same principle as the calling generator and the receiver, as will easily be seen. In Fig. 6

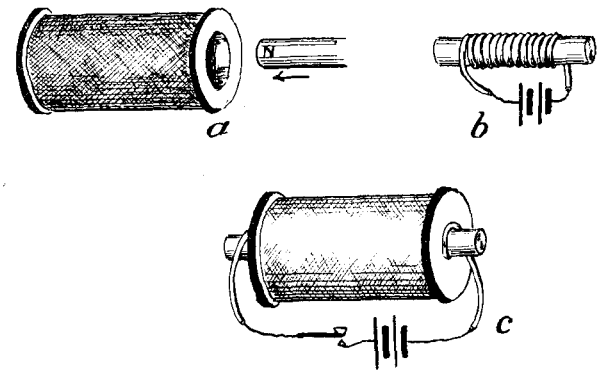

FIG. 6.

we have a large hollow coil of very fine insulated wire. If we thrust the permanent magnet sharply into the interior of the coil, its lines of force will " cut " the wires of the coil and induce a transient current therein, assuming that the coil is part of a closed circuit. The sharp withdrawal of the magnet will set up a reverse current.

Instead of using a permanent magnet we can use an electro-magnet, as at *b* in the same figure, and with the same results.

But imagine the electro-magnet to be permanently fixed inside the large coil, as at *c*, and a key placed in the former circuit so that we can make and break it at will. When the key is put down, the current flows and the core is magnetised. The magnetic lines in coming into existence cut the outer coil and set up a momentary current. It is indeed equivalent to thrusting in the magnet. Similarly the breaking of the circuit has the same effect as the withdrawal of the magnet: the lines collapse and cut the coil in an opposite sense and a reverse flick of current traverses the outer coil.

This is precisely the arrangement of the induction coil. The core is of fine iron wires, to facilitate changes of magnetism; over

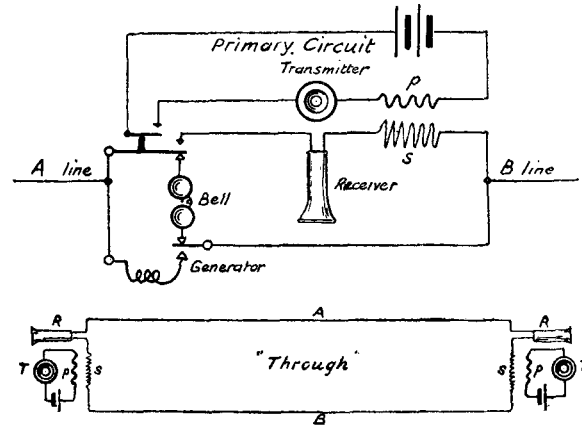

FIG. 7.

this is the first winding or primary, and over this in its turn, the secondary or outer winding is placed. As to the number of turns of the two windings, the ratio between these is of the greatest importance, and here is the true magnifying effect of which we have spoken. If both coils have an equal number of turns, the EMF induced in the secondary by a certain current in the primary, will have a certain value. If the secondary has double the turns of the primary, this EMF will be practically doubled; if it has ten

times the number the effect will be increased ten times, that is, speaking quite loosely and without taking into account certain modifying factors. This is the magnifying effect of the coil. In the coil commonly used, the primary and secondary have a resistance of 1^{w} and 25^{w} respectively, with a ratio of 1 : 3 in the turns.

The primary winding is connected with the speaking battery and the transmitter: this constitutes the primary circuit. The secondary is in series with the receiver (for reception) and the line. Normally, therefore, a steady current flows through the primary circuit, but the secondary is perfectly quiescent. When speech is uttered before the transmitter, the resistance of the latter is at once subject to variation and the primary current becomes a varying or undulatory one. Every variation sets up a change in the magnetic field and these variations are magnified by the secondary of the induction coil and pass over the line to the distant receiver, there to reproduce the original speech.

Fig. 7 shows the connecting-up of the different parts, and the lower portion of the figure shows two telephone stations "through" to each other.

(To be continued).

TELEGRAPHIC MEMORABILIA.

A C.T.O. enquirer asks for the origin of the indication "P.Q." given to the French Atlantic cable route. These letters stand for Pouyer Quertier an ex-French Minister of Finance, a successful dealer in cotton and a notable personage in Parisian financial circles, in the seventies of last century. He it was who, under the influence of a persuasive French ex-cavalry officer of Irish origin named Dillon, but one whose efficiency as an administrator and scientist was undeniable, financed the laying of a trans-atlantic cable from Brest to New York in 1877 or thereabouts. P.Q., however, nearly wrecked the scheme, despite his financial genius. There was a woman in the case! According to Mr. Roland Belfort it happened thus: P.Q., about this time was taking a very tender interest in a young comedienne who much wanted Quartier to quit Paris. Ignoring the fact, and against Dillon's advice, that that particular moment was one quite unfavourable to the flotation of the company from a Bourse point of view, he insisted on rushing the flotation through so that he might leave the French capital without further delay. The flotation was a failure and it was only by the superhuman efforts of Dillon that the scheme was re-organised and one cable laid and successfully worked in 1880.

During the month of September two delegates from the Czecho-Slovakian administration, M.M. Kucer and Strnad, paid official visits to the C.T.O. and various other departments of the British Post Office specially interesting to telegraph and telephone engineers and administrators.

The retirement of Mr. Hartwell, overseer, was made in particularly sad circumstances, and these lines are an attempt to collectively express to this worthy and much-respected member of the supervising staff the sincerest sympathy of his Cable Room colleagues of all ranks.

A congratulatory paragraph had been written on the recent visit of Mr. James Fraser, late Executive Engineer at Aberdeen, to the C.T.O., where a host of old friends felicitated him upon his twelve months of retirement from the service. Alas, within but a few days the note is changed to one of poignant grief, for the news reached us that our old friend passed away suddenly owing to heart failure, very soon after his return to his beloved Scotland. The printed word is but a cold medium in which to express one's appreciation of so kindly and so sterling a character. As an official technological examiner he performed that duty to the Department with a blunt honesty which all men appreciated, but certainly not without a touch of the milk of human kindness. Few however realised how keen and personal was the pain of another's defeat when that same duty demanded that he should be the one to write against a candidate's name "Not Qualified." To his wife and daughter and his brother Andrew, the C.T.O. tenders its respectful sympathy on the passing of one of God's good men.

It is noted that "A Constant Reader" and other correspondents in the daily press have lately been attempting to mould the English language to their will by suggestions for substituting one or two new words in connexion with radio telegraphy and telephony. Among the more or less beautiful productions are *airophone*, *airograph*, *earthophone*, *earthograph*, *etheraphone* and *etheragraph*! It seems rather late in the day to invent a new nomenclature when other words have had time to become well current in the common speech of the man in the street, but what do our readers think of the above?

Congratulations to Mr. A. E. Tanner, of the Cable Room, upon his appointment as an Assistant Traffic Inspector of Telephones in the Canterbury district. As local secretary of the U.P.W. Mr. Tanner has proved a specially tactful and helpful representative without yielding a single point on any principle which appeared vital.

The Engineer-in-Chief must have rubbed his eyes one evening in October upon reading the latest sheets from Fleet Street to learn that "The laying of a new cable from Eastbourne to Dieppe at present being carried out is an event that recalls . . ." As a matter of fact the work upon which the cable ship was at the time occupied was a simple diversion of submarine cables laid many years ago from their old cable hut at Birling Gap near East Dean to a new and more convenient landing place at Holywell, a spot well-known to most visitors to Eastbourne.

The hut at Birling Gap was in a very isolated spot, the overhead land lines from Polegate to the Gap were very exposed, and the new arrangement by which the London-Continental wires now pass through Eastbourne and thence by means of underground lines into the Holywell hut, where they are linked up with the respective French cable cores, is obviously a great improvement and should give additional stability to this route. It is somewhat of a miracle that the old Birling Gap shanty was not itself washed away long before this, and it is probable that had the war not intervened the much-needed removal would have been effected a year or two ago. It was no enviable post during the years of 1914-18 for the lonely watcher to sit in that tiny building on stormy nights, the waves washing away the beach steps, at its rear, while thundering on the roof and pouring down showers of salt spray and water in front of the only possible exit!

Perhaps we may encroach upon Telephone ground to congratulate our colleagues of the Anglo-Continental Telephone Service upon the steady progress made with the Anglo-Dutch trunk circuits. It is understood that Utrecht and Gouda are perfectly good extensions from The Hague and that Ymuiden and Bois-le-duc may follow shortly, probably *via* Amsterdam.

From information received from Germany and also through the medium of the columns of *Telegraphen und Fernsprech Technik* it is ascertained that something more than the mere nucleus of a large Transradio Central Office has been opened and is now in full swing in Berlin. Here the huge transmitting station of Nauen and the terminal reception station of Geltow are associated. The central control is lodged in Post Office 24, hard by, and is thus in close contact with the wireless section of the H.T.A. (the Berlin C.T.O.). As the principal wireless station, Königswusterhausen, and its receiving station, Zehlendorf, are also controlled by the H.T.A., Berlin, it will be seen that a co-ordination of the wireless services has thus been obtained by the opening of the Central Transradio office.

All radio telegrams are forwarded to this Government wireless centre, European wireless traffic being dealt with by Nauen as well as by Königswusterhausen. By means of the concentration of both wire and wireless services considerable acceleration of wireless traffic is anticipated. The arrangement, so it is gathered from the report, has so far developed that the wire and wireless systems are practically working side by wide, the Transradio Centre with its apparatus even "intruding" into the space normally allocated to wire telegraphy. This, however, concludes my informant, only means the closer co-operation of the wire and wireless systems. In this last observation undoubtedly lies the key to the future position of wireless, *i.e.*, a weaving into the extant land and subaqueous systems of all radio communications. One can see the beginning of the evolution already. Most of the wireless systems and station now in existence may best be considered as experiments, as first steps in the evolution of a new branch of the telegraphic art, the future of which none can foretell but the present tense of which is definitely expensive. At the moment most long-distance stations need the help of wire systems. The problem of the immediate future will therefore doubtless be as to where exactly radio circuits may prove the most useful adjuncts to land and submarine communications. No one has so far attempted to show that from a cost accountant's standard any present wireless circuit is a paying concern. That is to say, political considerations or national exigencies apart in no single journal in any part of the world has it been contended that this or that particular wireless station has proved anything other than a debit. MM. H. Abraham et R. Planiel in *Le Journal Telegraphique*, the official organ of *Le Bureau International de l'Union Telegraphique*, scientifically examining systems applicable to wireless telegraphy in order to increase output, declare that:—The future of long-distance wireless essentially depends upon the methods that may be discovered in order to increase the output of large wireless stations. *L'exploitation de ces grands postes restera en effet deficitaire tant que l'on n'aura pas trouve le moyen de leur faire debiter un trafic considerable*, the receipts of which will be able to exceed the enormous cost of power, of staff and capital charges necessary for the working of a high-power station.

It is to the interest of wire and wireless telegraphy alike that these means of obtaining increased output should be found if they are to be interlaced into the national and international telegraph systems of the world.

The same journal notifies the interesting fact that Palestine has affirmed adherence to the International Telegraph Convention.

A trial with the Siemens' Halske printing telegraph was made between Leipzig and New York during the latter half of September, by means of the high-power wireless station. The test it is understood, was made for the special benefit and education of the Natural Scientists Convention. The test only lasted fifteen minutes but a speed of nearly 800 letters per minute was successfully attained and worked.

It will interest all who are desirous of keeping *au courant* with the development of printing telegraphs to know that a short series of well-illustrated articles on The Teletype was commenced in our contemporary *Electricity* in the issue of Sept. 29.

The article on the North Walsham Repeater offices recently reproduced in these pages brought to our minds in London the fact of how little the work of a repeater officer is appreciated, especially by those who have never had to stand at a repeater for an hour on end trying to make a circuit "go."

It is a nerve-racking job at best and if one may say as much without offence to our foreign neighbours it is more especially so when the difficulties of international circuits are taken into consideration.

The adjustments at a repeater office of the standard and duties of North Walsham or Lowestoft, for example, are not a mere matter of "a little more marking" or a "little more spacing" and off we go! They are something much more tireseome, much more difficult and much more irritating than that! We shall therefore do well to give a kindly considerate thought sometimes to that other man's job away down in obscurity!

Via the South African Telegraph Service comes the following:—An Indian postal and telegraph exchange journal advertises a "charm" which is apparently guaranteed to cure "heart disease and double pneumonia." Other virtues it is stated to possess may be judged by the testimonial of an alleged purchaser who gratefully writes:—"I am pleased to say I have had promotion by wearing your Talisman!" Service papers, please copy!

From East of Suez we learn that Siam is up to date and uses electricity. The company supplying the necessary current provides the following printed notice, a sample of which may be seen in every room of a Bangkok hotel. It reads:—"Sir,—For the case that your electric light should fail, we beg to send you *enclose I* a post-card which please send us at once when you find your light out. The company will then send you another post-card."

Engineers of the earlier days of telegraphy and telegraphists of a like period will be pleased to read that Mr. Oliver Heaviside, F.R.S., was recently presented with the Faraday Medal of the I.E.E. Mr. J. S. Highfield, the President of the Institution, went down specially to Torquay to hand over the coveted honour.

The "understanding," "alliance," "agreement," or whatever it may be called, between the Postal Telegraph Company of the U.S.A. with the All-American Cables Corporation is probably the biggest telegraph combination of the present century. The total length of submarine cables involved is estimated to be between forty and fifty thousand miles. Until quite recently the "Postal Company," as it is locally termed, were conspicuous in America as having refused to adopt any system of high-speed type-printing telegraphy, relying upon the simple sounder to deal with all their traffic. It is understood from those who have visited the States recently that there has been a movement latterly in the direction of more modern appliances. The fact, however, remains that they have hitherto held their own with the more simple type of apparatus. This appears to be explained by the circumstance that the "Postal" company's system deals with a very different type of traffic from that of the Western Union who, as is well known, have made a fine art of the high-speed machine telegraphs.

From Helsingfors we learn that telegraphic communication between Norway and North Russia *via* Petsamo has been established. Also that a telephone circuit is in operation between Kirkenaes (Norway) *via* Petsamo to Vaida Guba in the Fiskar Peninsula. Petsamo is apparently the Finnish equivalent for Petchenja as is also Fiskar for Rabachi. Petchenja will probably be recalled as the ice-free port ceded to Finland, hence the importance of the communication.

Sixty Years Ago:—A new and important discovery in electricity!

"A wonderful discovery is reported to have been recently made in electricity as applicable to the purposes of the electric telegraph. Incredible as it may appear, it is said that experiments have established the fact that intelligible signals can be exchanged between distant stations without the intervention of any artificial conductor whatever, and that with equal success, whether the intervening space be wholly or partially land or water.

The *modus operandi* has not been disclosed, but the promoters of the new system believe it to be a reasonable expectation that this discovery may render unnecessary any future attempt to lay an Atlantic cable. Many years ago this achievement was regarded by some scientific men as a speculative possibility."—*Cassel's Illustrated Family Paper*, Dec. 13, 1862.

J. J. T.

CORRESPONDENCE.

RECORD TABLES.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—In an article contributed to the September number of the JOURNAL on the subject of "The New Record Tables" at the London Trunk Exchange, Mr. Kennedy refers to the introduction of the arrow head ticket for use on the pneumatic tube system and adduces as the reason for adopting this design of ticket the fact that additional impetus is given to the ticket by the extra sail. Perhaps I may correct this misapprehension.

The tests made on the experimental tube were unsatisfactory, and as a consequence the Department was unable to proceed further with the installation of a new tube system. This incidentally arrested any progress in the preparations for the transference of the record work from the Trunk Exchange.

Investigations into the cause of the failures were pursued, and it was demonstrated that the stoppages usually occurred at the flat bends of the tube. The following explanation of the causes leading to the tickets being delayed in transit was then deduced.

On a ticket approaching a bend, the normal tendency is for it to travel in the line continuing the direction of its motion in the straight length of tube preceding the bend. The ticket consequently moves to the concave face of the bend on the inside of the tube. At this point the components of the air forces acting normally to the surface of the tube increase the tendency of the ticket to adhere to the tube. The surface of the ticket may lie as a chord to the arc of the bend, or its flexibility may be such as to allow it to conform completely to the inner surface of the tube at that point. The end of the ticket is depressed on the inner surface of the tube so that the flow of air between itself and the concave surface of the tube is prevented. If the single sail of the ticket is adjacent to the concave surface of the tube it becomes ineffective and the ticket may remain stationary for long periods while other tickets continue to traverse the full length of the tube. It may of course actually result in a complete blockage of the system by the accumulation and wedging of tickets at the bend.

The aim in modifying the design of the ticket was to ensure that whatever be the position of a ticket in the tube at any moment one or more driving surfaces upon which the air pressures would impinge should always be available to the driving air current.

It was for this reason that the arrow-head ticket was designed and introduced. The resulting reduction in the frictional losses which retard the rate of transit were incidental, though of importance on long tube systems with a considerable lift. The arrow-head ticket passes through the tube with only the edges of the flaps bearing against the surface of the tube, the main portion of the ticket being supported free from the surfaces of the tube. The use of a much cheaper class of paper is consequently possible with this modified pattern of ticket.—Yours faithfully,

H. P. BROWN.

Engineer-in-Chief's Office, Sept. 30.

THE FIVE-UNIT SYSTEM.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—If Mr. Polley will read into my "startling statement" what it was intended to convey—and it appeared to be thoroughly understood by those attending the lecture—he will know that if a Wheatstone transmitter and a Baudot were sending out reversals at an equal rate, their relative speed of working would be as 82.5 is to 120 words per minute. A quadruple Baudot running at 180 revolutions per minute is working *at the rate* of 120 words per minute whether 1, 2, or more arms are used. After my explanation that "it is not claimed that 120 words per minute is obtained in actual working . . . with the 5-tapper keyboards and a distributor speed of 180 revolutions per minute."—Yours faithfully,

W. T. COUSINS.

C.T.O., Sept. 20, 1922.

ABOUT SUPERVISION.

BY H. MORGAN (*City District Contract Officer.*)

SUPERVISION is more than the art of getting things done. As wisdom is the ability to utilise knowledge, so supervision includes the adaptation of the knowledge of how things *should* be done, to the art of getting them done.

Supervision should be consultative rather than autocratic.
Sympathy is essential to successful supervising.
Dignity of control is not divorced from fraternal deportment.

The function of the supervising officer is to supervise, this fact is not infrequently overlooked.

Conscientious oversight ensures the forward flow and easy progress of the work carried out by the branch or section supervised.

Authoritative direction should characterise superintendence.
Chronology should be a strong point with the officer in charge.
When all men speak well of him the supervisor should go cautiously.

"Easy-going" is a label which should be a libel so far as he is concerned. It is indicative of laxity when applied to the overseer.

Conversely he's a bad boss of whom nobody says anything good.

True justice never adjudicates blindfolded. He who holds the supervisory balance between employer and employee needs incisive discernment.

The keystone of the arch of efficiency is supervisory reliability.
Supervision that counts is causal not casual.
It is not politic to "standardise" oversight.

Lack of initiative is closely related to irresponsibility. Resourcefulness and responsibility come of the same stock.

Decision should denote discerning decisiveness.
Conclusions clearly conceived carry conviction.
He who gives decisions is he who has decisions to give.

The pulse of the Department is its post-bag. Generally speaking, people put on paper opinions worth perusing when the subject is commercial in character.

The
Telegraph and Telephone Journal.

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Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. NOVEMBER, 1922. No. 92.

ANGLO-CONTINENTAL TELEPHONE COMMUNICATIONS.

WE recently recorded the opening of a direct telephone circuit between England and the Netherlands, and during October a second line was brought into use. Communication is now obtainable with Amsterdam, Rotterdam, The Hague, Utrecht and Gouda, and will be extended to other Dutch towns. The first line was no sooner open for public service than it was filled up and, indeed, overloaded with traffic ; the second circuit has effected considerable improvement is diminishing delay on calls, and when the third (superimposed) circuit is ready, as it will be shortly, a very good service should be given. Thus rapidly does demand always overtake supply in international telephony. Times are greatly changed since officials feared that the language difficulty would adversely affect the traffic with foreign countries. Five lines to Belgium barely suffice to carry the calls made to Brussels and Antwerp, and the twelve lines to Paris and three to Northern French towns are inadequate for the Anglo-French traffic. On the Continent a system of " urgent " trunk calls has long been in vogue by which those who care or can afford to pay triple fees obtain priority over the ordinary caller. In some cases at least this has had the simple effect of trebling trunk charges, as calls booked at the ordinary rate stood no chance of being completed within reasonable hours. The objection to a sort of call *de luxe* would not be so patent if other calls suffered no inordinate delay, but where the latter are reduced to futility by the urgent call it seems to us that there are the gravest objections to the " urgent " system.

The present paucity of long-distance facilities in Europe is one of the *sequelae* of the War. Negotiations for direct lines to Germany, which probably would have been working long ere this, were of course discontinued in 1914. The original Anglo-Dutch cable was ready for laying in 1915 but as our readers are aware was diverted for War purposes. There are, however, hopeful signs of improved conditions in the not far distant future. Proposals have been received from Germany for the provision of direct communication with that country by means of a cable constructed on the economical principle of the East Prussian and German-Swedish combined telephone and telegraph cables. This project is at present engaging the attention of the Engineer-in-Chief and, while it would be premature to say more, it may be said that it is full of interesting possibilities.

The French Administration, we believe, have under consideration far-reaching schemes of trunk line development, including the provision, with the co-operation of the British Post Office, of additional cables to this country, and when these are carried into effect it is hoped that it will be possible to afford communication between England and the countries adjoining France, such as Luxemburg, Italy, and even Spain. Moreover, a project is under consideration for the early provision of a direct line, at least in the evening, between London and Basle, pending the completion of arrangements for a more satisfactory scheme of general service with Switzerland than that given when the Paris lines can carry it. Again, negociations are in hand with Belgium for the provision of an additional cable to that country.

Everything points to a notable increase in the facilities for communication between this country and Europe in the coming years. Long-distance lines, especially where submarine cables are involved, require an enormous outlay of capital ; but, once the lines are laid, the gain both material and moral is great. Poor countries compared with this are bestirring themselves to provide and improve communication with their neighbours, for the international telephone has not only become an economic necessity but also a sound investment. To carry out elaborate schemes such as those projected will of course require considerable time, but the Dutch service will serve as an earnest of what will follow and we have every hope that the addition to the Anglo-Continental services will be continuous as years go on.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE total number of stations in use in the Post Office system on Aug. 31 last was just short of a million, viz., 999,430. Of this total 358,663 stations were connected with exchanges in the London telephone area, and 640,767 with Provincial exchanges. The number of new orders received during August was well up to the average of recent months, the net number of stations added during the month being 5,327. Since July 1 last, when the lower tariff for residence connexions was introduced, nearly 30 per cent. of the new orders received have been for circuits to private houses. As

the proportion of residence rate subscribers in the whole service is only about 23 per cent. of the total there are thus indications that the reduced charges will assist materially the development of this branch of the service.

The number of public call offices in use at the end of August was 15,755, a net addition during the month of 88. A substantial addition to the number of rural party line stations was reported during August, the total number of subscribers at the end of the month being 4,894 as compared with 2,522 a year ago.

Further progress has been made with the development of the local exchange system. Among the more important new exchanges opened recently are the following :—

London area.—Wallington.

Provinces.—Penarth, Inverness, Aldershot, Weymouth, Ramsgate.

The main underground trunk system has been extended by the completion and bringing into use of a new cable between Glasgow and Paisley.

TELEGRAPHS.

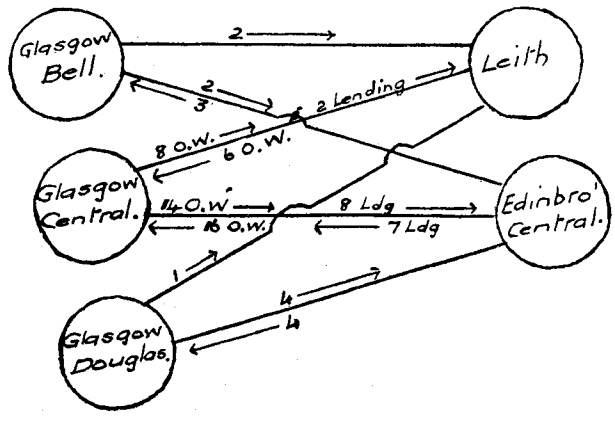
A divided Baudot installation connecting Newcastle-on-Tyne, Edinburgh and Aberdeen commenced working on Oct. 16, each office having two duplexed arms to the other two offices.

"NO DELAY" TRUNK SERVICE.

BY D. HOWIESON (*Glasgow*).

A FEW years have now elapsed since a "no delay" service on certain short-distance trunk routes was inaugurated in Glasgow, and it may be of interest to readers of the JOURNAL to have some of the outstanding points gleaned from the experience of working this arrangement put before them. At present the Glasgow "no delay" trunk scheme embraces direct communication by means of 270 short-distance trunk lines between Glasgow local exchanges and 28 surrounding towns over which a full "no delay" trunk service is afforded. (These figures do not include late "junction fee" lines now trunk lines.) In addition to the full "no delay" trunk routes there are lines from twelve surrounding towns to the Glasgow Central Exchange over which a partial "no delay" trunk service is given for incoming work to and through the Central Exchange.

The largest and at the same time the furthest distant group of lines worked on a "no delay" basis in the Glasgow district is the Glasgow-Edinburgh-Leith group. Besides order wires there are 77 lines in this group ; the route mileage is about 50 miles and the charge for a three minutes' conversation between 7 a.m. and 2 p.m. is 1*s.* 6*d.* The following sketch shows the allocation of the lines :—



Other fair-sized groups are :—

Greenock 25 lines, Coatbridge 21 lines, Hamilton 21 lines, Falkirk 19 lines, Kilmarnock 18 lines, Wishaw 15 lines, Dumbarton 12 lines, Airdrie 11 lines, and Helensburgh 10 lines. The remaining places have 8 lines or less in the group.

The foregoing rough outline of the Glasgow arrangements will be readily comprehended as the "no delay" trunk scheme has spread to most districts. It is given however as bearing on the further remarks of this paper which may be divided into two phases, viz. :—

1. The efficiency of the "no delay" service.
2. The effect on the local service.

1. *The efficiency of the "no delay" service.*

In the first place the general telephone public has appreciated the "no delay" trunk service especially on the larger and busier routes, and many unsolicited encomiums have been received. There is no doubt that this service is a great boon to the business man in providing a quick means of communication by cutting out the circumlocution of passing through a trunk exchange. A commercial traveller stated that the Glasgow-Edinburgh "no delay" service saved him two hours per day and was the means of increasing his business. This is typical of the commendations bestowed by the public. It has also been the means of settling some long-standing grievances and brought good relationship between some subscribers and the Department. There is no doubt therefore that from the point of view of the telephone-using public the system is a great success and is appreciated.

From an exchange standpoint the "no delay" service on the larger groups of cable lines has been an unqualified success. Before the present trade depression curtailed the traffic, an average paid time per line on the Edinburgh and Leith circuits of 35 minutes in the busy hour was obtained over a period. This compares very favourably with the paid time obtained on the average trunk lines worked on a delay basis. It was feared at one time that the timing of trunk calls in local exchanges would be somewhat lax and that there would be a large drop in the percentage of calls of over three minutes' duration. Despite the fact, however, that the clocks in the Glasgow Central Exchange pulsate only once per minute, a recent check on the Edinburgh and Leith traffic showed that the percentage of calls over three minutes paid duration was 13. The holding time of the line per call on the Edinburgh group generally ran about 3 minutes before the increase of the rates.

The great gains on this service are the decreased operating value of the call, saving of switching points, and the decreased holding time of the subscribers' lines. If the advantages of reducing the number of switchings, the corresponding reduction in the liability to error, the reduced holding time of the subscriber's circuit and the controlling operator being in close proximity to the calling subscriber's home position be considered, the points in favour of local exchange control are apparent. Of course the expense of additional lines where a no-delay service is worked has to be taken into account, but in these days of cable lines a few additional circuits are not of such moment as the provision of aerial lines. Reckoning has also to be taken of the increased value of the local operators' work and the effect on the switchboard equipment. When these points are considered, however, there still appears to be a considerable advantage on the side of local exchange control.

A feature of the "no-delay" trunk service has been the absence of complaints from subscribers with respect to such calls. The only cases coming under notice are disputed calls where the local operator has mistaken the calling subscriber's number. Such cases are infrequent and the careful recording does credit to the local operators, who are sometimes working under the disadvantages of indistinct figuring on the subscriber's number plates.

A certain amount of difficulty has been experienced with the smaller groups of "no-delay" trunk lines, principally due to stoppages. The smaller groups are generally aerial lines, and as such, are liable to interruption. Where a group of four lines serves for a no-delay service, the stoppage of one circuit means a loss of 25 per cent. and causes a certain dislocation of the traffic during the busier hours. In this connexion it is considered that small groups of lines for a no-delay service should be worked both-way in order that stoppages may be compensated as far as possible and erratic traffic met. When the lines were in good working order, however, the traffic on the small groups was satisfactorily dealt with, and the bringing of such circuits underground should largely do away with stoppages. Some slight holding up of the local operators is experienced at times on "through" calls and calls to smaller exchanges, but compared with the large amount of traffic where the calls go through quickly and smoothly, the percentage of such cases is small, and when spread over the operators the effect is almost negligible.

2. *The effect on the local service.*

The "no-delay" trunk service in local exchanges affects the loads equipment and service in varying degrees according to the percentage of trunk traffic. Up to a certain point there is considerable saving effected by local exchange control of short-distance trunk traffic. When the percentage of trunk traffic, however, is high, or where there is a number of large exchanges in a town each having a fair percentage of trunk traffic, the position calls for other measures. In the former case there would be a large wastage of valuable subscribers' multiple through having to use a much larger number of "A" positions than necessary, and in the latter case the undue splitting up of groups of trunk junctions might be wasteful. In such cases the question of a "Toll" exchange has to be considered. Glasgow is favourably placed in connection with the "no-delay" system of local exchange control in having a large percentage of the trunk users in one exchange. Practically all the short-distance trunk lines are in the Central Exchange, and the groups are therefore not split up, the only exceptions being a few lines between

Edinburgh, Leith and Greenock, and Glasgow-Douglas and Glasgow-Bell Exchanges.

The question of the effect on the actual service is a vital one. The desideratum in a local exchange in order to give an even and rapid service is to have the calls as simple as possible—all local calls would be an ideal state. When difficult junction and trunk calls are involved, the matter becomes more complicated, and the introduction of the no-delay service has added therefore a certain additional amount of complex working. It has been found, however, that in the cases of the larger groups of cable lines the calls are rapidly disposed of, in fact the actual operating is easier than on small groups of local junctions. It may be said that in the case of Glasgow-Edinburgh calls, with the exception of ticketing and timing, the operating of the calls is quite as expeditious as that on calls to the larger Glasgow local exchanges. The ticketing and timing are to some extent overlapping work. Such eminently satisfactory results, however, are not obtained on calls to small towns on direct or indirect routes. Of course it cannot be expected that small exchanges can always give the same prompt attention as the larger exchanges. There is sometimes a holding up of the "A" operators when dealing with trunk calls to small towns or through trunk calls involving three or four switchings. If such calls occur in any numbers and on adjacent positions, there is a tendency to make the local service erratic with occasional long answers. When, however, the daily average time of answer is taken, it is generally found satisfactory, and a few long times of answer are nullified to a large extent by the calls of average time. If the loading of the exchange is judiciously worked out, giving attention to the incidence of trunk traffic, the local operators dealing with trunk calls should not materially affect the service, and any slight erratic time of answer would be more than compensated by the privilege of the no-delay trunk service.

CONTRACT DEPARTMENT ORGANISATION.

By F. W. GEORGE (*Contract Manager, Brighton.*)

THE return of normal conditions in telephone development gives a fresh impetus to the activities of the Contract Department and the time is opportune for a review of the essentials of efficient and successful contract work. The recent instructions determining the basis on which new exchanges can be established afford the greatest opportunity the Contract Section has ever had of securing a comprehensive development of the telephone service throughout the Kingdom and should result in the opening of not merely hundreds, but thousands of new exchanges, opening up entirely new territory and pushing out the tendrils of the telephone system into practically every village and hamlet in the Kingdom.

The base of operations is the Contract Office. Space will not permit of enumerating the whole of the duties in detail but they may be summarised under general headings of:—Correspondence; statistical; preparation and checking of contracts; cessations, &c., and card indexing; the number of staff engaged being proportionate to the size of the district. In a well-organised Contract Office the Contract Manager is relieved of all minor detail, concentrating his efforts on the general development of the telephone service, the retention of existing business and development studies. Correspondence should be courteous, concise and conciliatory in tone and convey to the public a sense of confidence and efficiency. Statistical work, including preparation of returns, should be so conducted as to enable the Contract Manager at any time to see at a glance the progress of the district.

Card index work follows the general lines, but it is necessary to emphasise that a comprehensive and accurate card index system is a vital necessity to the Contract Section.

The office staff should be of good address, conciliatory in manner and capable of interviewing callers or dealing with telephone enquiries. In brief, all should specialise on new business and be "rate perfect."

The success of a Contract Department is dependent on expert direction and organisation, combined with commercial vision. Although the duties of a Contract Manager have been generally defined in the service instructions, they are amplified in general practice. A Contract Manager who occupies himself in small detail generally fails, as he has no time for his primary duties—the adequate development of the territory under his control—the efficient training of staff and the important development studies which require to be undertaken. He should possess an intimate and first hand knowledge of the whole of his district in order that he may effectively realise the possibilities therein and direct and assess the work of the contract officers. In a provincial district, apart from the large cities, a Contract Manager must necessarily travel considerably to keep in touch with the contract officers and new development, but this knowledge is invaluable, enabling him to visualise the territory covered and so ensure the comprehensive development of the district with an effective and flexible disposition of the canvassing force. In this district there are, in addition to the base, seven sub-centres staffed by one or more contract officers and each provided with an office and telephone service. A framed diagram is kept at district headquarters showing the lay-out of the district and the exchanges allotted to each contract officer, the list of exchanges being in pencil so that any alteration in territory may be neatly recorded. A progress report, as shown below, is also kept for the 150 existing exchanges and the date each exchange is canvassed is recorded, enabling the Contract Manager to see that no part of the district is neglected or overlooked:—

EXCHANGE PROGRESS CHART.

Name of Exchange.	Dates visited.				
Buxted	26/6/22	5/7/22	12/8/22	25/8/22	5/9/22
Durrington ...	10/6/22	23/6/22	15/7/22	12/8/22	30/8/22
Eastergate	15/6/22	15/7/22	1/8/22	18/8/22	4/9/22
Hassocks	17/6/22	14/7/22	26/7/22	4/8/22	28/8/22
Hawkhurst ...	23/6/22	4/7/22	24/7/22	15/8/22	4/9/22
Holmwood	31/5/22	30/6/22	14/7/22	5/8/22	23/8/22

Each sub-centre is provided with a complete set of ordnance maps, and works in cordial co-operation with the local engineers.

In allocating territory to contract officers, consideration should be given to the potential possibilities of the respective sections, road and rail travelling facilities; not on the basis of an average number of telephone stations to each contract officer. Conditions vary and out-stationed contract officers in undeveloped areas with a comparatively small number of existing subscribers have equal opportunities with contract officers stationed in the populous centres where the service is more fully developed.

Coming to the contract officer. To be successful in the arduous quest of new business a contract officer should possess invincible optimism, planning his work with insight and method. His appearance, conversation and bearing should be such as to convey a favourable impression upon the potential subscriber. Slovenly deportment militates against business success. He must be "rate perfect" and trained with a general knowledge of the telephone service which will enable him to discuss it intelligently with existing and prospective subscribers. He must be an enthusiast with an objective: "the development of the telephone service." Without an objective, enthusiasm wanes. Resourceful and adaptable in argument, patient and tenacious, he knows that "the proper study of mankind is man." The "personal equation" is the great factor in contract work and may be briefly defined as the ability of the contract officer to adapt himself to the personality of the prospective subscriber that his proposition may be acceptable. A contract officer who does not combine the general qualities enumerated is hardly likely to achieve marked success and has mistaken his vocation. The paper work of contract officers should be reduced to a minimum and they should be relieved of simple removal and superseding work, which should be dealt with by the Contract office, leaving the contract officers free to concentrate on obtaining new business and retaining existing business. With organised contract work and the recording of calls on the cards provided, an efficient contract officer will in time be able to account for the majority of the potential subscribers in his district and keep in touch with changes of tenants and new arrivals. His records can be kept in such a way as to enable an alteration of territory to be made without adversely affecting the new business prospects.

The opening of new exchanges forms a highly important duty. A good basis for these canvasses is to consider the possibility of converting each rural call office into an exchange which, in addition to meeting the requirements of residents and traders situated within 2 or 3 miles therefrom, enables rural party line services to be extended to the more remote and scattered territory. There is no doubt that the effect of past economic conditions as regards the provision of new exchanges has resulted in rural party line services being provided in localities which could be more adequately served by a local exchange and has prevented the development of these services in the more remote villages they were primarily designed to serve. The new conditions enable the new business net to be cast still further.

Writing with a long and successful experience in opening new exchanges, I have always found it good policy to secure the influential support at the outset of the canvass and have invariably made the first call on the local vicar; not that he is usually a likely subscriber as he probably finds the cost of living percentage bears no closer relation to his expenses than it does to those of the Civil servant; but he will be interested in the progress of his parish and often furnish much useful information about his parishioners. In turn, the influential subscribers will often volunteer assistance in securing the support, either by introduction to their friends or by personal activity, which materially aids the success of the canvass.

Development studies have been dealt with by able and qualified writers in the TELEGRAPH AND TELEPHONE JOURNAL but it is perhaps permissible to express the view that the only study of real value is the block development study. Consideration of past growth is of small utility, owing to restricted conditions during the expiring years of the National Telephone Company's licence, the incidence of the war and later economic conditions. When one considers the development of the telephone service within the past 20 years, in spite of prejudice and various retarding factors, one can only realise the vast possibilities of the future, with the number of telephones likely to be doubled within a comparatively short period and quadrupled at no far distant date. Effective contract work combined with prompt completion of orders and efficient service will enable the vision to be realised.

The development of Call Offices has not received the attention it deserves, and one may visit many towns where the number of signs advertising Call Office facilities is lamentably small. The educational value of Call Office

service is too well known to need further emphasis but the old slogan "a Call Office in every block" in the populous thoroughfares needs reviving.

The compiling by the exchanges of lists of people called for who are not connected is of considerable canvassing value. These lists are dealt with in the ordinary way of business and not by a selective canvass, the method being quite as effective and less costly.

It should be realised that the Contract Department is not merely an enquiry bureau but a "live" business department. I have heard it remarked that, in a Government Department with a telephone monopoly, people needing the service should come along and ask for it. This contention, which shows lack of vision, is fortunately rare. Telephone development is good for the State, in the sense that commercial lines of communication will ultimately reach the remotest villages; good for the subscribers, who receive an enhanced value for their subscriptions by reason of the accession of large numbers of new subscribers; good for the Department, who benefit by the cumulative revenue; and for the further reason that active telephone progress will absorb a large and increasing amount of labour.

The Contract Department will take its great part in telephone progress, facing the future with unconquerable optimism, having as it motto "FORWARD!"

A UNIVERSAL FIVE-UNIT CODE FOR PRINTING TELEGRAPHS.

BY A. E. THOMPSON,
(International Western Electric Company).

As it is now generally recognised that the 5-unit code is best suited for Printing Telegraphs, the time is perhaps opportune to agree upon a universal method of using the code. This would facilitate the operating of International circuits by Printer Systems, and would make for more efficient handling of messages in all European languages.

The purpose of this memoradum is to point out the merits of the Western Electric, or Murray code over the original Baudot code. Fundamentally, of course, these are the same, the difference being in the association of the signal combinations with the letters of the alphabet, figures and other symbols.

The modified Baudot code was first proposed and used by Mr. Donald Murray in his high-speed automatic printing telegraph system. One purpose of the modifications made by Mr. Murray was to reduce the amount of wear on the various machine units, primarily on the perforator, so as to minimise the cost of maintenance. This is achieved by using only one impulse for such letters as E. and T., which recur most frequently in the English language, two impulses for such letters as A I R N O, &c., which recur next most frequently, and so on.

Although the changes were based upon the letter frequencies in the English language, it will be seen from the appendix that they are advantageous also in the following languages:—French, Italian, Spanish and Swedish. No study has been made of German, Norwegian or Danish. Opposite each letter is shown the number of punches which would be actuated per letter (1) with the Baudot code (2) with the modified Baudot.

It will be seen that when the frequency with which the letters recur is taken into consideration the original Baudot code involves more perforations than the modified Baudot code as shown below:—

	Modified Baudot.	Baudot.
English	100	124.2
French	100	116
Spanish	100	130
Italian	100	124.8
Swedish	100	119.3

The advantage to be derived from these changes, such as the less frequent sharpening of perforator punches, are not of great importance, but if a serious effort is to be made to produce an ideal telegraph system it can only be evolved by taking into consideration all such minor features.

Correction of Errors in a Page-Printing System.

If it is to be used for a page-printing system the Baudot code requires to be modified so as to provide means for the elimination of detected errors at the sending end. This can be accomplished by using the signal combination 1 2 3 4 5 (letter P in the Baudot Code) as the "letter shift" combination, and providing means on the keyboard perforator for back-spacing the perforator tape, letter by letter.

For example, if the word PARIS is punched PAIRS, the tape is back-spaced three times, Fig. 1.

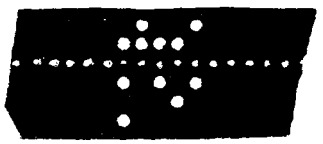


FIG. 1.

and the "letter shift" key depressed three times, followed by RIS. On the tape the word appears as in Fig. 2.

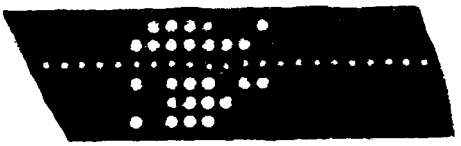


FIG. 2.

With a printer which does not space forward when the "letter shift" signal combination is received, the word will be printed PARIS. That is, the error has been corrected without mutilation.

If an error be made in a group of figures the series of "letter shift" signals must be followed by the "figure shift" signal to restore the printer to the "figure shift" position." Consequently, it is essential that neither the "letter shift" or "figure shift" signals shall produce a spacing movement on the printer.

Automatic Control.

Another device used in the Western Electric multiplex system the practicability of which necessitates the non-spacing of the printer with certain signal combinations, is that known as the Automatic Control. By its means it is possible to interrupt automatically the transmission of a message, send signals wihch will cause a bell at the printer at the distant station to be rung from one to five times, without producing any mutilation of the message in course of transmission. This is achieved by inter-connecting a switching mechanism termed the auto-control between the transmitter and the sending segments of the distributor. The auto control comprises a group of permutated cams which cause the following signals to be transmitted:—

"Fig. Shift,"
"J"
"Letter Shift,"

meanwhile stopping the transmission of the message.

In the upper case position for letter J the circuit of a bell on the printer is closed and the bell rings once. Therefore, if these signal combinations are repeated one or more times, the bell will ring a corresponding number of times.

By arranging a code of signals for these bell rings, it is possible for a printer operator to transmit to the distant station such requests as "Stop," "Start," "Re-run," "Re-punch," without calling upon the perforating operator.

If the automatic control is to be used at all times, it is necessary that the "figure shift," "bell signal," and "letter shift" signals shall cause no spacing movement on the printer, otherwise the message would be mutilated.

Group Combinations.

When the "figure shift" and "letter shift" combinations do not produce a spacing movement on the printer, it is possible to reproduce such combinations as 1st, 2nd, 3rd, 2 LG 5 exactly as set down on the original message form. Such combinations appear as 1st, 2nd, 3rd, 2 LG 5, on the Baudot printer.

Handling Messages in Foreign Languages.

In order to be able to transmit messages in such languages as Swedish, Danish, Norwegian, French and Spanish, the following extra letters are necessary, ö, œ, é, æ, ä. By having these letters as "upper case" characters, and using a printer which does not space forward when the "figure shift"

and "letter shift" signals are received, it is possible to print words composed of letters in both the lower and upper case. Here again is shown the advantage of the non-spacing arrangement as used in the Western Electric systems.

Position of Letters and Figures on Keyboard.

The position of the letters on the Western Electric keyboard, and in fact on all 5-unit code keyboard machines, except the Carpentier, is in accordance with standard typewriter practice in America and England, except that only three rows of keys are provided instead of four. As it is not essential in a printing telegraph system to make provision for two series of letters (small and capital), as is done in the case of typewriters, the "upper case" characters differ from those in typewriter practice.

Position of Figures in Upper Case.

The numerals appear in proper sequence as "upper case" characters on the top row of keys instead of having a separate key row for themselves. This is a distinct advantage from an operating point of view.

Experience has shown that faster and more accurate work can be done with fewer keys, using shift keys, and practically all typewriters now have but four rows of keys, whereas at one time 6 and 8 rows of keys were commonly used. Some manufacturers have gone further in this direction, in providing two shift keys, using only three rows of keys as in the printing telegraph keyboard perforator machines. Further, a machine with but three rows of keys is cheaper than one with four, and is less costly to maintain.

Perforator for Baudot Code.

If a keyboard perforator be used for preparing messages in the Baudot code, the figures will be scattered throughout all three rows of keys. From an operating standpoint this is a disadvantage, but it may possibly be considered that the resulting loss of speed would be partly compensated by a higher standard of efficiency in the transmission of figures. The scattered lay-out can be avoided by using some complicated change-over device in the perforator, but this would involve increased maintenance, and probably impair the "touch" of the keys.

Conclusions.

To adapt the Baudot code to page-printing and automatic transmission the following modifications would be required:—

1. Provide a space signal.
2. Change combination for letter P.
3. Letter shift signal should be the old P signal combination (12345).

APPENDIX.

NOTE.—For the purpose of this study and the production of the tabulated results, the leading article of a newspaper printed in the respective countries was used.

Column 2 shows the total number of letters appearing in the article.

The totals under columns 5 and 6 indicate the actual number of punch operations that would be involved in preparing the newspaper article for telegraph transmission:—

1. By a standard Western Electric perforator.
2. By a perforator adapted to the Baudot code.

To use Western Electric or Murray keyboard perforators on existing Baudot circuits it would be required either to—

1. Change the printing wheels on traducteurs to accord with the modified code; or
2. Change the permutations on the key levers to accord with Baudot code. With this arrangement numerals will appear scattered throughout the keyboard; or
3. Embody a mechanical code change-over device in the perforator to avoid the disadvantage indicated under 2.

If it is the intention to change over to page-printing at some future date, it would seem worth while at this time to adopt the code and letter positioning as used on the Western Electric system. Provision of new type-wheels is less expensive than altering the keyboard permutations, and by having two sets of type-wheels, a Baudot set can be made available for reception either from a standard 5-key keyboard, or from a typewriter keyboard perforator and automatic transmitter, in a few minutes.

The time is opportune for deciding upon a five-unit code by means of which messages in such languages as English, French, Swedish, Norwegian, Danish, German, Italian and Spanish can be accurately handled.

The modified Baudot code with minor changes in the upper case characters, used in conjunction with a printer which does not space with the "letter" and "figure shift" signal combinations will meet all requirements in this direction.

The rapid development of wireless telegraphy is due partly to the adoption of a universal code, and if the Baudot principles of telegraphy are to become universal, it will be necessary that steps be taken to secure like uniformity of code in all countries.

SWEDISH LANGUAGE.

	Frequency of Letters.	Punches Actuated. Modified Baudot.	Punches Actuated. Baudot.	Total Punches Actuated. Modified Baudot.	Total Punches Actuated. Baudot.
a	106	2	1	212	106
r	105	2	3	210	315
e	100	1	1	100	100
n	96	2	4	192	384
s	86	2	2	172	172
l	76	2	4	152	304
t	72	1	3	72	216
i	52	2	2	104	104
g	51	3	2	153	102
o	48	2	3	96	144
d	46	2	4	92	184
k	37	4	3	148	111
m	35	3	3	105	105
x	28	4	2	112	56
u	26	3	2	78	52
h	26	2	3	52	78
v	22	4	4	88	88
b	22	3	2	66	44
p	19	3	5	57	95
j	13	3	2	39	26
c	10	3	3	30	30
f	25	3	3	75	75
y	7	3	1	21	7
q	1	4	4	4	4
z	1	2	3	2	3
				2,434	2,905

ITALIAN LANGUAGE.

	Frequency of Letters.	Punches Actuated. Modified Baudot.	Punches Actuated. Baudot.	Total Punches Actuated. Modified Baudot.	Total Punches Actuated. Baudot.
E	126	1	1	126	126
I	115	2	2	230	230
O	106	2	3	212	318
A	94	2	1	188	94
L	79	2	4	158	316
R	66	2	3	132	198
T	64	1	3	64	192
S	57	2	2	114	114
N	55	2	4	110	220
C	52	3	3	156	156
U	41	3	2	123	82
P	36	3	5	108	180
D	35	2	4	70	140
M	28	3	3	84	84
G	24	3	2	72	48
F	18	3	3	54	54
B	15	3	2	45	30
H	10	2	3	20	30
Q	5	4	4	20	20
V	5	4	4	20	20
Z	5	2	3	10	15
J	—	3	2	—	—
K	—	4	3	—	—
W	—	3	3	—	—
X	—	4	2	—	—
Y	—	3	1	—	—
				2,136	2,667

FRENCH LANGUAGE.

	Frequency of Letters.	Punches Actuated. Modified Baudot.	Punches Actuated. Baudot.	Total Punches Actuated. Modified Baudot.	Total Punches Actuated. Baudot.
E	204	1	1	204	204
N	85	2	4	170	340
U	81	3	2	243	162
A	74	2	1	148	74
R	73	2	3	146	219
S	71	2	2	142	142
I	69	2	2	138	138
L	63	2	4	126	252
T	58	1	3	58	174
O	50	2	3	100	150
C	48	3	3	144	144
P	42	3	5	126	210
D	37	2	4	74	148

FRENCH LANGUAGE (*continued*).

	Frequency of Letters.	Punches Actuated. Modified Baudot	Punches Actuated. Baudot	Total Punches Actuated. Modified Baudot.	Total Punches Actuated. Baudot.
M	29	3	3	87	87
Q	17	4	4	68	68
F	15	3	3	45	45
H	12	2	3	24	36
B	11	3	2	33	22
Z	7	2	3	14	21
G	6	3	2	18	12
W	1	3	3	3	3
X	1	4	2	4	2
Y	1	3	1	3	1
J	—	3	2	—	—
K	—	4	3	—	—
				2,118	2,454

SPANISH LANGUAGE.

	Frequency of Letters.	Punches Actuated. Modified Baudot.	Punches Actuated. Baudot.	Total Punches Actuated. Modified Baudot.	Total Punches Actuated. Baudot.
E	135	1	1	135	135
A	129	2	1	258	129
O	99	2	3	198	297
I	96	2	2	192	192
S	82	2	2	164	164
R	76	2	3	152	228
L	71	2	4	142	284
N	69	2	4	138	276
C	61	3	3	183	183
D	53	2	4	106	212
T	53	1	3	53	159
U	47	3	2	141	94
P	39	3	5	117	195
M	28	3	3	84	84
B	14	3	2	42	28
G	13	3	2	39	26
F	9	3	3	27	27
Q	9	4	4	36	36
Y	9	3	2	27	18
V	8	4	4	32	32
H	6	2	3	12	18
Z	4	2	3	8	12
J	3	3	2	9	6
K	3	4	3	12	9
X	2	4	2	8	4
W	—	3	3	—	—
				2,207	2,844

ENGLISH LANGUAGE

	Frequency of Letters.	Punches Actuated. Modified Baudot.	Punches Actuated. Baudot.	Total Punches Actuated. Modified Baudot.	Total Punches Actuated. Baudot.
E	125	1	1	125	125
T	85	1	3	85	255
A	82	2	1	164	82
I	80	2	2	160	60
R	72	2	3	144	216
N	69	2	4	138	276
O	68	2	3	136	204
S	67	2	2	134	134
H	51	2	3	102	153
L	38	2	4	76	152
C	37	3	3	111	111
U	26	3	2	78	52
D	26	2	4	52	104
M	25	3	3	75	75
W	25	3	3	75	75
P	23	3	5	69	115
B	21	3	2	63	42
F	21	3	3	63	63
G	21	3	2	63	42
Y	19	3	2	57	38
V	12	4	4	48	48
Q	3	4	4	12	12
X	3	4	2	12	6
K	1	4	3	4	3
				2,048	2,543

CENTRAL TELEGRAPH OFFICE BAZAAR.

THE preparations for the Central Telegraph Office Bazaar in aid of St. Bartholomew's and other hospitals, are reaching the final stage. It may seem to be a little unfortunate that the General Election Polling Day coincides with the first day of the Bazaar, but those responsible for the Bazaar are hoping that the effect will not be serious and are re-doubling their efforts to ensure success. Her Majesty the Queen has graciously sent a number of beautiful presents including a wonderful doll's house and a number of pictures and porcelain of various kinds. A large number of contributions in kind have been received and attention is now directed to the proper advertisement of the Bazaar in order that a sufficiency of purchasers may come. The various Divisions have contributed a rich variety of gifts and some of them have specialised in particular directions, for example, one Division has provided sweets and another Division has provided dolls and another Division a large amount of knitted costumes. There will be a large number of concerts in the way of side shows.

Provincial friends will be glad to know that an album of photographs of the different Galleries is still on sale, and Mr. C. P. Burch of the "F" Division will be glad to receive applications.

EDINBURGH RADIO AND TELEGRAPH AND TELEPHONE SOCIETIES JOINT MEETING.

A LARGE audience under the auspices of the above Society assembled to hear Major Jayne, Controller of Telegraphs, lecture on "Modern Telegraphy" at the Society of Arts Hall, on Oct. 4, with Sir Alfred Ewing, K.C.B., Principal of Edinburgh University, presiding.

The lecturer, by means of lantern slides, explained quite briefly the progress of telegraphy up to the present time. He dealt at some length with machine telegraphy, particularly the multiplex and the 5-unit code system. At the present time he said multiplex telegraphy held the field, and there were almost as many advocates of different systems as there were systems. Enthusiasm varied in relation to the extent the advocate was a specialist in one or other of them. He begged the audience not to shut their eyes to the developments and possibilities of other types of apparatus than the ones they had made their specialities; and to keep their minds open to the rapid advance that was being made, not only in the wireless world, but in the telephone world, and endeavour to be impartial in all matters of scientific progress. He thought the time was near when start-stop type-printing apparatus would be generally adopted for all lightly loaded circuits.

Major Jayne laid emphasis on the need for as much research on the operating side as on the purely scientific side and attached great importance to close collaboration between these sides before any fresh apparatus was installed for working trials, either in a telegraph room, a telephone room, or a wireless station.

Excellent slides were shown to illustrate points in the lecture, and those portraying the interior of the Central Telegraph Office, London, Edinburgh Telegraph Office, and various wireless stations, created a good deal of interest, particularly those tracing out the distant control system from beginning to end of the London-Stonehaven Wireless Traffic Channel. In addition to scientific or technical progress, it was, he said, of vital importance from all points of view that the question of office organisation should receive adequate attention.

Some very interesting information to the public was given in the section devoted to the Imperial Cable.

FLEETWOOD AUTOMATIC EXCHANGE.

FLEETWOOD Exchange has been equipped with the Relay Automatic System and is unique in that it is the first of its kind opened for public as distinct from private service. All modern telephone systems, whether manual or automatic, utilise small electro-magnetic "relays" to a very large extent for controlling the various electrical circuits, but the system installed at Fleetwood is remarkable for the fact that it performs the whole of the work of establishing and controlling subscribers' connexions entirely by means of such "relays," without the intervention of mechanical switches or continuously rotating shafting employed in other automatic exchanges. The system has been aptly termed the Relay System; it might also be characterised as the silent and motionless system, for the moving parts are so light and their travel so minute that it is difficult to detect any movement when the apparatus is in operation. The exchange has an ultimate capacity for 920 subscribers.

The requirements of any telephone service are exacting and complex, and particularly is this true of a public exchange such as Fleetwood. The new automatic installation, however, experiences no difficulty in meeting the many and varied demands of the service with far greater precision and speed than could be attained by human agency.

"TALK OF MANY THINGS."

THE closing date for entries for the "Amusing Incident" competition is Nov. 30, so that those whose comic muse has not up to the present time manifested itself, will have time to think again.

The competition has been criticised by some as not affording enough scope, the allegation being that there is nothing superlatively amusing in the atmosphere of an exchange. Well, of course, it all depends on the point of view. Let us take, say, your first day in the exchange. Looking back at it, and at what you were then, is there not something that makes you smile—some misapprehension you were under in your unfledged state, some amusing error you made? We remember on our own first day at school, at the early age of five, being asked by the headmistress, "Can you draw?" and our eager "Yes." Her amused: "*What* can you draw?" and our reply, in lamentable English, "Old mans;" which called forth the stern rejoinder: "Oh, but you mustn't draw 'old mans' here!"

And official first days—and even many succeeding days—must contain many a *faux pas* of a humorous nature—even if not apparent to the victim at the time. We hope to receive many more entries before the closing date.

We are glad to say that we have had several contributions from our Provincial colleagues, and we hope to publish some of them next month. We shall be glad to receive others from the Provinces, and also from London, especially prose (not prosy) articles, rhymed entries being rather a glut upon the market at present.

At the first meeting this session of the London Telephone Society (commented on more fully in another column), Miss James, of Gerrard, referring to the title of the paper "Where are we going?" said that so far as the women are concerned, as the men are in power, she supposed they would go just as far as the men would allow them! This remark seems to fit naturally under the heading, "Things that might have been expressed differently." The fervid proposal of Mr. Dive (always our champion): "I move that women be allowed to go the whole hog," had no seconder, so that's that!

Seasonable Thought.

"Rainy days will surely come,
Take your friend's umbrella home."

Swimming.

S is for Swimming, so dear to our heart,
W Women—with fervour take part,
I the Instruction, all learners should heed
M Many hours spent on getting up speed,
M for the Men who are like us in zest,
I the Intention of doing our best
N Never flinch in the face of bad luck,
G Gala Night to exhibit our pluck.

L. A. FISHER.

Courtesy in the Provinces.

OPERATOR: "Your time is up. Will you have another call?"
OBLIGING SUBSCRIBER: "No, thank you; the same one will do."
(*Llandudno*).

Miss E. A. WILLIAMS, Regent Exchange.

Ladies' 120 yards Championship of the Post Office.

We print some impassioned outburst from Miss Gertrude M. Turner. Her percentage of "unoccupied time" will indeed be low if she carried out one tithe (or perhaps we should say 0.1) of the somewhat ambitious scheme outlined in verse 3.

A Soliloquy.

After reading some advice from Miss Dorothy Turner.

Three months ago I scanned these pages,
And read advice from many sages.
Then in our column I did note,
"We really do not want a vote,"
My name is "Gertrude" I'm called "Gerty,"
I want a vote, though I'm *not* thirty.

Shy as a child; when I was older
I made a dash—and then grew bolder.
Knowledge and wisdom oft I sought,
With thinking people, then I thought,
In wisdom's ways I'm yet a learner,
And still I'm only plain "Miss Turner."

'Tis not for fame my heart is yearning,
My soul to higher things is turning.
I'll take my place in life's affairs,
Bearing all other people's cares.
Women of any rank or station,
Can help to guide and rule a nation.

They say we're as a nation slacking,
In great ideals we now are lacking.
I ask you, "Is this really true?"
The future lies with me, with you,
That in the end we may have striven,
To honour God by gifts He's given.

Why cannot we all take our places?
Staunch in this life's stern hard-won races.
Strong women with the head and heart,
In every age have borne a part.
Sisters! the "Age of Peace" is dawning,
Be *ours* the glory of the morning.

G. M. TURNER.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

LONDON ENGINEERING DISTRICT NOTES.

Nights Out.

THE Telephone Society is to be congratulated on securing such a fine set of papers this year. The authors of the papers are all men who are worth listening to at any time, and the range of subjects is so wide as to negative any suggestion of monotony.

The Institute of Post Office Electrical Engineers opened its Winter Session on Oct. 10 with a paper by Mr. J. S. Elston, on "Applied Telephone Transmission." The programme of this Institution is not completed, but papers have been promised on "Wireless Telegraphy" by Mr. Shaughnessy for November, and on "Electrolysis" by Mr. Bartholomew for December. Other meetings will be announced later.

The several series of lectures to be given by the Institution of Electrical Engineers, the Wireless Society, the Society of Civil Servants, the Institute of Public Administration, and the Institution of Professional Civil Servants, must of course be attended by those who wish to keep abreast of the times. The one or two nights off will no doubt be spent in the bosom of one's family if one or other of the societies mentioned has not ear-marked them for public dinners.

Transmission.

The proper study of mankind is man, and the proper study of Telephone Administration is Transmission. Towards the latter end of the late National Telephone Company's licence a great deal of attention was given to this subject, and certain standards were agreed upon jointly by the Post Office and the National Telephone Company. The Company issued some very explicit technical instructions on the subject.

Since 1911 the study of transmission has been pursued in conjunction with the study of traffic routing. From time to time instructions dealing with various phases of the subject have been issued from headquarters. On Oct. 10 Mr. Elston summarised the present position of this important branch of the Department's work in an admirable manner, in a paper read at a meeting of the Institution of Post Office Electrical Engineers. Listening to the paper one might have been led to believe that the matter is a very simple one, but the subsequent discussion brought out a number of points that indicated that there is more in it than meets the eye. The present position, briefly, is that the United Kingdom has been divided into some 13 zones, and in each zone are one or more group centres with dependent exchanges linked to them. All trunk traffic passes *via* one or more zone centre, and an extreme connexion may involve switching at two zone centres, two group centres and two dependent exchanges, with the use of five links. Transmission allowances have been fixed for each class of link, for the losses at the intermediate exchanges and for the subscribers' loops. The total allowance in the worst possible case is limited to 35 miles standard cable, zero loop basis, which is taken to be the limit of commercial speech. The apportioning of the permissible allowances has of course been considered from an economic standpoint, as an alteration in the allowance of one section of the system naturally affects the allowances in all the other sections. A little thought will make it apparent that the economic proportioning of costs must have involved some extensive and careful calculations.

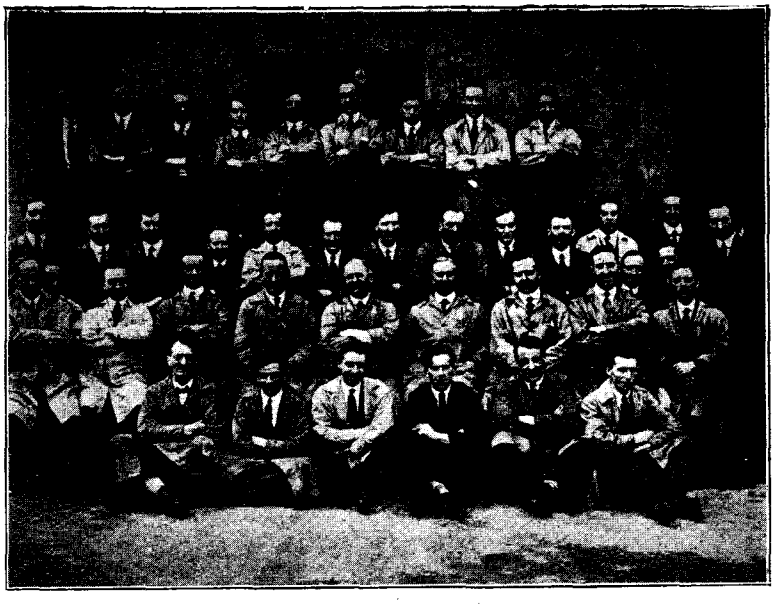
The allowances having been fixed it is the engineer's duty to design his plant so as not to exceed them, and of course to keep his costs to a minimum. Unfortunately, line plant cannot be moved or altered in constitution to suit changing incidences of traffic without heavy expenditure.

Expectations in regard to inter-zone circuits are that by the use of telephone repeaters the standard mile equivalent will be reduced at the same time as the weight of the copper required, although some hints were given in the discussion that there are some flies to be extracted from the amber before its full value can be realised.

Technical Classes.

In the August 1921 issue a paragraph appeared under the above heading setting forth some of the particulars of the classes held under the aegis of the P.O. Engineering Department at various Technical Institutes in and around London.

The 1922/23 Session has now commenced and the many members of the staff are taking advantage of the facilities afforded, but the entries are not so numerous as last year. This is partly accounted for by the fact that very few additions are being made to the staff. If the staff were to remain at a fixed number for a few years the tendency would naturally be for all those capable of obtaining certificates to do so and for the number of students to diminish year by year.



THE MECHANICAL STAFF RESPONSIBLE FOR THE MAINTENANCE OF THE MACHINE TELEGRAPHS AT THE C.T.O.

The staff of the district at the present moment hold some 1,000 certificates for P.O. Classes, while there are over 400 in receipt of technical allowances in virtue of holding City and Guilds Certificates.

There is bound to be always a fair number of men who on account of age, domestic reasons, and so forth, do not take up the classes. Very great care is exercised by both the Institute Authorities and the Department to make the clases of real value, and anyone who is eligible and fails to avail himself of the opportunities afforded is acting in a very short-sighted manner. It is not wise for those who aspire to gain promotion in the career they have chosen to give all their attention to technical studies, and in this connexion it may not be out of place to give the following extract from an address given by Mr. Highfield before the Institution of Electrical Engineers on taking up his office as President of that body in 1921:—

"I use the term education to include all upbringing, the formation of character, the means of health of both body and mind, the Christian virtues, the love of work, the need of service and the sacrifice for duty that alone should win us rights. Every skilled trade is in its nature an art, just as music, painting and sculpture are arts, and all arts must be practised at an early age. Education besides assisting in the perfecting of art must be directed mainly in the formation of character, and continuity of education should be insisted on so that no student leaves school or college with any other idea except that he leaves with a mental equipment designed for the acquisition of further knowledge."

Wireless.

By the time these notes are in print the broadcasting system should be in operation in London. The promoters have a great opportunity for creating liveliness in the electrical supplies industry and it is hoped that they will rise to the occasion. The difficulty will be to cater for all classes and tastes. Generally, when one sets out to amuse or interest oneself there is a large field of choice: one is not bound to see the same play or read the same book as everyone else, but "listeners-in" will have to take what is given or nothing at all. Unless the taste of all classes is satisfied there will soon be a large number of second-hand sets to be picked up at low cost. Demands for licenses from members of the staff continue to pour in. At the outset the neophyte is content with the simple crystal set, but soon the desire to extend the area of search sets in and more and more money is spent in elaborating the receiving apparatus. Back gardens are rapidly being disfigured by aerials. It is to be hoped that in the interests of suburban amenities that indoor aerials will soon be generally adopted. It would be helpful to many members of the staff if the editor would prevail upon Mr. Addey or some other expert to write an article for the JOURNAL giving detailed instructions for the construction of simple home-made listening-in sets.

New Tube to Liverpool Street Station.

A new $2\frac{1}{4}$-inch pneumatic tube has just been completed between the C.T.O. and the railway company's telegraph office in the Great Eastern terminus. The usual lead street tube is continued inside the station by means of a brass tube suspended from the foot-bridges across the station. In front of the main booking hall, however, the company.s own brass tube under the metals was utilised. This section of tube had been down about 40 years and had been derelict for many years past. It was in an excellent state of preservation, but it was found necessary to remove two faults which had developed during the idle period. This was done by the Post Office staff, who indeed carried out the whole of the construction work.

Internal Construction.

The transfer of a further batch of 226 Hampstead subscribers to the new Maida Vale Exchange was effected on Sept. 23, thereby affording additional relief to the Hampstead Exchange. It is satisfactory to note that this transfer was carried out without a single fault arising.

On Oct. 2, 1,260 lines were added to the Clerkenwell Exchange. These lines were transferred from Central, City, London Wall, Bank, Holborn and North.

Alterations and additions have been completed at Gerrard, East, Ilford, Hop and Palmers Green.

An extension of the Park equipment is in progress. This involves the provision of 12 A and 13 B additional positions and will increase the local line equipment by 1,460.

The work of constructing the new Operators' School in the Clerkenwell Exchange building is nearing completion; 24 A and 9 B positions have been installed. The school will replace those at London Wall and G.P.O. South.

An addition to the Bartholomew House Exchange is in hand, and on completion it will be possible to meet the requirements of a number of prospective subscribers who, it is understood, are desirous of obtaining service—a fact which is some indication of an improving condition in the world of finance.

Presentation of Imperial Service Medals.

An interesting occasion was that on Oct. 2, when the Superintending Engineer, Mr. McIlroy, presented on behalf of His Majesty the King the Imperial Service Medal to Messrs. F. J. Skinner, inspector, and G. Jones, skilled workman, for long and unblemished service with the State. Reference was made to the long and intimate connexion that Mr. Skinner had had with the C.T.O., and to the many epoch making changes that had taken place during his 45 years of service in that office. Representatives from the Controller's staff were present to wish their old colleague a long and happy life in his retirement. Mr. Jones who had been on the C.T.O. clock staff saw service originally with H.M. Office of Works, and when the clocks in Post Office buildings were transferred to the care of the P.O. Engineering Department in 1913, Mr. Jones came with them.

Relay Automatic System.

Through the courtesy of the Relay Automatic Company many members of the Institution of Post Office Electrical Engineers visited Marconi House during the second week in October, and had the system explained to them from a theoretical standpoint with the aid of some very clear lantern slides by the company's Chief Engineer, Mr. Bryant. Afterwards a demonstration with working apparatus was given by Messrs. Johnson and Hollings. So much trouble was taken to make the subject clear and the demonstrators were so entirely masters of their subject that no single visitor could have left without having gained a good grasp of the subject.

The writer of this note has always had a strong belief in the future of this system, partly because of its obvious merits and partly because of the fact that the Company's Engineers and senior officers are nearly all old National Telephone Company's men, who during many years' practical experience have gained that telephone sense which can only be acquired by those who love their work sufficiently to make it their hobby.

The relay is so familiar a piece of telephone apparatus and plays such a large part in every telephone exchange system, whether manual or automatic, that its possibilities and performance are well understood. Despite the fact that all the requirements of a large public telephone exchange have been met with the relay system no mechanical aids have had to be adopted. The type of relay used is so reliable that maintenance troubles are negligible even when no special precautions are taken to exclude dust from the plant. By careful circuit design the number of relays per line has been kept at quite a low figure even in the largest installations. The firm has plants in all parts of the globe, which are giving entire satisfaction.

There is little doubt that there is a bright future in store for the system in the public exchange field. The Department's Fleetwood Exchange was supplied and equipped by the Relay Automatic Company, and is, it is understood, giving complete satisfaction.

Everyone who had the privilege of being one of the party of visitors regretted the enforced absence, due to indisposition, of the Managing Director, Mr. C. B. Clay (late Metropolitan Superintendent, N.T.Co.). Mr. Morley Ward, the Manager, acted as host in Mr. Clay's absence. Thanks are due to all the officers of the Company who took such pains to make the visit instructive and agreeable.

LONDON TELEPHONE SERVICE NOTES.

The Telephonists' Society.

THE first meeting of the Session was held on Friday, Oct. 13, to hear Mr. G. Buckeridge read his Presidential address. There was a good attendance, and the new meeting place, the Y.M.C.A. Hall, Aldersgate Street, proved to be an improvement on former places.

The title of the address, "Where are we going?" had created a good deal of curiosity, but Mr. Buckeridge left us to find our own answer. He pointed out that never before had the telephone world such a wealth of knowledge founded on experience, and that the wielders of the economy axe should pause and reflect awhile before attacking such a healthy tree. The immediate past was reviewed and the effects of various circumstances and conditions upon telephone progress commented upon. Amongst these were the after effects of the War, the trade boom and the subsequent slump and the later tendency for trade to revive. It was remarked how the slumbering giant of progress was stirring himself and schemes for further development were taking shape. The progress made in automatics in the Provinces was mentioned, and also the great possibilities of wireless telephony.

Mr. Buckeridge said that superficially, and so far as the outsider could see, we had stood still for the last eight years, but in fact much had been done in preparation for the future.

Some interesting figures were given illustrating the importance of London in the country's telephone service. London has 31 per cent. of the total number of subscribers' lines in the Kingdom; 50 per cent. of the Department's telephonists are busy in London and of the 33,600 or so P.B.X. switchboards, 12,900 are in the Metropolis.

The opening of the Toll Exchange and the recent extension of its scope was mentioned as one of the outstanding features of recent times, and the handling of calls to more distant places than Brighton was confidently looked forward to.

Attention was drawn to items which constitute a drag on the operating staff and possible remedies were suggested. The collection of fees through coin boxes, the offer to complete ineffective calls and the resulting increase in ticket work, some drawbacks in the enquiry system,and the high percentage of junction traffic with the inevitable troubles were among the matters mentioned. A strong point was made of the big influence on the service of the great number of B.P.X. telephonists employed by subscribers, and the need for the closer co-ordination with the Department's methods was emphasised.

Mr. Buckeridge's provocative title "Where are we going?" gave rise to a lively discussion.

Mr. Corner mentioned that now "familiar friend," whom most of us have met on many occasions recently—in print—who it appears is again in Petrograd making calls from public call offices, and who is still being told, "Please put 30,000 roubles in, and turn the handle after each."

Mr. Stirling told us that he knew where *he* was going, as he had been told by preachers many times his destination if he did not reform; but he was still far from clear where *we* were going, as Mr. Buckeridge had omitted to answer his own question.

Mr. Dive told us one of his happy and apt stories, proving that although we may *think* we know, some influence beyond our control might lead us quite otherwise. Mr. Stirling must have been greatly cheered by this thought. Mr. Dive added parodying Kingley's note on "Tobacco," "The telephone is for the tired man rest, for the hungry man food, for the sad man cordial, for the lonely man company; there is nothing like it under the canopy of heaven!"

Miss James then rose and said that she thought it was time that a woman spoke. It was! Her fervent little speech brought a generous assent from Mr. Dive.

Miss Heap, whom we are all very glad to welcome as an honorary member of the Society, told us how, at the age of sixteen, somewhere in the "eighties," she sat upon a coalbox, and, to the unfeigned admiration of the Superintending Engineer, read Shakespeare between the calls! (We hope there were no pressmen present on Friday.)

Miss Cox said that, according to experts, there would be no need of telephones in the future, because each person will know what every other person is thinking.

This chastening thought brought the Chairman, Mr. Pink, to his feet. He refused to dwell on that aspect of the future, but let us instead glance at some of his visions, a very brief glimpse, perhaps, but one which stirred the imagination of us all.

Mr. Buckeridge then replied to the questions which had been raised; and the first meeting of the Session came to a highly successful finish. We congratulate Mr. Buckeridge on his maiden Presidential speech.

Owing to an unfortunate clashing of dates with other fixtures, the next meeting of the Society has been postponed to Wednesday, Nov. 8, when Mr. H. L. Pountney will discourse upon "The Opening of New Exchanges."

London Telephone Service Swimming Association.

The London Telephone Service Swimming Association held its second Gala of the season at Pitfield Street Baths on Friday, Oct. 6. Excellent as the first Gala was, the second was even better, and the well-appointed Baths was packed. The evening commenced on a top note, the first item being the heats for the much-coveted "Pounds" Challenge Cup, competed for by teams of four from the different exchanges. There were eighteen entries so that three heats had to be decided before the final. The holders of the cup were Gerrard Exchange. Gerrard, Central, Trunks, Hammersmith, Regent and Victoria contested the final, which was won by Regent after a magnificent struggle, the holders being second. A sealed handicap in connexion with the event resulted in Central being the winners, Regent and Gerrard following.

WHERE TO STAY.

The attention of our Readers is directed to the following list of Boarding and Apartment Houses.

A little later the men had a look in, the "Prossor Cup" being the coveted trophy. The cup is competed for annually by teams from the Traffic Districts and Headquarters Sections. Five teams entered, the holders, the Service Section, being again successful. Last year's runners-up, the North-West District, maintained their position.

There were three handicap events, one confined to Supervisors, another to the West and North-West Districts, and the third the Lotos Club Handicap.

The London Telephone Service Diving Championship was won by Miss H. Davis, of Gerrard, the judges placing her half a point in front of Miss E. Williams of Regent.

Results :—

"POUNDS" CHALLENGE CUP. (Team Race 133 yards.)

Regent (Misses Amos, Broomsgrove, Williams and Phipps), 1; Gerrard (Misses Davis, Wilson, Burt and Smith), 2; Central (Misses Sowden, Izzard, Knight and Millbank), 3.

SUPERVISORS' HANDICAP (33 yards).

Miss Birchenough (Mayfair), scratch, 1; Miss L. T. Davies (Trunks), 1 second, 2; Miss McNee (Central), 2 seconds, 3.

"PROSSOR" CUP (Team Race, 133 yards).

Service Section (Messrs. Prossor, North, Beck and Pettigrew), 1; N.W. District (Messrs. Townsend, Higham, Reece and Mason), 2; Equipment Section (Messrs. McCrimmon, Hack, Gillett and Gregory), 3.

HANDICAP (N.W. and W. DISTRICTS, 33 yards.)

Miss Phipps (Regent), scratch, 1; Miss Hawkins (Park), 8 seconds, 2; Miss McBirney (Western) 4 seconds, 3.

LOTOS CLUB HANDICAP (66 yards).

Mr. Teed, 7 seconds, 1; Mr. Thompson, 11 seconds, 2; Mr. Frier, scratch, 3.

NOVELTY COSTUME RACE.

Winners—

Miss O. M. Jones (Central). Miss Cole (Regent). Miss Emery (Victoria).

L.T.S. DIVING CHAMPIONSHIP.

Miss Davis (Gerrard), 84½ points, 1; Miss E. Williams (Regent), 84 points, 2; Miss Phipps (Regent), 25 points, 3.

The London Telephone Service Challenge Shield awarded for the highest aggregate of points gained in selected events was won by Regent with 35 points, Gerrard being the runners-up with 21 points.

The Association is indebted to Miss Dorris Sutton (Plaistow Swimming Club) for giving an exhibition of swimming strokes, to Messrs. A. G. Griffiths and G. A. Wilkinson of the Otter Swimming Club for their splendid display of ornamental swimming, and also to Messrs. D. H. Fairman, W. G. Reid and A. S. Coombs for a thrilling exhibition of high diving.

The evening, which went with the usual swing where the London Telephone Service Swimming Association is concerned, ended with a polo match, Essex County beating the Civil Service by 7 goals to 3.

Langham Choral Society.

The first concert of the season is arranged for Wednesday, Nov. 22, at Queen's Hall. The chief item in the programme is Coleridge Taylor's "Tale of Old Japan," excerpts from Berlioz's "Faust" will also be given. The principal soloists are Miss Olive Sturgess, Wilfred Temple, and Peter Dawson. The last named is seldom heard in London, and the Society is fortunate indeed to have secured his services. Last season ended in such good style that it is confidently expected that the new season will have a good send off.

Readers of these notes who have enjoyed the Society's concerts in the past will doubtless make a point of attending on this occasion. Tickets, posters and handbills can be obtained from the Hon. Secretary, Mr. W. R. Child, of the Contract Branch, 102, Dean Street, W.1.

Culled from the Exchanges.

Gerrard.

Although the "Pounds" Cup has found a new home for the time being, a measure of consolation is vouchsafed to us through the successful efforts of Miss H. M. Davis, in the London Business Houses Diving Championship.

Regent.

Owing to the many Swimming Galas which have been taking place throughout the Telephone Service recently, the London Notes are sure to be of an aquatic nature. We may as well join the general dampness, so are including a few hitherto unpublished details concerning the Gala which took place on Oct. 6 at the Pitfield Street Baths. The cold tabulation of results in no wise serves to satisfy the detail-loving feminine soul, and leaves to the imagination the hopes and fears, the efforts and heart throbs always attendant upon such an important occasion. There are weeks of preparation and determination in which all competitors vow themselves to do their uttermost, and when, and when at long last the great day arrives, everybody anxiously scans everybody else, to ascertain if they are feeling really fit and ready. At lunch time there was a great demand for boiled fish and milk pudding, whilst the more toothsome and indigestible dishes were bravely forsworn.

In Regent there was a certain amount of anxiety because Miss Williams—whose photograph will be found in the "Telephonists' Column"—had been the victim of a 'bus accident a fortnight previous to the Gala, and it was not known until the last moment, whether she would be sufficiently recovered to take part in it. However, to their relief—and to the help of their ultimate success—she entered with a damaged hand and nerves which could not possibly be quite up to the mark.

At the baths the atmosphere was one of tense excitement. All the competing exchanges were well represented and everyone had come prepared to cheer their own particular champion to the last echo. The programme showed a list of names which proved that each exchange had sent their best—Central, Trunks, Victoria, Western, Gerrard and Regent. The result could not be anticipated. Everybody was wondering, wondering—for indeed, it is not wise to under-rate one's opponents. Mr. Pounds presided and was certainly in his element. Of course the event of the evening was the race for the "Pounds Cup" which had been in the possession of the Gerrard Exchange for two years running. Its owners were determined to fight hard for it, and those who desired it for themselves were equally determined. During the heats the spectators watched breathlessly and gave tremendous vent as each result became known. There was much discussion and conjecture during the events which separated the heats from the final. Towards the approach of the latter, there was a general air of uneasiness and apprehension. It was a matter of vital importance to each exchange that they should become the owners of the Pounds Cup and the thoughts of possible failure made them on edge. Girls refused chocolates, saying, "No thank you, not yet." Somebody said "Polly, lend me your smelling salts." Somebody else vowed she couldn't watch the progress of the swimmers—it was too much of a strain, so she proceeded to read the *Daily Sketch* upside down. There was a great outburst when the competitors entered the water and it continued—a vast column of concentrated noise which rose to the roof and if one stopped to listen, one was aware that it was made up of girls' voices hoarsely shouting, Ethel, Phippie, Gerrard, Regent! go it, Oh! one girl clutched her escort and implored him: "Say something, oh, say something quick! Shout *Regent*!" She felt her own vocal powers were worn out—he obediently yelled "Regent" and just then Regent won! It was great for Regentites. Everybody was asking everybody else if it was really true, although they had seen it with their own eyes. One of the nicest things about the victory was the sincere congratulations of Gerrard's captain—it is a great thing to be a good loser and in no wise of less account than the actual winner. Gerrard turned the tables on Regent by wresting from them the Diving Championship which they held last year—Miss Davies' diving feats were beautiful to witness. One cannot help appreciating the difficulties of the situation when one considers the position of the Traffic Superintendent who controls the two exchanges. It was necessary for him to look glad down one side of his face, and properly consolatory down the other side. The race for the men—as far as we are concerned—was chiefly delightful because it gave us an opportunity of seeing Traffic Superintendents and other dignitaries with their hair ruffled. This touch of human nature gave us a new and added respect for them. And they *can* swim too! The Novelty race was highly amusing. The girls emerged from the water in their draggled finery with great and ludicrous dignity—we enjoyed it immensely.

The whole event served to show the high standard of enthusiasm and endeavour which prevails and the grace and prowess of the swimmers were worthy of the highest priase. It might be well to note that the girls who refused the chocolate before the *Pounds* Cup Final, made up for it afterwards.

PERSONALIA.

LONDON TRAFFIC STAFF.

Resignations on account of marriage :—

Telephonists.

Miss D. CANN, City.
Miss E. E. CRABBE, City.
Miss R. C. BURRILL, Museum.
Miss E. A. RICHARDS, Museum.
Miss G. M. ROWE, Victoria.
Miss M. B. CROUCHER, Victoria.
Miss E. ALCOCK, Victoria.
Miss E. F. YALDEN, Victoria.
Miss D. W. KNIGHTLEY, Palmers Gn.
Miss K. E. HURN, East.
Miss G. SPRIGGS, Trunk.
Miss R. E. BAILEY, Trunk
Miss E. KENNEDY, Trunk.
Miss G. E. BARTON, Trunk.
Miss E. M. POOL, London Wall.
Miss W. M. KING, London Wall.
Miss F. E. BRADBURY, Central.
Miss E. A. SHEATH, Central.
Miss C. U. KIER, Central.
Miss E. A. WILLIAMS, Paddington.
Miss A. HERRIDGE, Hammersmith.
Miss E. A. PLOWMAN, Finchley.
Miss E. A. GWINNELL, Avenue.

CENTRAL TELEGRAPH OFFICE.

Mr. W. H. OFFORD, Superintendent, High Grade, promoted to Assistant Controller.

Mr. T. M. ALMOND, Superintendent, Lower Grade, promoted to Superintendent, Higher Grade.

Mr. J. J. MANSELL, Superintendent, Lower Grade, promoted to Superintendent, Higher Grade.

Mr. H. HAYMAN, Assistant Superintendent, promoted to Superintendent, Lower Grade.

Mr. W. I. WOOD, Assistant Superintendent, promoted to Superintendent, Lower Grade.

Mr. A. M. MARTIN, Assistant Superintendent, promoted to Superintendent, Lower Grade.

Mr. F. J. PALMER, Overseer, promoted to Assistant Superintendent.

Mr. E. COOPER, Overseer, promoted to Assistant Superintendent.

Mr. A. J. JELLIE, Overseer, promoted to Assistant Superintendent.

Mr. C. A. KINDON, Overseer, promoted to Assistant Superintendent.

THE

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CONTENTS.

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HOW THE TELEPHONE WORKS.

By A. Crotch.

III.

The Telephone Exchange.—We have seen how two "stations" or "subscribers" are enabled to have speech with each other. The next problem is to set up the telephone exchange or centre to which all the subscribers' lines are brought and where are provided the means by which any member can be put in communication with any other member.

The main element of such an exchange consists of a tablet or board on which are mounted a quantity of switchsprings or jacks and annunciators or indicators. Every line is brought to one of these jacks whose springs are in series with the indicator—a simple electro-magnet provided with a shutter. The first current of a series from a calling generator liberates the shutter and attracts the operator's attention. The latter is provided with a number of pairs of "plugs and cords," that is, a cord consisting of two or three flexible conductors, on each end of which a plug is connected. One of these pairs is inserted in the jacks of the calling and wanted subscribers and the two lines are thus put in connexion with each other. The insertion of a plug to a jack breaks certain contacts, cutting off the calling indicator and substituting the other subscriber's line. The act of putting them through also brings in a third piece of apparatus, the "ring-off" indicator, in bridge between the lines (at the exchange). This indicator is of high impedance so that the speaking currents, with their high frequency, will not traverse it, but the ringing current will. The dropping of this shutter is the signal for the operator to sever the connexion.

Multipling.—With an increasing number of subscribers, larger switchboards are required and more operators. With the increased size of the board it becomes very difficult for a single operator to reach the full extent of the board. Hence the plan was evolved of "multipling" the subscribers' jacks—that is, of repeating them on a second space so that all the operators have an equal chance of reaching them. This "multiple" can, of course, be repeated as many times as is necessary and the result is that every operator, in any position, has before her the full range of the entire exchange. This plan, however, at once demands that an operator, before plugging into a wanted subscriber's jack, shall be assured that that subscriber is not already engaged, that is, that no connection has already been made on another section of the multiple, out of sight of this particular operator. This is the function of the third conductor on the plug and cord. Before inserting a plug in the jack required, the operator touches the "bush" of that jack with the tip of her plug. If a connexion already exists, a current will pass to the operator's receiver giving a "click" therein. If no sound is heard, it indicates that this line is clear; the plug can then be pushed home.

By the plan just indicated, it was necessary for a subscriber to "ring up" the exchange by means of his own generator. The latter is got rid of and the calling rendered automatic by the following plan. At the exchange a battery, in series with the calling indicator, is connected to the two lines of each loop. At the subscriber's end, however, one of these lines is left disconnected. When the receiver is lifted, the circuit of the loop is established, and a path is open to the battery current, which then actuates the indicator. By this plan, therefore, to get the operator, it is necessary simply to lift the receiver from its hook. The replacing of the receiver breaks the circuit and restores the indicator to normal.

C. B. Working.—To-day, with an exchange of any considerable size, the common or central battery plan is adopted. By this,

all batteries are removed from the subscriber's premises and the current for the whole is obtained from a single battery of great capacity situated at the exchange. This battery also serves for the signalling, which is automatic. Several advantages of the plan are obvious. The placing of an enormous number of small sets of cells in all conceivable positions in a town, and the necessary maintenance visits, are saved, and the single battery is situated where it can have constant attention.

The relation between the subscriber's apparatus and the exchange is indicated in Fig. 8. The common battery is normally connected to both lines through the calling indicator, but at the subscriber's end the circuit is broken by a condenser which is in

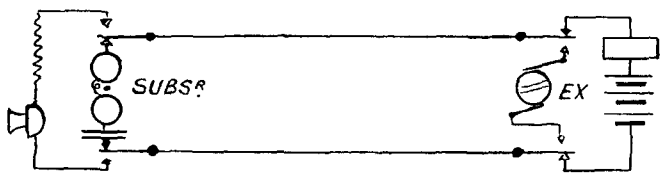

FIG. 8.

series with a magneto bell. When the exchange calls, the generator is applied to the loop and the bell is rung through the condenser. when the subscriber requires the exchange, he lifts his receiver and this brings one winding of his induction coil and his transmitter across the lines, thus opening a path for the current from the exchange which actuates the calling indicator.

Fig. 9 shows the connexions of the subscriber's set. It is actually a wall set, but a table instrument obviously consists of the same essentials, differently arranged. On the right of this figure the skeleton of the connexions is shown.

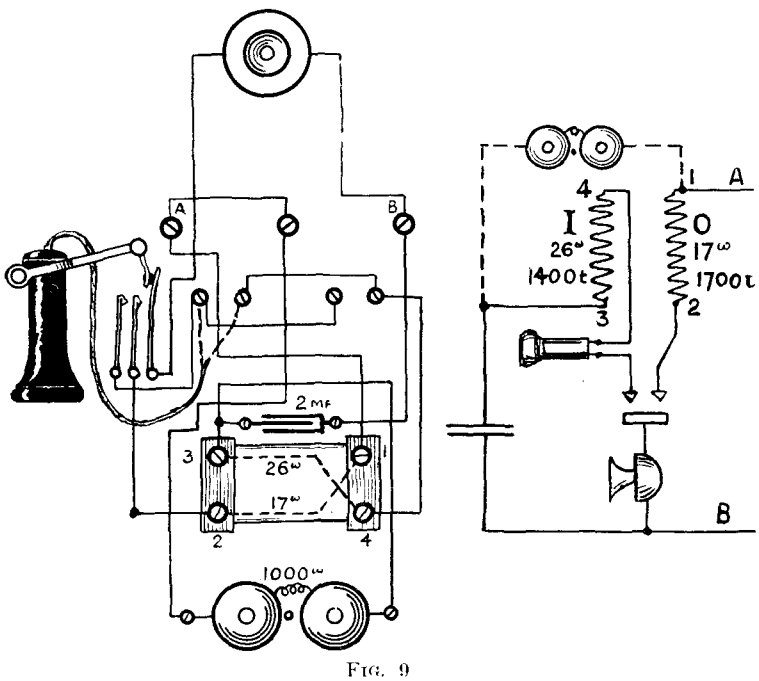

FIG. 9

The transmitter is the " solid back " of Fig. 5. The induction coil is considerably larger than the one used for magneto working and the ratio between primary and secondary winding is considerably different. This will be understood when it is remembered that this induction coil has to serve in the reception of speech as well as in its sending out. Its first winding is of 1,400 turns, of 26 ohms., and its second of 1,700 turns of a larger wire, giving a resistance of some 17 ohms.

The subscriber's connexions at the exchange are shown in Fig. 10—that is, the essentials. In every section of the exchange the subscriber has a jack: this is shown at the top of the figure. In addition, he has an " answering " jack on one particular section only. That is, his calls are received on one position only, but he can be *called* on any section. All these jacks are in parallel with each other and all their bushes are connected together. CO is the " cut-off " relay: through its contacts one wire of the loop

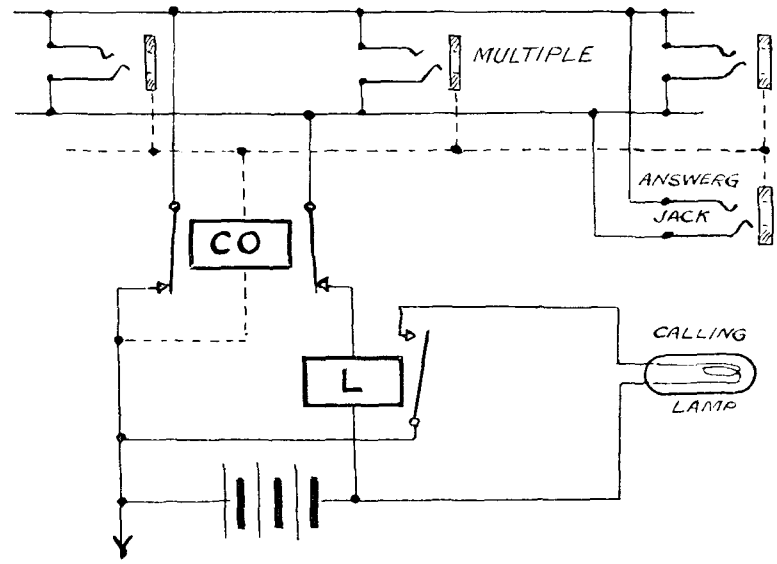

FIG. 10.

is taken through the line relay L to one pole of the common battery. and the other line to the other pole. When the subscriber lifts his receiver he opens a path between his two lines, the current flows and actuates the line relay. Its armature closes the circuit of the calling lamp and gives the signal to the operator that he requires attention.

The line and cut-off relays are generally mounted in pairs and are indicated in Fig. 11. The first is a simple electro-magnet with return pole-piece on which the armature plays on its lower edge. The other is somewhat different in its arrangements. When it is energised, the armature rises and an ebonite stud passing through the lower spring pushes the upper one away, thus breaking the contact. There are two sets of these springs mounted side by side.

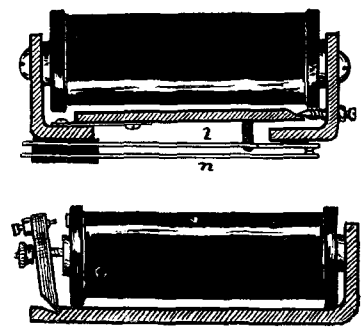

FIG. 11.

The essentials of the cord circuit are shown in Fig. 12. In the centre is the " repeating coil," an induction coil of equal windings each of which has to serve as primary or secondary as speech is uttered at one end of the circuit or the other. It really consists of two coils, but each is divided in two so that the battery may be inserted in the middle. From the upper end of each coil a connexion goes to the " supervisory " relay and thence to the tip of the plug. The lower end of each winding is taken to the ring whilst the shank is connected to one side of the supervisory lamp, the other

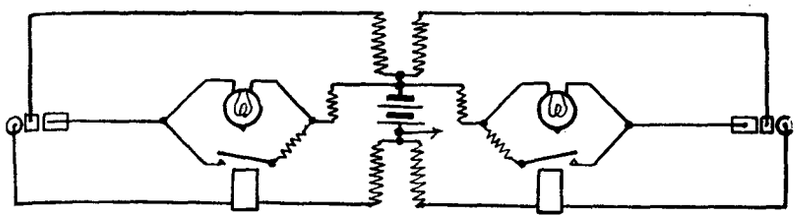

FIG. 12.

side going, *via* a resistance coil, to the negative pole of the battery. The armature of the relay, when attracted, puts a shunt across the lamp and thus extinguishes it. On the calling plug side a speaking and ringing key is inserted (not shown) by which the operator can come in circuit and by which she can ring up the required subscriber.

(To be continued).

DEWSBURY NEW EXCHANGE.

AN interesting event, reminiscent of pre-transfer days, took place at Dewsbury on Saturday, Oct. 28, being the occasion of the opening (involving the transfer of some 1,000 circuits) of a new C.B. (No. 1) Exchange.

Invitations to the function had been sent out in the name of "The West Yorkshire Telephone and North-Eastern Engineering Districts Headquarters' Staffs" to the Mayor, Mayoress and a number of prominent local officials and their wives. The Mayoral party, accompanied by the mace-bearer, reached the building at 2.45 p.m., in time for the opening at 3 o'clock. They were met at the entrance and conducted to the very commodious Switchroom where the assembly was held. The visitors were formally welcomed by the Surveyor and District Manager. The Mayoress, after opening the exchange and making the first call was presented by the Supervisor with a bouquet provided by the local telephone staff.

After the visitors had been "shown round" by officers of the Engineering and Traffic staff detailed for the duty, a short meeting was held in the retiring room—to give the opportunity for a few speeches—at which the Mayor presided. Afternoon tea, to which Yorkshire hospitality adds a ham sandwich and sausage roll, followed. After the visitors had left, further celebrations of the event took place in the shape of a second tea arranged by the local telephone staff for themselves and friends.

The new building was very handsomely decorated through the generosity of Mr. W. Ballance (florist), a Dewsbury subscriber, who "as a citizen"—to use his own expression—desired to provide the many beautiful ferns and palms which were so much admired.

The occasion was voted a great success by all concerned—as such it was The following chief officers were present :—

Survey Branch :—
Surveyor, District Manager, and Traffic Superintendent.

Engineering Branch :—
Superintending Engineer and Sectional Engineers.

Local Officials :—

The programme of the proceedings is appended, which may be of interest to those who have similar functions in view.

PROGRAMME OF PROCEEDINGS

on the occasion of the opening of the new Telephone Exchange at Dewsbury kindly performed by the Mayor and Mayoress.

HISTORY :

1880.

The first Exchange was opened in Dewsbury and was one of the earliest in the Country.

There were then 17 subscribers connected, operated by one Telephonist. There were no Trunk or Junction circuits.

1922.

The service has increased to nearly 900 subscribers ; in addition to some 159 Junction and Trunk circuits.

The Exchange is staffed by 29 Supervising Officers and Telephonists.

PROCEDURE :

2.45. The Mayor and Mayoress will arrive at the building and proceed to the "Switchroom" with other visitors.

3.0 A few explanatory remarks will be made by Mr. T. A. Bates, Manager of Telephones for the West Yorkshire District, at whose request the Mayoress will press a button and give the signal for the transfer of the circuits from the old to the new Exchange.

After this has taken place the visitors will see the new Exchange in operation and will be given any information desired.

A visit will then be paid to the "Apparatus" room and the plant there explained.

3.30. In the staff retiring room the Mayor has kindly agreed to take the chair at a short meeting, when a few brief remarks will be made by the following : —

Mr. W. H. HANCOCK, Postmaster-Surveyor of the West Yorks District—Matters relating to the new Exchange.

Mr. O. P. LAWRENCE, Postmaster, Dewsbury—Will refer to the Staff.

Mr. E. S. FRANCIS, A.M.I.E.E., the Sectional Engineer, will thank the Mayor and Mayoress for their presence and give some particulars of the installation.

3.45. Tea will be provided.

THE C.T.O. BAZAAR.

THE dates, Nov. 15, 16 and 17, 1922, will live for many a year as red-letter days in the history of the C.T.O., London. In telegraphic history indeed, 1922 may possibly be known in the future as "Bazaar" year, for certainly this function has been the outstanding feature of the present year of grace.

There were certain of us maybe who had their misgivings regarding the possibility of reaching so dizzy a height as *thousands* of pounds may indicate to the statistician. If so we were badly yet gladly doomed to disappointment for as these lines go to the printers we hear that considerably over £3,000 has been realised and additional sums are still coming in.

The Memorial Hall proved all too inadequate accommodation for the hundreds of would-be visitors and buyers who surged up the steps and in many cases, alas, vainly tried to obtain access. The patronage of our ever-sympathetic Queen with her right welcome and appropriate gifts, the willing assistance of the Lady Mayoress, Lady Baddeley (late Lady Mayoress) and Lady Gwendoline Marshall all gave practical encouragement and added brilliancy, beauty and vivacity to each day's proceedings.

What of the trojan labours performed by the many willing workers, men and women alike, who, especially the latter, had for months past spent their time and energies upon scheming, devising and working on behalf of this great effort to aid certain London hospitals ?

It would be invidious to pick out any particular stall-holder, concert-organiser or side-show proprietor for special praise where all laboured so whole-heartedly and unselfishly. The atmosphere of general satisfaction which prevailed when the last article had been sold on the last day of the function—a certain high functionary assuming the *role* of Dutch auctioneer—was typical of the splendid team-work which had gone so far in producing the finest effort ever made by the C.T.O.

THE RETIREMENT OF THE TRAVELLING SUPERVISOR, FIFE SECTION, EDINBURGH, DISTRICT.

ON Aug. 18, 1922, Mrs. A. H. Irvine, Travelling Supervisor for the Fife Section, who has been 35 years in the Service, was presented with a case of cutlery and a wallet of Treasury notes by the staff of the late Dundee Telephone District on the occasion of her retirement from the Service.

The presentation was made by Mr. Mackenzie, Postmaster, Kirkcaldy, who, in very appropriate terms, assured Mrs Irvine of the unanimity which characterised the movement culminating in this meeting of her old friends and well-wishers, who were most desirous that she should carry away with her some tangible expression of their kindly feelings and their sincere wishes for her future happiness.

Mr. Hastie, Contract Officer, who has been associated with Mrs. Irvine in the District during the greater part of her service, thanked the contributors on her behalf for their handsome gifts, and spoke highly of Mrs. Irvine's capabilities. Mr. Lambert, the Engineering Officer, also paid tribute to Mrs. Irvine's qualifications as a Supervising Officer, referring particularly to the invariable spirit of helpfulness and camaraderie which was ever present in the performance of her duties.

The meeting was also addressed by Mr. Lynch from the Traffic Office Edinburgh—one of the transferred Dundee staff—who spoke to the pleasant relations which existed between Mrs. Irvine and the other members of the staff, and who, on behalf of the members of the Dundee Traffic staff, wished her long life and happiness in her retirement from official duties.

Thereafter tea was served by Misses Telfer and Kirk, Supervisors of the Kirkcaldy trunk and local exchanges respectively, bringing a most enjoyable evening to a close.

PHONOGRAM WORKING.

BY W. C. GRIFFITH (*Headquarters Traffic Section*).

(Paper read before the Edinburgh Telegraph and Telephone Society.)

THE opening meeting of the 1922-23 session of the Edinburgh Telegraph and Telephone Society took place on Oct. 4, Major A. A. Jayne, Controller of Telegraphs, presiding in the unavoidable absence of Brigadier-General Price. There was a large and representative audience present to hear the paper submitted by Mr. W. C. Griffith (Headquarters Traffic Section) on "Phonogram Working, with special reference to Ancillary Equipment," and the interesting discussion which followed indicated that the functions of the Society, in stimulating the exchange of ideas on the various problems confronting the Telegraph and Telephone Services, were being fully recognised by the members.

Mr. Griffith said that a number of factors had contributed of late years to increase the importance of phonogram and telephone-telegram work. As regards phonogram working, the steady increase in the number of subscribers had necessarily tended to increase the number of telegrams handed in by telephone, while similarly increasing the opportunities for telephonic delivery of telegrams. As regards telephone-telegram work the development of the public telephone system had provided facilities for serving many small offices which it would have been unduly expensive to serve telegraphically. Later years too had brought a further development in the system of direct telephoning between comparatively adjacent offices in order to avoid intermediate telegraphic transmissions.

"It will perhaps," he proceeded, "be of interest if at this stage I comment upon the advantages of telephonic disposal of telegrams, and it will be convenient if in this connexion we consider phonograms* and telephone-telegrams separately."

The phonogram service is an obvious advantage to the public. It enables subscribers to hand in telegrams without leaving their offices and homes, and to hand them in at hours when they could not otherwise be despatched and to hand them in more quickly, in most cases, than they could be taken by messenger. Similarly it enables subscribers to receive telephone messages which might have taken longer to deliver by hand, and, after normal delivery hours, messages which would otherwise have been delayed till next morning. Further, phonogram services are paid by quarterly account instead of by cash payment for each transaction The advantages of the phonogram service from the point of view of the Department are less obvious but none the less real. It is clearly cheaper to accept a written and stamped telegram over the counter than it is to accept it by telephone, to write it down, and later to render an account and collect the charges, and were there no compensating advantage the phonogram service would clearly be an expensive facility to offer to the public. The compensating advantage lies almost wholly in the opportunity which the service affords for the Department to choose the accepting office—called the "appointed office." By concentrating the phonogram work of an area upon the main transmitting office a large number of transactions between small sub-offices and that main office may be eliminated. Detailed returns taken recently showed that of phonograms accepted at a number of representative offices 55 per cent. were from subscribers whose offices or homes were nearer to sub-offices than to the "appointed office" and it is reasonable to suppose that most if not all of these messages would have been handed in locally had the phonogram service not been available, and would have suffered an additional transmission. Studies of the costs involved, making full allowance for exchange switchings, junctions, &c., show that the saving on this 55 per cent. of the phonograms more than compensates for the loss on the other 45 per cent. We have then in the acceptance of telegrams from subscribers by telephone that rare combination of a special facility alike advantageous to the public and economical to the Department.

In considering the delivered phonogram service we are on more difficult ground, but fortunately we are able to discriminate comparatively freely as to which messages shall be offered by telephone and which shall be delivered by hand.

The telephone-telegram service offers advantages in a different direction. To the public they are indirect in that, as previously mentioned, the service enables many small telegraph offices to be opened which could not otherwise be served. To the Department the great advantage is that, by utilising existing telephone junction circuits the erection and maintenance of many long telegraph circuits can be avoided. As already mentioned arrangements are now being made to divert short-distance messages to direct telephonic transmission between office of origin and office of delivery with consequent acceleration.

Necessity for Phonogram Equipment.—It would be possible to give a phonogram service without further equipment than the provision of the necessary number of circuits between the telephone exchange and telephones on the phonogram positions, and such an arrangement is in fact standard where the number of such circuits does not exceed two. Reasons of economical working make the provision of some form of switching apparatus necessary at the phonogram positions in larger offices.

It has been decided as a matter of policy that subscribers ought not, except in very rare instances, to be told "Number engaged" when they call "Telegrams." The reasons for this are obvious. The Department ought to set an example in providing adequate circuits for its traffic, while subscribers who want to send telegrams, which are of their nature urgent communications, naturally chafe at delays in handing them in. Operating conditions in telephone exchanges are such that telephonists have no facilities for holding over, for even brief periods, calls which cannot be completed on demand. Accordingly phonogram circuits must be provided on a basis which will ensure that it shall, except in rare instances, always be possible to give connexion to one on demand. At the phonogram positions, however, there is not quite the same necessity for an absolutely instantaneous answer. The answer of a phonogram telephonist to a demand from a subscriber for "Telegrams" is equivalent from the point of view of the subscriber to the answer of a called subscriber. The average time taken to answer the bell by a called subscriber is about 12 seconds, and the service may be regarded as reasonably good if the period which elapses between the time when the exchange operator calls on a phonogram circuit and the time when the phonogram telephonist answers does not exceed this figure. This period of permissible delay may be utilised to achieve very appreciable staff economy by allowing incoming calls to be "held over" for brief periods so that by overlapping, the load may be "evened up," and the calls, after waiting their time, be handled by phonogram telephonists, who, though perhaps engaged when the calls were made, have become free in that waiting period. The same result could be achieved if each phonogram circuit from the exchange terminated on a separate instrument and the staff moved about from instrument to instrument. Such an arrangement would obviously be unsatisfactory, and hence the provision of concentrating equipment.

Types of Phonogram Equipment.—Two distinct types of concentrating equipment are used for phonogram work, the older form, the concentrator, being gradually displaced by the newer form, the ancillary panel.

The "concentrator" is a small switchboard equipped with jacks and indicators (magneto or lamp) upon which terminate the exchange circuits, and single cords upon which terminate the lines from the phonogram positions. This type of equipment achieves its purpose but, except in the very largest installations the switching load, even in the busy hour, is insufficient to employ the concentrator operator fully, and in practice therefore she is expected to handle messages also. This arrangement is open to the objection that her attention is divided between two quite dissimilar duties, and it is difficult for her to perform either with full efficiency. A simple development of this system in offices where there are three phonogram positions is to place the concentrator on the middle position and require each telephonist to operate her own calls. This the two end telephonists can readily do by reaching in front of the middle one, and this arrangement completely overcomes the objections to making only one telephonist responsible for the switching. The operating of an ordinary concentrator by each telephonist for herself is however restricted, by limitation of reach, to three positions. The logical development along the same lines is the evolution of ancillary equipment.

The primary feature of ancillary equipment as applied to phonograms is that it is arranged that every calling signal appears before every phonogram telephonist. This is arranged by placing on the centre position of each group of three positions a panel upon which appears every circuit, whether incoming or outgoing—in fact by repeating the whole "concentrator" every three phonogram positions. Each calling signal is thus given simultaneously on every panel, and, since the telephonists on each side of the centre position of each group of three can easily see and reach the panel on the centre position it follows that every telephonist is in a position to answer every call. Similarly all outgoing circuits appear on every panel and every outgoing circuit is thus directly available to every telephonist.

This type of equipment has the great advantage that during slack periods of the day it may be closed down position by position by withdrawing staff until in the limit the whole of the work can be performed from any one panel without any reference to the other panels which there may be.

The ancillary system has now been adopted as standard for all but the very largest installations.

Standards of Service.—In order that a uniform standard of service may be given in both small and large towns variation in the load of the phonogram telephonists is necessary. It will be obvious that in a large installation the chances that a telephonist is free at the moment at which a call is received will be greater than in a small installation, and similarly if all the telephonists are engaged at the moment at which a call is received, then the chances are that one will become free to take the new call sooner in the case of a large installation than in a small. In order to compensate for this and so to give a service of approximately uniform quality it is necessary to reduce, in the case of small installations, the chances that all the telephonists shall be engaged when a call is received, *i.e.*, to reduce the load, so that on a larger proportion of the calls there shall be a very quick answer (theoretically instantaneous) on those calls received when a telephonist is free, to balance the inevitably slower speed of answer on the remaining calls which mature when all the telephonists are engaged. (It will be observed that this arrangement, while it may preserve a uniform *average* speed of answer in small and large installations cannot prevent the maximum fluctuations from that average being greater in small installations than in large).

In the foregoing remarks the references to "large" and "small" installations apply not only to offices of different size but also to the varying conditions which occur throughout the day within any one installation due to varying load. The conditions at an ancillary installation with, for

* Phonograms are telegrams passed by telephone between the public and the Post Office.

Telephone-telegrams are telegrams passed by telephone between two Post Offices.

example, ten positions when only three are staffed are precisely the same as those at another office with only three positions when all are staffed.

The fact that a large phonogram installation can thus be staffed much more efficiently than a small one for the same quality of service is of great importance. If the load per operator attainable when five positions are staffed is represented by 100 units, then it is considered that the load per operator when only one position is staffed, to give the same average quality of service, must be only 60 units, which is a strong argument for concentrating phonogram work on big offices.

From another and equally important point of view concentration of phonogram work is advantageous. The general system of telegraphic circulation is now such that minor offices are normally connected to their group centres, which either are, or have outlets to, area centres and these in turn to zone centres. If then phonograms can be concentrated upon the highest possible class of office one and sometimes two telegraphic transmissions may be saved. The extent to which concentration can be carried is, however, clearly limited by considerations of the cost of the telephone circuits which must be provided for this traffic—that is, in effect, by distance. The limiting economical distance in turn depends upon the proportion of messages saved a transmission by concentration on a more distant office with superior outlets.

These factors have therefore led quite logically to the system of "appointing" certain offices, chosen to suit the convenience of the service, to accept telegrams from subscribers, and the natural tendency is to decrease the number of such offices.

Delivery of Telegrams by Telephone.—The extent to which telephonic delivery of telegrams is practicable depends upon the willingness of subscribers to accept their messages in this way. There are always subscribers who will not accept telegrams by telephone, either for fear of mistakes or loss of secrecy or because the number is so great as to make too much demand upon the time of the employee who takes down the messages, and upon the subscriber's telephone circuit.

The conditions under which, broadly speaking, it is and is not economical to deliver telegrams telephonically depend upon (*a*) the distance of the address from to office of delivery; (*b*) the type of address; (*c*) the size of the town; (*d*) the necessity or otherwise for transmission from the head office to a sub-office for delivery.

(*a*) THE DISTANCE OF THE ADDRESS FROM THE OFFICE OF DELIVERY is a fundamental condition in the economy of telephonic delivery. It may be taken that it is normally more economical to deliver by messenger with ½-mile radius than to deliver by telephone, and in certain circumstances this radius may be greatly increased.

(*b*) TYPE OF ADDRESS.—There are three types of address:—
Full.
Registered.
Telephonic.

The difficulty, and therefore cost, of segregation of telegrams for subscribers from those for non-subscribers depends upon the type of address employed.

Full Addresses.—Reference to a directory in the case of every telegram is necessary.

Registered Addresses.—Reference to the registered address list shows the telephone number and postal address, and segregation is automatic.

Telephonic Addresses.—No reference is necessary to ascertain whether the addressee is a subscriber, or his telephone number, but a reference is necessary to ascertain the postal address to which the confirmation copy must be sent.

On the whole the most convenient form of address for telephonic delivery is the registered address.

(*c*) THE SIZE OF THE TOWN has a considerable bearing on the question. In small towns the circulation officers get to know without reference the names and telephone numbers of regular users of the telegraph service and pick out their messages without expenditure of time or effort. In large cities the matter becomes beyond the capacity of memory and reference to a directory is necessary.

It may, therefore, be said that except in small towns it is uneconomical to pick out fully addressed telegrams for delivery by telephone within the normal hand delivery area of the main delivery office.

(*d*) THE NECESSITY OR OTHERWISE FOR TRANSMISSION FROM THE HEAD OFFICE TO A SUB-OFFICE FOR DELIVERY has a great bearing on the question of economical telephonic delivery. It may be taken that, where an additional telegraphic handling may be saved by direct telephonic delivery from the head Post Office, then that form of delivery is more economical (as well as more expeditious) within a radius of about 20 miles than transmission by telegraph to a sub-office and subsequent hand delivery.

Direct Disposal of Telegrams between Adjacent Offices.—The public, somewhat naturally always expects a telegram to a place comparatively near to be delivered more expeditiously than one to a more distant place, although in practice the short-distance message may require quite as much handling as the long-distance message if passed through the ordinary channels of circulation—in fact it may often require more. With the object of reducing as far as possible delays on short-distance messages, as well as of economy in handling, arrangements have recently been made for short-distance messages to be telephoned direct between office of origin and office of delivery when both are connected to the public telephone system and no direct telegraph circuit exists.

Counterfoil Forms.—There has been under trial for some months in the Central Telegraph Office a combined form and ticket for phonograms, or, as I think it might preferably be described, a phonogram form so designed that the portion which relates to the fees can be detached and sent to the Telephone District Manager, and the message itself sent to the instrument room. The aim in designing this form to avoid the manuscript duplication of any item on both main form and counterfoil, in order to save unnecessary labour (which involves increased circuit holding time) and to prevent the errors which now arise from copying the information from the form on to a separate ticket. The subscriber's number accordingly appears only on the counterfoil. Re-association of form and counterfoil, if necessary, can be made by means of the serial number, which is stamped on both.

The question of introducing the form generally, is still under consideration.

Phonograms from Coin Box Call Offices.—It has been suggested that the public shall be permitted to use any coin box call office circuit for the purpose of handing in telegrams. The proposal may sound a little revolutionary in that it would in effect make every call office a telegraph collecting office, but it has much to recommend it. There are many districts, particularly in the suburbs of large towns, where call office facilities are available and where the nearest telegraph collecting office is some little distance away, and at night and on Sundays this condition is very common. It would be an undoubted convenience to the public in such cases to be able to use the call office to hand in telegrams, which at such times may be assumed to be specially urgent. The difficulty lies in the fact that the fees would have to be collected in pence, and as the usual call office fee would of course be charged the caller would have to provide himself with at least fifteen pennies (twenty-one on Sundays). If, however, he is able to fulfil this condition there seems no reason for refusing the messages. The fact that the call office fee would be payable in addition would automatically restrict the use of the facility to reasonable limits. The matter is under consideration.

The paper was followed by an interesting discussion in which Major Jayne and Messrs. Moncrieff, Potts, Rankine, Mendine and Davis took part.

The syllabus for the current session so far as it has been completed includes Lieut.-Col. Crawley, M.I.E.E., etc., on "Wireless Communications" (Nov. 7); Miss Norah Milnes, B.Sc. Director, School of Social Study and Training, University, Edinburgh, on "The Economic Position of Women" (Dec. 5). "The Murray Multiplex," by W. P. Morris, Esq., of the *Scotsman* (Jan. 9), and "The Working of a Large Telephone Exchange," by W. C. Yarroll, Telephone House (Feb. 6). Subject for the meeting on March 6 has yet to be fixed.

TELEGRAPHIC MEMORABILIA.

THE broadcasting of films in the near future may seem to be a rather far-fetched proposition even to those who may have ceased to marvel at any development of radio-communication. This, however, is prophesied by the Society of Motion Picture Engineers of America as a certain achievement during the next year or two. Telephotography, however, has of late become considerably simplified and at least one system is known to exist which by means of the five-unit telegraph code an high-speed telegraph apparatus is capable of transmitting over long-distance wires certain signals. These signals can then be reduced to minutely fine degrees of light and shade by means of ancillary apparatus at each end of the circuit. Now any telegraph apparatus workable through a metallic circuit can also be worked with the ether as a medium of transmission. While the writer does not profess to be in the slightest manner acquainted with the method likely to be adopted for this particular broadcasting of films, nevertheless, the possibility of such a development is assuredly well within practical limits. Whether financially the scheme would prove a sound proposition is quite another matter.

The opening meeting of Session 1922-23 of the T. and T. Society at the Institute of Electrical Engineers on Oct. 23 was conspicuous by a good attendance of the membership. Sir Henry Bunbury, K.C.B., the Chairman for the year gave an extremely interesting address on "Technique" which once the audience had warmed to its work gave rise to some interesting comments from Mr. F. J. Brown, Mr. John Lee, Major Brown and others. The suggestion by one of the younger members of the audience that when a junior officer was first introduced into a department he should be shown not only the routine of his own particular work as a junior but should also be shown in a general way the connexion between his own special job and that of the organisation of which it formed a part, did not receive the attention which it deserved. This is not to say that there was any lack of sympathy towards the idea. It was in fact due rather to the lateness of the hour at which it was made. In at least one department of the C.T.O. this principle is actually carried out with every new entrant who is escorted from point to point by an experienced officer of supervisory grade, who explains the general lay-out of the department, the functions of each section and their relationship to the whole. This occupies say a day or two. Thus, the novice from the first is able to seize the idea that the simple task allotted him has a definite relationship to every other function which he sees in operation around him. The time spent on this introduction repays itself manifoldly.

The impression one carried away from the gathering was that of the genial personality of the new Chairman whose key-note was struck and

sustained throughout in the crisp sentence when speaking of the staff of a department, "we are dealing with human nature not with a machine."

The recent meeting of the Eastern Telegraph Company which authorised the declaration of a 10 per cent. dividend free of tax, the carrying to reserve of £500,000, and the carrying forward of £568,000, would appear to be a highly satisfactory result of submarine telegraph cable working. It certainly shows no signs yet of the competition of any of the wireless services. At least that is the presumption for the report now lying before the writer only comments on the money spent on cable renewals, new cables laid, the extension of automatic telegraph apparatus and the bringing up of the staff to its full complement, and that the company's landing licences on British territory had been extended for a period of 25 years.

The Board, however, appears to be just a little hurt at the Government competition for Australian traffic, which is perhaps natural.

When addressing the cadets at the Royal Military Academy, Woolwich, some short time ago, Lord Cavan, Chief of the Imperial General Staff, referred to the heavy casualities among men burying telephone wires during the war, and said that the Army Council had decided that in future wars there would be no telephone wires from "division" to the front line: therefore officers should obtain a knowledge of wireless.

Another Authority recently stated:—

> "In the next war, so far from universal wireless communication being the rule, for practical purposes *there will be no wireless.* The earth's ether will simply be *jammed* by both sides, and that will be the end of *that.* Hence, cable development should be pressed strenuously forward."

So there you are. You pay your money and you take your choice.

One thing is fairly certain. The unceasing efforts made by wireless experts to minimise outside interference has led to much greater knowledge of the possibilities of *jamming* than existed during the last war.

To the Managing Editor:—I do not know whether it is the levity of our friends, the ladies of the Telephone Service, which leads me, a mere man, to claim equality of sex as regards a writer's privilege or whether it is the approach of Merry Yule-tide, but having obtained the kind permission of the Editor of the *Cable Room Monthly* to publish the following piece of fun and frolic from its pages, I am presuming your permission by sending "How Bill Adams Whacked the Macaroni," to the printers for insertion in the December' column of Memorabilia. I may say that the article was written after reading some complimentary notes on the excellent work of the Government staff when dealing with certain wireless traffic. Begins:—

"It was like this, sir, I was having a look at the Circular and reckonin' my chances for one o' them Postmaster jobs, like Liverpool, five pun a day an' find yer own grub, when a chap came runnin' up like as if he'd lost his train or forgot to pay the waitress; out o' breath 'e was so's 'e could hardly stutter, and 'e ses 'Bl'Adams,' ses 'e, 'Cap'n wants yer.' 'Send 'im along my man,' I ses. 'Nunno,' ses 'e, 'come up to Leafield quick.' An' when 'e ses 'Leafield' I smells the rat. 'Right,' I ses, 'get a move on yer.'—And off we pelts to the scene o' action. There was Cap'n and all the bhoys lookin' mad an' paper runnin' at 500 a minute. As soon's they saw me they roared. Up I steps to Cap'n an' salutes an' ses, 'here I be Cap'n,' I ses, 'ready an' willin' to show you 'ow to whack anybody an' anythin', an' earn your economies like I got Wellington's at Waterloo. Wellington ses, Sergeant Adams, ses 'e:—'all right,' ses Cap'n, 'never mind Wellington, think of Halifax. 'Ere's Macaroni turnin' out a hundred a minute and we want to beat it.'—'Just leave it to me Cap'n,' I ses, 'just you all stand round and see me do it.' So 'e showed me about fifty rolls of paper. an' 'e ses they was press. So I ses, 'we'll see to that presently; you go and shout down to the engine-room an' tell 'em to shove every bit o' coal on the fire, an' let me 'ave plenty o' juice,' I ses. So in about five ties the aureoole began to buzz like a mad cat, an' I gets hold of the thing they calls the key an' pushes it down at a eluvarate. The sounder gives a screech, which Cap'n ses means 'you're too slow,' ses 'e. Cap'n, 'e wants me to push the rolls of paper along, but I ses, 'no,' ses I, 'the humin 'and is the most perfick thing in nature,' ses I, 'an' shall it be beat by holey paper,—not likely,' an' I starts off again at 100 words a minute. That bloomin' sounder screeched again; and Cap'n 'e went mad and ran round the room twice. So I speeds up to 150, and the aureoole smoked and looked as if it was goin' to melt; and down in the engine room the poor beggars wa shovelling coal by the ton, to kep the juice movin' for them 200 words I was sendin'. The sounder screeched 'you're not fast enough'; Macaroni's in front of yer by two pages.' So I pushes out 250, and the floor shook so's Cap'n had to dance to keep still. 'Faster, faster,' he yells, 'Macaroni's 500 words ahead.' So I plugged in 300, and the fire brigade come down the street thinking the aureoole was afire. The table began to crack, and the chaps in the engine room fell down dead. Still Macaroni was in front. But I was just gettin' in form, and slammed that knob at 400 a minute, if I did one, sir, and never a lie about it.

"I was on the last page, and sounder, he yelled Macaroni was too. The engines was red hot, and the water in the radiators boiled over. There was chunks fallin' out o' the wall: Cap'n's hair was turnin' grey, and the boys was all slid off to the King'd Hed. 500 I was doin' now, sir, with half a page to go, and the fire engines was coming up all over the place. 10 lines—and up come the escape! 9 lines—and the sky was full o' sparks! 8 lines—and Cap'n's finger fell off! 7 lines, and Sounder yells, 'Macaroni's only one line afront'; 6 lines, and St. Paul's roof was afire! 5 lines—the firemen smashed the windows! 4 lines—Cap'n yelled, and fell out, head first; made me larf so, I lost 'arf a word: 3 lines, and there was such a mob the police had to charge them: 2 lines, and we was neck and neck! larst line, Macaroni guv' a groan—and I finished that line by meself, sir.

"That's 'ow we whacked the Macaroni, sir; whacked 'em 'ollow, we did: it was vairy dry work, sir; beggin' your pardon, sir; I've felt thirsty ever since. Thank you kindly, sir."

According to the Commerce Department of the U.S.A. the telephone system of Esthonia leaves rather much to be desired. This was of course a relic of the old Russian *regime.* The only connexion with other countries is one with Petrograd and a second is with Helsingfors by means of the submarine cable. The present central office equipment is a veritable hotch potch. Some parts are of old Russian material, the cables are of German manufacture, the connecting wires are Swedish and the remainder of the apparatus is apparently the product of the Esthonian factory in Dorpat. There are a few underground cables but not being laid in conduits it is not always easy to find them! In these circumstances it is satisfactory to learn that the Esthonian authorities have a scheme on foot for re-organising and renewing the entire system. A switch-board for 25,000 subscribers is mentioned as being part of the plan.

The history of the submarine cable has been full of romance and has fascinated some of the biggest financiers by its possibilities. The writings of Roland Belfort to whom we have previously been indebted for other interesting information have reminded me that perhaps the most sensational financial submarine cable *coup* was that of Jay Gould, who in 1882 suddenly decided to satisfy one of his ambitions by laying two cables across the Atlantic. Without further hesitation he cabled from America to Siemens of London asking for an estimate for "making and laying two Atlantic cables." Siemens replied with a promptitude rather betokening that Atlantic cables were a stock line that the order could be executed for something considerably over £1,000,000. With equal promptitude Gould replied:—"Fifty thousand pounds paid to your bankers here. Make and lay two cables according estimate." The work was put in hand forthwith!

The article in last month's issue on "A Universal Five-Unit Code for Printing Telegraphs" has been read with exceptional interest by a number of telegraph authorities. The only criticism that has come to my knowledge concerning it is the comment that tables of "letter frequency" to be reliable should be based on a wider basis than one short leading newspaper article. No doubt Mr. Thompson will be able to enlighten our readers as to whether the tables given are based on the averages of a number of leading articles or simply upon one sample taken haphazard from newspapers of the respective countries mentioned. The October number of the *P.O. Electrical Engineers' Journal* also contained an article by A. C. Booth on the same subject. The latter takes the view that the Baudot code should be the one adopted for international use as being that likely to cause the minimum disturbance in the telegraphic world by its adoption. Mr. Booth maintains that "the large number of present-day business telegrams, consisting of ten-letter code words made up with a high proportion of the less frequently used letters, entirely destroys the basis of the allocation of both the Murray and Siemens' alphabets."

Electricity, in a paragraph or two regarding "Broadcasting Risks," warns the amateur against certain dangers attending the careless erection and use of apparatus. The following few lines may prove not without their value, even to those of our craft whose familiarity should itself remind them of the necessary precautions to take.

> "There is the risk attendant upon the use by some amateur experimenters of the house wiring system as a sort of network aerial. Special connectors are marketed enabling the wireless set to be connected up to any convenient lamp-holder or wall socket by the insertion of a plug connector. Unless these devices are designed with an ample margin of safety and barrier insulation, the practice is likely to cause accidents in certain circumstances. Finally, there is the danger attendant upon an unearthed aerial during thunderstorms. Every wireless aerial should be furnished with simple facilities for earthing when not in use, and, to ensure safety, it is as well to install one of the better-class lightning protectors as used in connexion with telegraph or telephone circuits. Such apparatus, designed for this specific purpose, will automatically shunt a lightning discharge to earth should the aerial function as a conductor, and may well save its nominal first cost many times over in the first twelve months of broadcasting."

The Inaugural Address of the I. E. E. for 1922 given by the president Mr. Frank Gill, O.B.E., was eminently scientific both from the economic and the electro-technical standpoint. It was also pre-eminently simple and direct in its diction though dealing with the highly technical subject of long-distance telephony. Mr. Gill naturally admits the difference of conditions obtaining when he urges the necessity of unity of control in trans-European communication as the key to efficient and economical long-distance circuits. His proposals are "To operate all the through business both within and between the various countries in Europe, by a single long line company working under licences from the various governments, taking the calls from the local originating organisations and being entirely responsible for them until turned over to the local receiving organisations." This arranged there would be no insurmountable problem in establishing direct telephonic communication between London and say Delhi, Calcutta or Rangoon, as part of the daily routine of the Central Exchange.

Mr. Gill proposes a conference of all the European telephone authorities including Great Britain, companies, municipalities and Government departments to study the problem in detail. In the U.S.A. utilising the "carrier system four wires between Chicago and Omaha, to London (450 miles about) produce 27 separate communications, *i.e.,* 2 physical telephones, 1 phantom ditto, 4 earthed telegraph circuits (workable one-way or two-way) and 20 two-way carrier telegraph circuits.

Mr. Gill's enthusiasm for his calling is well-known, but it is feared that even that quenchless fire would become damped if instead of the one-tongued hearty unified co-operation of trans-America he had to deal with a dozen nationalities, speaking as many languages, with purses more or less filled with paper money, and with differing national ideals as regards the value of an international communal communication service.

Unified control of international communications, railways, telegraphs and telephones is not altogether a new proposition. One recognises therein a splendid ideal and we here in Europe look wistfully across the Atlantic where these conditions are realisable, comparatively with a stroke of the pen.

As to Conferences, even in Telegraph Conferences and their Convention there is a latter-day tendency to ignore some of the most salient regulations to which the high-contracting parties have placed their signatures.

According to *Reuter's* agency a committee has been formed for holding a Wireless Telephone and Telegraph Exhibition in Geneva some time during 1923.

The same authority tells us that the new Fascist Prime Minister proposes to hand over the postal, telegraph and telephone services to private enterprise as these services are at present being run at considerable loss.

Is the following quatrain any use to telegraph canvassers ?

"The man who whispers down a well
About the goods he has to sell,
Will never gain the golden dollars
Like him who climbs a tree and hollers ! "

The office of origin is said to be New York !

Mr. F. J. Muller, Assistant Superintendent of the C.T.O., London, retired upon reaching the age-limit on the 13th of last month. Fred leaves behind him a reputation and a record of efficiency of which anyone may well feel proud. His knowledge of the C.T.O. and its circuits was always well abreast of the latest developments and changes which is high tribute during the last decade or two. He leaves us with nothing but the best of wishes for a long and happy autumn of life from all. Many of us will always recall his helpfulness and willing co-operation in official difficulties with abiding pleasure and no small appreciation of cheerful service rendered.

The following conventions have been entered into between the Marconi Company and the respective Governments concerned. Portugal, for wireless stations to be erected at Lisbon, Madeira, Angola, Mozambique and the Cape Verd Islands, and South Africa, for a specially high-powered station capable of communicating with England. The *Electrician* states that it would be double the power of Ste. Assise near Paris. In the case of the former country the contract is for 40 years and in that of the latter for a period of ten years with the right of expropriation at the expiration of that period or renewal of the license every ten years whichever may prove the more acceptable alternative from the Government's point of view.

If the facts could be published I am fairly well confident that wireless proved a very considerable help during last month's critical time in the Near East. The only thought that struck one as the broadcasting nature of the transmission was realised, was the absolute lack of actual secrecy, as against submarine cable transmission. Experts maintained during the war that there is no cypher code that cannot be deciphered and even Siemens or Baudot or Teletypo or Murray or Western Electric, fitted with change-over shifts for coding and decoding would not in the long run during war-time remain unassailable as regards the secrets they held.

The Western Electric Company's multiplex is now being installed in the Cape Town C.T.O. Our South African correspondent adds the information that some of the younger members of the staff are being trained at the Yost Typewriting School, but he does not indicate the centre with which Cape Town will open this experimental circuit.

Much has been said from time to time as to the exploits of the older school of telegraphists in manipulation. Possibly fancy has at times woven something in the nature of a fantastic story as is the wont of the affectionate concerning the object of their *amour*. Be this as it may, it is becoming more and more evident that the younger generation is not to be denied. Their zeal has been particularly evident these last two or three years with regard to growing expertness in connexion with the working of foreign circuits, Paris Stock Exchange (Hughes), Berlin (Siemens), and Amsterdam (Baudot), and even more latterly the handling of the Banbury wireless program.

Another leaf was recently added to their crown of laurels by the particularly smart management of a defective cable wire between London and Antwerp, and the excellent result (notwithstanding the natural difficulties) of, at times, just a fraction over a message per minute.

Life, the Immeasureable.—There is plenty of physics and chemistry and mechanics about every vital action, but for a complete understanding of it something beyond physics and chemistry is needed. . . . The behaviour of a ship firing shot and shell is explicable in terms of energy, but the discrimination which it exercises between friend and foe is not so explicable. . . .

Life introduces an incalculable element. The vagaries of a fire or a cyclone could all be predicted by Laplace's Calculator, given the initial positions, velocities, and the law of acceleration of the molecules ; but no mathematician could calculate the orbit of a common house-fly !

Oliver Lodge.

Science depends on measurement, and things not measurable are therefore excluded, or tend to be excluded from its attention. But Life and Beauty and Happiness are not measurable. . . If there could be a unit of Happiness, politics might begin to be scientific.

A. J. Balfour.

J. J. T.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEM.

DURING September, for the first time in the history of the Post Office Telephone system, the number of working stations exceeded a million, the total at the end of the month being 1,005,773. Of this total 360,753 were connected with exchanges in the London Telephone area and 645,020 with provincial exchanges. Outside London the Telephone District with the largest number of stations is Manchester with 51,980, Liverpool coming next with 46,976, and then follow Glasgow, 44,894, Birmingham, 36,484, Leeds 34,308, and Edinburgh, 31,455.

It may be of interest to record that the total number of stations in the combined Post Office and National Telephone Company's systems at Jan. 1, 1912, was approximately 690,000 ; and that, allowing for the transfer of the Hull and Southern Ireland systems, the total has been increased by 50 per cent. since the transfer, despite the intervention of four years of war, when development was necessarily suspended and when practically the only new circuits provided were those essential in the national interests.

The local and trunk traffic, which showed the usual seasonal fall in August and September, give signs of a recovery and possibly of a slight increase in October, but there is not yet any indication of a substantial improvement in the calling rate. The gain is rather more marked in the trunk than the local traffic.

Some statistics showing the general development of the service during the 6 months ended Sept. 30 last are given in the appended table :—

	Total at end of—					
	April.	May.	June.	July.	Aug.	Sept.
Exchanges	3,112	3,116	3,115	3,113	3,114	3,116
Exchange stations ...	942,671	947,534	953,931	957,476	962,852	969,126
Private wire stations...	36,960	36,934	36,810	36,627	36,578	36,647
Call offices (stations)...	15,405	15,487	15,573	15,667	15,755	15,838
Call offices in street kiosks	275	289	305	317	327	335
Rural party line stations	3,747	4,101	4,408	4,671	4,894	5,191

Further progress has been made with development of the local exchange system. Among the more important new exchanges opened are the following :—

Provinces.—Bolton. Dewsbury. St. Albans. Chorlton-cum-Hardy.

The following important exchanges have been extended :

London.—Palmers Green.

Provinces.—Leicester. Gt. Yarmouth, Jesmond (Newcastle-on-Tyne), Leeds, Sunderland, Sheffield (Central).

The main underground trunk system has been extended by the completion and bringing into use of a new cable between Birmingham, Wednesbury and Wolverhampton.

During the month of October 18 new overhead trunk circuits were completed and brought into use.

A PERFORMANCE which is perhaps somewhat noteworthy in the telegraph world was accomplished at Newcastle-on-Tyne on Nov. 7 in connection with a speech made by Mr. Lloyd George. The ex-Premier's speech which occupied one hour in delivery was signalled in its entirety over a circuit made up to include six other offices, within 100 minutes (99 minutes to be exact) of the text being handed over to the Post Office ; and not a single correction or repetition was required by any office concerned. Eight S. C. and Ts. (four of them ladies) and a male learner were the officers concerned at Newcastle. Most of the Wheatstone slip used was punched by Gell perforators and at all of the distant stations Creed perforators were probably used.

About twenty years ago such an occurrence might have occasioned the attendance of special staff from other offices, and whether or not this occurred, it would probably have been considered necessary to fit up a second complete circuit for the purpose of giving repetitions. Such a case of no repetitions in a message of this length and no stoppages during the vital period on a circuit embracing several stations affords a good testimonial to the smooth working of the apparatus and to the efficiency of the staff employed.

J. WEBSTER,

P.O., Newcastle-on-Tyne, Nov. 20, 1922.

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NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

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BROADCAST MUSIC—CONCORDS AND DISCORDS.

IN an article in the *Wireless World* of Nov. 18, "H.S.P." urges that broadcasting is likely to "crowd out" the experimenter in continuous wave reception because he is forbidden to use reaction at all on the band 300-500 metres during broadcasting hours (5 p.m.-11 p.m.), that the Post Office is turning down applications for experimental licences wholesale, and that wireless manufacturers are losing their old-established businesses in experimental apparatus and are forced to enter the field with broadcast receiving sets in order to secure a share of the industry.

Doubtless these serious allegations were made in good faith; but, unfortunately for "H.S.P.'s" arguments, the facts do not coincide with his statements.

The condition as regards reaction is given below, and it will be seen that it contains no prohibition of reaction or of heterodyne arrangements. The terms of the condition were settled after full consideration with the interests concerned, and are not unreasonable if broadcast programmes are not to be failures. "H. S. P." will himself remember that during recent programmes repeated appeals were necessary to amateurs on account of gross interference by direct reaction.

The condition reads as follows :—

> The apparatus shall be used in such a manner as to cause no interference with other stations. In particular, between the hours of 5 p.m. and 11 p.m. on week days and all day Sunday, any oscillating valve or valve circuit employing magnetic or electrostatic reaction must not be directly coupled to the aerial or the aerial secondary circuit over the range of wave-lengths between 300 and 500 metres. The use of separate heterodyne circuits coupled to the aerial or the aerial secondary circuit over the range of wave-lengths between 300 and 500 metres is similarly restricted.

That is to say :—

> (1) Any reactive arrangement or a separate heterodyne oscillator may be used directly coupled to the aerial or the aerial secondary circuit on all waves at all times, with the exception of the range of wave-lengths between 300 and 500 metres provided no interference is caused with other stations.
>
> (2) For the range of wave-lengths between 300 and 500 metres—
>
> (*a*) The use of reaction or a separate heterodyne oscillator as in (1) is permissible between the hours 11 p.m. and midnight and from midnight till 5 p.m., Sunday excluded.
>
> (*b*) The use of reaction as a separate heterodyne oscillator directly coupled to the aerial or the aerial secondary circuit is not permissible between the hours 5 p.m. and 11 p.m. on week days and all day Sunday. If the use of reaction or a separate heterodyne oscillator is desired on these waves during these hours, the reaction or separate heterodyne oscillator must be so arranged that a valve is interposed between the aerial circuit or circuits and the circuit to which the reaction or separate heterodyne oscillator is coupled.

On the second count of the indictment, the Post Office can fairly plead "not guilty." During the twelve months ended on March 31 last 4,000 experimental receiving licences were granted and during the seven months ended on Oct. 31 over 10,000 have been granted. We appreciate the interest in the art of wireless created by the present boom and its undoubted educational value, but even so we feel some doubt whether the inclination to carry out serious experiment has spread thus like wildfire throughout the community. We would suggest that the growing desire for experimental licences is a direct result of the attractive broadcasting proposals, and the applicants prefer an experimental to a broadcast licence mainly because of the persistent boosting by the trade of sets and component parts which are not covered by the "broadcast licence," and of the technical (!) advice in the non-technical press that an efficient set can be made for a mere song out of a tobacco tin, half-a-dozen french nails or hairpins, a piece of cardboard, and the remnants of an old spring mattress.

Lastly, the number of potential customers for experimental apparatus has in fact increased exceedingly.

INTERNATIONAL TELEPHONY.

MR. FRANK GILL'S inaugural address to the Institution of Electrical Engineers, of which we publish an abstract in another column, re-opens the interesting subject to which we referred last month : the improvement of telephonic communication between this country and Europe. We agree with him that this can only be realised by definite and unified planning throughout the area to be served, and naturally we give preference to the third of his suggested methods of effecting this much-desired end, viz., by the formation of an association by the various European telephone-owning authorities to study the problem in detail and to endeavour to find a solution of the problem. Indeed, we have good warrant for saying that the British Administration would cordially welcome such co-operation with foreign Administrations and is only too eager to support any comprehensive scheme for the improvement of international telephony which may prove to be feasible.

Recent advances in the art of telephony, especially the increase in the range of long-distance speaking by means of repeaters, have rendered surprising developments possible, and there seems to be no physical, as apart from an economic reason, why the most

civilised and populous parts of Europe should lag behind America in this respect. We do not think, however, that the intervening space between London and Bagdad or London and Delhi can be compared with that between New York and San Francisco or Key-West—New York—Los Angeles in any respect but that of pure distance.

In the case of America, flourishing telephone systems abound along the whole of the route, whilst in Europe, east of Vienna or Budapest, the telephone is a comparative rarity, and in Western Asia almost non-existent. We hardly think the Kurd, the Arab, the Persian and the Afghan would look upon an overland route with a lenient or approving eye, nor, quite apart from any language difficulty, would even the civilised Mohammedans of the cities come flocking to load the line with traffic. It is the proud task of engineers to translate into reality to-morrow the scientific dreams of to-day, and if ever a circuit from London and Bagdad or Delhi became a reality it might confer the greatest possible benefits on the relations between the Mother Country and our Indian Empire, but it is difficult to foresee the telephonic development of States in the Middle East following the happy example of, say, Nebraska. To put it in another way the line east of Bucharest or Constantinople would be purely an *ad hoc* line to Bagdad and India, whilst we imagine that a route west of Omaha would carry lines from all sorts of places in America to all sorts of places on the Pacific coast.

Another important point which Mr. Gill did not lose sight of was the power for peace latent in the international telephone. To increase the facilities for a better understanding between nations would be not the least of the benefits which an improved inter-European trunk system would confer.

A NOTABLE JUBILEE.

As quite a junior among those periodicals that deal with matters electrical we offer sincerest congratulations to our contemporary, the *Electrical Review*, which on the fifteenth of last month completed 50 years of unbroken journalistic service to the electrical community.

The first issue appeared as a monthly under the title of the *Telegraphic Journal* which was indicative of the then existing conditions of the electrical industry, with telegraphy practically the pioneer. On Jan. 15 of the succeeding year the title of the journal was changed to the *Telegraphic Journal and Electrical Review* thus widening the scope and outlook. In 1882 it became absolutely necessary to issue the paper weekly so distinct was its success and so great was the pace at which the field of electrical science and manufacture had developed. In 1891 the first part of the title was dropped leaving the more comprehensive name of the *Electrical Review*, a change which was again obviously due to the marvellous strides taken, and let us add to the able editorship of the late Mr. T. E. Gatehouse.

The younger generation may not recall its single-handed defence of several actions brought against the proprietors for their criticisms of a much-advertised quack apparatus in the shape of an "electro-pathic" belt the vaunted wonders of which were depicted in hundreds of advertisements. The Medical Battery Company, such was the name of the advertisers, succumbed very soon after the results of the various actions in the Law Courts were declared as every decision was given against them. This was in 1893-94.

The *Electrical Review* still survives, a model of quiet, unostentatious, but confident scientific information.

HIC ET UBIQUE.

MR. GEO. MIDDLETON, editor of our contemporary, *The Post*, has been elected member of Parliament for the borough of Carlisle. We offer him our hearty congratulations. Mr. F. Macquisten, late member for the Springburn division of Glasgow, and a censorious critic of the Telephone Service was amongst those who failed to secure re-election.

ON the occasion of the recent visit of Mr. Lloyd George to Newcastle-on-Tyne, a very smart telegraphic performance was accomplished by the Newcastle staff in disposing of the verbatim report of 59 pages on the Newcastle-Edinburgh &c. CQ Wheatstone circuit in 87 minutes. That the transmitter had practically a non-stop run, that scarcely a correction was required, and that one at least of the receiving stations had the last page of the report in the newspaper office within five minutes of its receipt, all combine to produce a feat telegraphists may well be proud of. Such achievements are only attained by thorough organisation and close co-operation of all stations concerned.

BY the Federal Law of Oct. 14, 1922, new telephone rates are sanctioned for Switzerland. They range from 70 francs in places with 30 subscribers to 100 francs (£4) in places with 1,001-5,000 subscribers, and 110 francs (£4 8*s*.) in places with over 5,000 subscribers. In addition 1*d*. per call is charged. Suburban calls cost 2*d*., and trunk rates vary from 3*d*. to 10*d*. Triple rates are, however, charged for urgent trunk calls.

A HUMOROUS contemporary, the *Passing Show*, publishes an article beginning:

> A contemporary has raised the staggering question: "Do telephone operators become fatigued?"
>
> In order to obtain first-hand knowledge of this all-important problem our star reporter was instructed to obtain an interview with an exchange operator while on duty and the following is his report upon the matter:
>
> To the accompaniment of many muttering voices, the whirr of wool becoming jumper and the incessant click of countless knitting needles I made the acquaintance of Miss Sizz, champion operator at the Holborn Wall Exchange.
>
> Explaining the object of my visit, she willingly agreed to answer any questions I might put to her, provided, however, that I did not interrupt her knitting.

There is about a column of this stuff. The telephonist, of course, is used to, and can appreciate a joke against herself. But we think that a surprise visit by the author to a large telephone exchange would leave him wondering where the joke came in, and perhaps a little ashamed.

ACCORDING to the *Financial Times*, the Uruguayan Government has taken over the telephone system of the Monte Video Telephone Company, which received $700,000 for its privileges, plant, &c. On the other hand we hear that the Facisti Government in Italy is handing back the Government telephone system in the towns to private companies, and retaining only the trunk lines.

ON Aug. 18—21, an international telegraph competition was held at Berlin, in which 332 telegraphists from Germany, Sweden, Norway, Denmark, Esthonia, Russia, Holland, Italy, Jugo-Slavia,

Austria, Russia, Switzerland, Hungary and Czecho-Slovakia took part, Erna Bansewer, of Breslau, sending 2,888 words an hour on a Simens printer, won the speed championship. The second prize also went to a German woman. Of 72 prizes offered, German contestants captured more than a third.

The chief awards fell to competitors of the various nationalities as follows: To Italians for the Morse apparatus; to the German for the Hughes, the Siemens and for radio; to the Spanish for the Baudot, and to the Danish for the Wheatstone. Oskar Schindler, of Vienna, won the master-telegrapher trophy for being a prize winner on three different types of apparatus. The award consisted of a large silver cup offered by the President of Germany.

SOME REMARKS ON TECHNIQUE.*

BY SIR HENRY N. BUNBURY, K.C.B. (*Comptroller and Accountant-General*)

THE upheaval and stress of the war period has put many established institutions to the test. Not least among the institutions which are being submitted to the process are the procedure and methods of Departmental work in Government Departments. I think, therefore, that no apology is needed if on this occasion I select this subject, or rather certain aspects of this subject, for my remarks on this occasion. It has been, it is true, much talked about and written about during and since the war; and indeed it was a subject if not for public thought at any rate for public merriment long before the war. But I venture to think that it is not yet exhausted and that a newcomer into the field may still be able to make some contribution not without value to its study.

Technique is a somewhat elusive term; but on Humpty Dumpty's principle that "when I use a word it means what I choose it to mean, neither more nor less," technique will mean in these observations the method on the part of individuals by which a desired result is produced. In short, the technique of the individual officer is first cousin, as it were, to established methods of procedure in the Department.

It may be said that technique is all very well for technicians, but that it means nothing for ordinary plain people; that there is no such thing for them to acquire, and that if it were there for them to acquire, they would be just as well without it.

The answer to that observation is this. In any form of human activity whether, for instance, it be the designing of an automatic telephone exchange or the attempt to reach a right decision in a discipline case, or to satisfy oneself that an account is correct and the transactions therein duly authorised, the human mind aims at economy of effort. The mechanical engineer in designing a power unit, has as his primary object that of converting into applied energy the maximum possible percentage of the crude energy put into the machine. The position of the Departmental official is not fundamentally different. The object set before him, either alone or in conjunction with others, is that the right decision shall be given or the right conclusion arrived at with a minimum expenditure of human effort. And that is where technique comes in.

We have heard much for many years of "red tape"; and almost as much in more recent years of "business methods," and if we call "red tape" the technique of Government Departments, and if we call "business methods" the technique of business organisations, without any implication as to their respective merits and suitability, we shall have before us precisely the subject of these present observations.

I propose first to invite your attention briefly to a few of the governing conditions which determine the nature of any technique of Departmental work.

The first is that Departmental work is, speaking broadly, on a very much larger scale than the work of commercial organisations. It follows from this that the organisation of Departmental work is apt to be highly complex, and that the work of any individual acts upon and is acted upon by the work of numerous other individuals. It follows too, that the character of the organisation itself affects the work of the individual officer and the way in which he does it, to a considerable extent, and that the rightness or wrongness of the organisation is a matter of very great importance. But this is a little outside the scope of the present subject.

The next peculiar feature of Government work is this. Because it is carried out on a very large scale, and because the Department is ultimately, through the Minister, responsible to Parliament for its every act and omission, *records* become far more important than they are in private business. We have, or at any rate, we think we have, to record everything we do, and, in many cases the reason why we do it. It is not so much that putting things on paper assists the decision itself, although this is often a useful and sometimes a necessary means of communication between officials, and the presentation of a case in writing is of value to very busy people in coming to their decisions. But even if these considerations did not exist at all, it would still be necessary to conduct in writing much official business which in a private undertaking would be dealt with by discussion round the table or over the telephone. And these records have to be preserved.

The third peculiarity of Departmental work to which I wish to draw attention is that, in comparison, at any rate, with the smaller types of private business, the incentive of the official to do the best that is in him is not to the same extent a *pecuniary* incentive. As to the extent of this difference, there will no doubt be differences of opinion; all I want to do for the present purpose is to call attention to the fact that there is a difference, because, as will appear later, it has some bearing on this question of technique.

The last distinction to which I wish to draw attention is that Departmental work is, in the main, not concerned with the making, directly or indirectly, of money. Indeed, if we may believe what wiser people than we tell us, we are concerned solely with wasting it. But however that may be, the fact remains that to most Departmental officials the function of money making is entirely absent from their official duties. Very few Departments could produce a profit and loss account, not because, as is popularly supposed, they do not know how, but because the services, if any, which they render, do not consist in the earning and receipt of money, nor can they readily be expressed in terms of pounds, shillings and pence.

The Post Office is, to some extent, an exception to this statement, I am not going to suggest that the primary object of the Post Office is to make money by its services, in the sense in which a manufacturing or trading undertaking aims at making money, or even in the sense in which a privately-owned public utility, such as a railway company or a gas company, aims at making money. But the fact remains that public opinion requires the Post Office, in conducting its services, not to lose money, and that that position is accepted by the Post Office Administration. Considerations of profit and loss therefore enter into all Post Office activities, and the Post Office, unlike other Departments, does publish each year its profit and loss account.

I have probably said enough to indicate in a general way the sort of conditions in which the technique of departmental work has to be applied. Let us now come to the subject of that technique itself.

We have set before us, as our guiding objective, the attainment of the right result with the maximum economy of effort. How are we to set about it?

In the first place, by simplicity and directness of method. "If you are simple you are right; if you are complicated you are wrong," as I remember hearing a former Secretary of the Treasury once say. If is a well-known mark of a good accountant that his accounts and his book-keeping systems are usually simpler than those of the less competent. He has the quality of perceiving and concentrating on the relevant, and of ignoring the irrelevant. Simplicity is, of course, a relative term; you do not attain simplicity, but merely imperfection, if in designing a house you leave no room for the staircase, or if in sending an overcharged telephone subscriber an amended acount, you omit to say that you regret (or at any rate the Postmaster-General regrets) the mistake.

But the directness with which any piece of work is approached; the simplicity with which it is handled; the absence of irrelevant work, of unnecessary checks, of unnecessary references, of unnecessary arguments, of unnecessary details and trimmings—these are surely all marks of a good technique which the competent judge will at once recognise. Don't write reports on references when the telephone will serve for all purposes; don't if you can help it, conduct controversies on paper, and avoid triangular or quarangular discussions on paper; keep before you the object of the activity in which you with others are engaged, viz., the ascertainment of the actual facts, the giving of the right and not the wrong decision, the production of the most efficient instrument or service or arrangement; the proof as to accuracy or authority of the accounts you are handling. When the end is clearly seen and realised, then, and perhaps only then, is the best, the most direct, the simplest line of approach apparent.

The next element in a good technique is to pay due regard to time. A machine, whether it is a departmental machine or any other sort of machine, which works too slowly—which is apt to be too late—is, whatever its merits, not an ideal machine. And if the actions and decisions and productions of a Department are to mature—to become available, as it were, at the right time, it is necessary that the time-sense, as I may call it, shall be exercised not merely by the heads, but by all concerned. There is nothing more pathetic than to see, as one has from time to time seen, a good and sound decision reached at a time when it is too late, if not to apply it at all, at any rate to derive the full benefit from it. I have often thought that it would be of great assistance to those who deal with cases on official papers if the papers could be conspicuously flagged, "decision (or reply) advisable by . . . "; it would stimulate and develop our time-sense. And we should each perceive, not merely how long we ourselves could afford to keep the matter in our hands, but within what limit of time the machine as a whole had to perform its function, and hence in what way—possibly some special way—it would have to be handled in order that the right action might be taken at the right time.

A third element in a good technique (and it follows naturally on that just described) is what I will call the team sense.

* The Chairman's address at the opening meeting of the Post Office Telephone and Telegraph Society of London on Oct. 23, 1922.

Earlier in this paper I spoke of the Department as a machine. The term is often used, but, useful as it is, the analogy it implies contains a fallacy. No combination of human beings working together to a common end, can be merely a machine; on the contrary they are essentially an *organism*; they are a company of players, not a group of puppets. And what is an important part of a good technique is that this fact should be present to the minds of Departmental workers. It makes a difference—sometimes a very considerable difference—to A's work if he is aware how it affects the work of B. C. and D.; if, in fact, he realises the part which he plays, and others play, in the common effort upon which they are engaged. It is the best corrective to what is supposed to be a somewhat typical defect in public officials—pedantry. We *are* a little apt to be pedantic, though I think that this criticism is far less warranted than it would have been a generation ago, or even before the war, But the pedantic mind always works in isolation and the team habit and the team spirit kill it.

Similarly, a man who is conscious that he is one of a team and of his place in the team in relation to the places of the other members, is free from the temptation, which may otherwise beset him, of unnecessary exactness, unnecessary elaboration, or an unnecessary degree of criticism, in his work. These defects, where they exist, are due, I think, mainly to over-conscientiousness; but they can only live in the mind which in the official sense, exaggerates the importance of its own job; when we realise exactly the relation of our particular bit of the job to the other bits with which it is connected, we find it easier to confine ourselves to the essential and to omit the trimmings, which is an important part of a good departmental technique.

One is tempted at first to give a special place in considering technique to the money sense; and yet it is doubtful whether it can claim a place at all. Economy and efficiency, though they are often used, especially in official utterances, as different, and even as incompatible things, are surely, in fact, different aspects of the same thing. You can't have the former without the latter, and I doubt if you can have the latter without the former. If then in the way in which we do our official work all the elements which constitute efficiency are present, we shall surely find our work economical also. But it is an advantage—especially in those types of work which are not directly concerned with money—to realise not only that we all are spending money, but how much money we are spending and what return it is bringing or going to bring in. This latter in many kinds of Departmental work is a difficult, frequently an impossible, task for the reasons I have already indicated. But it is a useful thing to know at any rate the cost to the State of one's own work per hour or per minute, and still more useful, because less obvious, to consider upon occasion the cost of the work we cause other people to do. I would commend this idea especially to officers in Departments of Control. It is important, because none of us earn individual profits and many of us do not earn profits at all, against which the cost of our work can be set.

There are other elements in a good Departmental technique, which I do not propose to mention, because they will be apparent to all and we can take them for granted; they are the A.B.C. of our official education. One other element, however, demands a word or two, and failing a better term, I will call it the human element. We all, in a greater or less degree, deal with human beings, whether the outside public or, if I may, include them in the same category, our own colleagues. Now when you address yourself to a human being, whether on paper or by word of mouth, it is well to consider how he is going to take it. If I were delivering these observations to the general public, I should have to tell then—or try to tell them—the proper way to address a counter clerk; as I am speaking to an audience of Post Office servants, it would be more appropriate (though perhaps less wise) to say how a counter clerk should address the general public. This, however, I do not propose to do. But it is a little important to acquire the habit of considering the psychology of the person to whom we are addressing our remarks, verbal or written—and indeed to consider whether verbal or written speech is the best means of getting what we want or conveying the information or instructions which it is our duty to convey. The business man, especially of the more enterprising sort, is very much alive to the importance of this, and indeed, I fancy that in the United States they write books and hold conventions about it and very likely confer University degrees in the art. We officials have not given the same self-conscious attention to the art of saying the right thing in the right way, but I think it is a not unimportant part of a good Departmental technique.

I now propose to deal, very briefly, with the application of these principles to certain classes of Departmental work—not so much constructively as by way of illustration. And I will take, as typical, three classes of work:—

Dealing with papers and correspondence.

Examining and auditing accounts.

Technical and semi-technical work.

The application of the principles I have just expounded to the work of dealing with papers and conducting official correspondence will be apparent and needs little elaboration. Directness and simplicity of thought and expression, regard to time, and to the part which others have to play in the subject under consideration, are all well known and well recognised elements in good administrative technique. What perhaps does not always receive the attention it deserves is the money aspect—the cost of dealing with any particular piece of administrative work in relation to the return to be obtained from it, and in relation to alternative ways of attaining the same result. It would be an interesting experiment to have official files weighed and to work out the cost of the results achieved by each file in terms of so much per ounce of official papers. I suspect that the cost to the Department of any one pound of official file does not vary very greatly from the cost of any other pound. May I commend this idea to those who are interested in official statistics; they may find it worth exploring.

There is, however, one aspect of the application of the team principle to administrative work which deserves special mention. It is connected with the thorny subject of delegation. We are constantly being urged, and urging others, to delegate. A right use of delegation is regarded, I think justly, as the secret of success in handling any large organisation, that is to say, in directing the work of a considerable number of other people. But it is often urged against some particular extension of the principle of delegation that if A. leaves it to B. C. and D. to dispose of the cases, he will not know what is going on nor can he be sure that B., C. and D. will proceed on the same lines. Now this is where the team principle comes in. There is an obvious loss of efficiency if 100 cases have to be submitted or referred to A. in order to secure him against the risk of a mistake being made in one of them. The insurance premium which the Department pays for this security is much too high. It is the duty of B., C. and D. to take care among themselves that they are proceeding on uniform lines and to keep A. informed from time to time of the lines on which they are proceeding. This is the way to make delegation successful, and I cannot summarise it better than in the words of an authority on American Rail-road Administration. He says, "the office (of Director of Maintenance and Operation) is administered on the theory of a minimum of direct action made possible by a maximum of information, he assisting each one of the units below from the bounteous lessons of experience furnished by all." There is the minimum of direct action from the top downwards, and the maximum of information from below upwards.

I come now to the examining and auditing of accounts; here again the importance of simplicity and directness of method and regard for time and cost are apparent. Unfortunately, the differences between the conditions of Departmental work and those of private business are specially marked in this class of work. The professional accountant has his road—it may be a difficult one—clearly marked out for him; he has to do so much work as will enable him to give the required certificate and not so much as will make the job unremunerative to him. If he gives an unwarranted certificate he may be held liable in heavy damages; if he puts in more work than he can afford he may find his fee absorbed in clerks' salaries and expenses. Not so the Civil Servant, who though subject to limitations of one sort or another is not in the same close contact with profit and loss. It is therefore the more important that those who are engaged in examining and auditing accounts should aim at the best possible method or technique. In particular, the team sense is important. No good auditor will tolerate badly-rendered accounts over and over again. His object is that they shall be so rendered as to give him as little to do as possible, and he will "go out of his way" as it is called (really it is very much in his way) to show the officer who renders the accounts how he ought to do it. The idea, sometimes met with, that the best auditor is the man who produces the most queries is a dangerous half-truth; in many cases the best auditor is the man who in the long run, produces no queries at all.

Some study of human nature, again, is valuable to the auditor. He must, for instance, remember that the feeling of the average auditee, in dealing with the auditor, is much the same as that of the average and otherwise innocent man when he stands at the counter of his bank face to face with the cashier. And, on the other hand, something in the method or manner of the auditee may put the auditor, if he is quick to perceive and interpret it, on the track of cleverly concealed fraud. However, the human element in auditing is a subject worth a paper to itself, and I must not pursue it further now. I would only add—and the connexion of thought is closer than at first appears—that in auditing for fraud, which after all is but a small part of our examination of accounts, it is the unexpected, the unusual, method of check that pays, when circumstances allow you to do it.

Lastly, the officer engaged in technical or semi-technical work. Now of him I am thoroughly frightened: and I am not going to put myself in the position of offering to teach him how to do his work. But I would just say this, that these marks of a good technique which I have been describing are, most of them, borrowed more or less from the methods and practice of technical workers. Simplicity and directness is the hall-mark of good design. For team work you have only to go, for instance, to the groups of medical and scientific men engaged in medical research. And so on. All I need say then to the technician is to commend to him, with all the earnestness at my command, the cultivation of the money sense, and to suggest that those same qualities which are recognised as valuable in his technical work proper are equally valuable, with perhaps some slight adaptation, in that part of his work which brings him, as a departmental officer, into contact with non-technical colleagues.

In concluding these observations, I must claim the indulgence of the Society if they appear to consist in the main of somewhat vague generalities. And I am well aware that in so far as they presume to advise, that advice is needed as much by the author as by his audience. But in accepting the invitation to address your society, I felt that the only path of safety for the non-technical men among the technicians was to be as non-technical as possible in the hope that, if I did not claim to be one of yourselves, you would be moved to pity rather than to wrath; and perhaps I had the further hope that these remarks, if they contain little of positive value, may provoke and stimulate thought upon subjects which I believe to be of very considerable importance to us all.

G.P.O. ARTS CLUB.

THE tenth Exhibition of the above club held Nov. 3-18 at Mount Pleasant maintained the high standard which has been set in the past. Nearly 500 exhibits were on view ranging from paintings, pastels and etchings to black and white drawings and photographs. Mr. C. S. Sanderson, Controller, L.P.S., opened the exhibition with a sympathetic speech, and Mrs. Sanderson presented the medals to the successful competitors.

Amongst the pictures which particularly attracted our notice were "Market Square, Midhurst" (A. T. Blythe), "Shower, Moorside, Baildon" (H. P. Staub), portrait of Mrs. Patterson (H. L. Bacon, bronze medal), and the very spirited horsemen in F. C. Osborne's "Hunter's Morn." Miss E. K. Lucas' studies of girls (bronze medal) were very charming; and the etchings of Mr. J. A. Swatkins, especially "The Ford" (bronze medal) and "The Corner Shop, Polruan," were the outstanding feature of their class. Mr. E. A. Lee's "Liza" was also excellent in its broad style. Other works awarded medals "Less than the Dust" (silver), Elsie M. Beagley; "The Field Barn" (silver), H. F. Edmunds; "The Barbican Gate, Lewes" etching (silver), A. E. Homewood; "Design for Club Poster" (bronze), T. P. Clark; "River Arun, Amberley" (bronze), W. A. Moody; "Summer Noonday" (bronze), S. H. Hancock; and "Coming in on the Ebb Tide" (bronze), T. P. Clark.

We should like to have seen some medals go to that fresh and admirable colorist, Mr. Frank Farmer, whose "Sky Study" and "Chateau Gaillard" were especially clever. We were glad to see an exhibit by Mr. Thos. Wilson, one of the original moving spirits of the club, a characteristic "Essex Common." Mr. A. G. Ferard contributed three paintings, of which we liked best "The Greek Theatre, Taormina." We regret that we have not the space to deal more fully and appreciatively with the many excellent exhibits. We can only mention the medallists in the Photographic section, viz., Mr. Upton Cooke (Thames at Twickenham), silver; Mr. E. A. Ife (An Angry Mantle), bronze; Mr. D. G. Luckings ("Gordon"), bronze; Mr. A. J. Freeman (November Morning, Tower Bridge), silver.

An innovation this year was an Invitation Section open to members of other Departments of the Civil Service. Considerable support was received and some fine work contributed, including "Beating out of the Creek" (silver medal), by Robt. H. Smith, of the Admiralty; "Portrait of Mrs. D. Patterson," already referred to, by H. L. Bacon of the Admiralty; and "A Scotch Hayfield," by F. Aumonier of the Customs. The medal in the class for pictorial photographs was awarded to Mr. R. E. Holmes of the Customs. We hope that the success achieved this year will lead to the Invitation Section becoming a permanent feature of future Exhibitions.

Incidentally, we understand that the Committee feel that there must be a considerable amount of talent in the various telephone exchanges which they would like to see more fully represented next time.

REVIEW.

"*The Post Annual.*" *Edited and published by Geo. Middleton, 43, Cromwell Road, S.W.7. 80 pp. 1s.*

The second issue of this annual is fully equal in quality to the first, which is no easy achievement. It contains stories by Stephen Kendall, Austin Phillips, and John Doye, the prize winner of the *Post Annual* Literary Competition, humorous drawings by Will Owen, Arthur Watts, Rene Bull, and "Stock" Walsh, an article on "The Theory of Humour," by Thos. Jay of *Punch*, and descriptive articles on the Postmaster-General's Working Day, Art in the Post Office, a Telegraph Messengers' Holiday Camp, the Postal Museum in Berlin, Post Office Sport, and (without which no periodical publication would now be complete) something about Wireless Telegraphy. Both on subjects, grave and gay, the *Annual* offers an excellent shillingsworth and we can heartily recommend it to all our readers.

INTERNATIONAL TELEPHONY IN EUROPE.

CONDITIONS OF EFFICIENT DEVELOPMENT.

MOST of Mr. Frank Gill's inaugural address as president of the Institution of Electrical Engineers was devoted to the problem of international telephony in Europe.

He showed that the result of loading the circuit is reduced attenuation and somewhat impaired articulation in open wire circuits, and reduced attenuation and better articulation in cable circuits. The use of repeaters enables additional energy to be put into the line as required, and the attenuation can be reduced by that means. It is, therefore, no longer necessary to sacrifice the quality which can be obtained on open wire circuits by loading them in order to reduce the attenuation, for this reduction can be effected by repeaters. In cable circuits, however, loading is necessary to reduce the frequency distortion. Consequently, long, heavy, open wire lines are not now loaded at all, but are repeatered, resulting in improved articulation, while the increased speed of propagation avoids echo trouble, which became insistent only because of the more powerful effects derived from repeaters. With cable circuits, on the other hand, loading still obtains. It cannot be abandoned, since it is necessary for the reduction of frequency distortion, but the tendency is towards lighter loading so as to raise the speed of the circuit, thus reducing the echo trouble, which, because of the reduced speed and the great electrical length of loaded cable circuits, demands most careful consideration.

Carrier Circuits.

In the search after increased capacity of telephone and telegraph circuits there has recently been developed and put into commercial service the carrier system, which has been added to the well-known methods of superimposing phantom telephone and compositing telegraph circuits. In this new method carrier waves of different frequencies for each channel of communication are generated. If the channels are to be used for telephony such waves have a frequency above the audible limit. By means of band filters the desired range of frequency is permitted to pass into each channel, but only frequencies within that range; thus on a four-channel telephone carrier circuit the frequencies might range in four or eight separate bands with outside limits of 4,000 to 27,000 cycles per second. Each carrier wave is modulated independently by the voice currents to be transmitted by that channel, and all the modulated carrier waves, or all of one of the side bands only, without the carrier waves, are transmitted over the line. Upon reaching the far end the waves are filtered out, each into its proper channel according to the carrier frequency assigned to each channel, and are then demodulated, leaving the voice current free to be farther transmitted over an ordinary circuit. Because of the increased frequency of the carrier waves, greater attenuation occurs with them than with the voice waves, and carrier current repeaters must be equipped more frequently than voice current repeaters; also, for the same reason, carrier currents cannot be transmitted over ordinary loaded lines, which it will be remembered cut off at frequencies within the audible range. Hence, if loaded carrier circuits are required, they must be specially treated. Special treatment is also needed in the construction and maintenance of carrier lines and equipment, and because the equipment is expensive such lines must be of considerable length in order to be economical.

The advantages to be gained from using this latest development are exemplified on the New York-San Francisco line. Between Harrisburg and San Francisco, about 2,500 miles, the circuits are of open wire, and the loads carried on four conductors, are two physical telephone circuits, one phantom telephone circuit, four earthed telegraph circuits, and a number of carrier telegraph circuits ranging from six to twenty. Between Chicago and Omaha (450 miles) four open-wire conductors carry two physical and one phantom telephone circuits, four earthed telegraph circuits which can be worked either one-way or two-way at will, and twenty two-way carrier telegraph circuits, or a total of twenty-seven circuits, while between Chicago and Pittsburgh (450 miles) eight open-wire conductors carry a total of fifty-one circuits. From Chicago to Omaha or Chicago to Pittsburg the direct distances are about the same as from Paris to Berlin, Paris to Marseilles, or London to Milan.

Deficiencies in Present System.

A long-distance telephone line used to be a relatively simple structure, consisting merely of a pair of copper wires, either open or in cable, which could be maintained in good order with comparative ease by independent maintenance units situated along the length of the line. But with repeaters and loading that simple structure has vanished, the plant is more complicated, the various parts are inter-dependent, and it is no longer possible to consider maintenance of each part solely as a sectional matter. In Europe, taken as a whole, there are about forty self-contained local operating organisations, most of which conduct a local business and a through business within their areas, together with that part of the international through business which lies within their own borders. But there is no organisation controlling or co-ordinating the various local operating organisations, which yet have to function as a whole; no means of keeping the separate organisations in touch with each other, and no systematic means of adjusting differences in matters of daily practice; no organisation to handle and look after the through business as a whole; no common agreement as to manufacture;

no common research, standard practice or technique of construction, maintenance, and operation. Under such conditions through-telephoning in Europe can never be worthy of the name of a service.

There is, however, no engineering difficulty, so far as distance is concerned, in constructing and operating lines at commercial rates to give satisfactory speech between every part of Europe, and there is every indication that, given facilities, there is traffic waiting to be handled between the cities of Europe as between the cities of the United States. New York originates over four million long-distance calls per annum, Chicago and Philadelphia a number approaching two million each, and Boston, Cleveland, and Pittsburg about half a million each. The direct distance between Brussels and Athens, or between Paris and Constantinople, is 1,300 miles—about the same as between New York and Omaha or Chicago and Salt Lake City, between which cities calls can be made at any time. The direct distance overland between London and Bagdad is about the same as between New York and San Francisco, over which line conversations take place daily, while the direct distance between London and Delhi is about the same as from Key West to New York and thence to San Francisco and to Los Angeles, over which distance calls can be made regularly. As a further encouragement, the New York-Chicago cable now in course of construction will have a gross transmission equivalent so great that if a 435 lb. (4.2 mm.) open-wire circuit were constructed to that equivalent it might be 10,000 miles long, enough to connect Paris with the telephone system of Seattle in the north-west of the United States and leave sufficient to take care of the cable across the Behring Straits. This illustration, though uncommercial, is sufficient to show that land distance is now no difficulty to telephony.

Unity of Control.

The through business must be handled as a complete unit if it is to be done efficiently; it cannot be done by independent units. The correct course is, then, obviously to depute a body to do for all the European nations what no one nation can do for itself. This is no new departure; it is already practised by banks and railways in their clearing houses. It is not enough for the separate organisations to attempt to agree to a code of rules subscribed to by each. The business is varying, flexible, and very much a living thing; it demands intelligent and prompt treatment of its many variations, and it requires control from central points with power to instruct persons at a great distance in the routines and duties they are to perform. Such control can be effected only by a living authority always on duty.

One possible method would be to operate all through business, both within and between the various countries in Europe, by a single long-lines company working under licences from the various Governments, taking the calls from the various local originating organisation, and being entirely responsible for them until turned over to the local receiving organisations. Another method would be for the various Governments to form what in effect would be a private company or commission, of which the Governments would be the stockholders and which in each country would derive its authority from the subscribing Governments. A third method, frankly of a temporising nature, would be for the various telephone operating authorities to form themselves into an association for the study of the problem. The president offered the definite suggestion that the telephone authorities of Europe, including the United Kingdom, should—as telephone-operating authorities rather than as Government Departments—hold an early conference of all the telephone authorities, companies, and municipalities, as well as Government Departments, to study the problem in detail and endeavour to find a solution.—(*Times Engineering Supplement.*)

LONDON ENGINEERING DISTRICT NOTES.

Institution of Electrical Engineers.

MR. F. GILL'S PRESIDENTIAL ADDRESS.

THERE was a great gathering of telephone men to hear Mr. F. Gill give his Presidential address at the Institution of Electrical Engineers on Nov. 2.

No announcement of the subject of the address was made beforehand, but all who know Mr. Gill anticipated rightly that he would have something interesting to talk about. The early part of the address dealt with some matters of importance to the profession as a whole: the remainder of importance to humanity at large and to Telephone Engineers in particular. Mr. Gill never handles anything that he does not put all his whole heart and soul into. As President of the Institution of Electrical Engineers he seized the opportunity of reminding members that they had their duties as well as the Council, and that it is only when the whole membership recognises this fact that the best interests of the profession can be served.

Mr. Gill dwelt on the importance of the proper training of Junior Engineers and stressed the importance of a proper appreciation of engineering economics. His remarks under this head touched a responsive chord in the hearts of Post Office Engineers, all of whose official actions are governed by the laws of economics. The responsibilities of commercial firms in assisting in the training of young engineers was the next point made. By arranging to accommodate apprentices and by assisting them to gain practical experience they would help to build up the supply of technical men from which to draw their own ranks in the future.

In the second part of his address Mr. Gill reviewed the advances in the art that had made it possible to conduct telephone conversations over great distances, such as New York to San Francisco, some 2,800 miles. He explained the difficulties that at present prevent similar results being obtained in Europe. There is no physical reason why London should not speak to Bagdad, a distance equivalent to that referred to above. To build such a line and to maintain it, unified control would be essential, and Mr. Gill gave his views as to how this desirable end could be attained.

The address was concluded by the suggestion that the surest way to ensure peace in Europe would be to remove misunderstanding between the various nations concerned, and the easiest way to do this would be to provide the maximum facilities for free intercourse with the aid of the telephone. The Great War was sometimes called an Engineering War; may the future Peace of the World be called an Engineers' Peace.

It is pleasing to note that during the same Session that Mr. Frank Gill is President of the Institution of Electrical Engineers, another telephone engineer has been appointed Chairman of the North-East Centre of the Institution. Congratulations to Mr. Baldwin on his selection, and congratulations to the Institution for their wisdom in choosing such an able engineer to preside at their meetings.

Mr. Baldwin, who is at present Assistant Superintending Engineer of the Northern District, with headquarters at Newcastle-on-Tyne, was in 1911 on the London staff and remained in the Metropolis for some time after the transfer. There is not a keener or sounder telephone engineer in the Kingdom. As was announced previously in these Notes he is devoting his spare time to the compilation of "A History of the Telephone in the United Kingdom." His many friends in the London District read his inaugural address to the North-East Centre with special interest.

Transfer.

The London Engineering District has experienced a great loss in the transfer to the Engineer-in-Chief's Office of Mr. G. F. Greenham, Assistant Superintending Engineer. Mr. Greenham has a unique knowledge of the telephone exchanges of London. He was the Metropolitan Electrician in the days of the National Telephone Company, and as such was responsible for the construction of new exchanges and the maintenance of existing exchanges. After the transfer he was made responsible for the internal construction work of the London Engineering District, and everyone who has been connected with Mr. Greenham on this work will know how extensive was his knowledge and how freely this knowledge was placed at the disposal of every earnest seeker. The transfer is not all loss to the District as Mr. Greenham will be dealing with telephone exchanges in his new sphere and will therefore be dealing with London matters as well as provincial exchanges. The staff with whom he has worked so long wish him every success in his new sphere.

Mr. Greenham's place will be taken by Mr. Thow, Assistant Superintending Engineer, from the South Midland District. Mr. Thow is an old friend having previously been stationed in the London Engineering District. A hearty welcome is extended to him.

Automatic Exchanges.

The L.C.C. have placed an order for an automatic exchange to be installed at the New County Hall. The equipment will be supplied and fitted by the Automatic Telephone Manufacturing Company and will consist of 600 preselector switches, also a manual equipment consisting of seven subscribers' sections. The work is due to commence early next January and will take approximately three months to complete.

Messrs. Pocock Brothers, 233, Southwark Bridge Road, also have placed an order for an automatic P.B.X. The initial equipment is as follows:—

Extensions, automatic	30
„ manual	3
Exchange lines	5
1 Manual "A" position.	

The work will be carried out by the Relay Automatic Company.

Eltham New Exchange.

It is expected that the new C.B. No. 10 Exchange situated in Well Hall Road, Eltham, will be ready for service next year. This exchange will cater for the district midway between Lee Green and Woolwich. The initial equipment will be for 880 subscribers' lines and two junction sections. The work of installing will be carried our by the Department's Engineers, a portion of the apparatus to be supplied by Messrs. Siemens Brothers.

Passing it on.

One of the speakers who took part in the discussion on Sir Henry Bunbury's address at the Telephone and Telegraph Society's Meeting on Oct. 23, asked whether any steps were being taken to put into practice the suggestions that are made and ideas that are outlined during the reading of papers and the subsequent discussions. This particular Society was formed

some years before the Transfer with the object of engendering in the staff an interest in all branches of the late National Telephone Company's activities, and by the reading of papers and by debates to widen the outlook of every member of the staff. With this end in view papers were sought from all grades of the staff, and officers in the humblest positions were encouraged to express their views on the subjects before the meetings. It was not an uncommon occurrence in those days for workmen to take part in the discussions, and the views of the manipulative staff undoubtedly helped the administrative staff in the conduct of their duties.

After the transfer it became apparent to those interested in the Society that in an organisation such as that of the Post Office with its more or less water-tight compartments, the Society, if properly supported, would have an even greater field of usefulness than under the old *regime*. Consequently its doors were thrown open to all Departments of the Post Office, whose work is directly or indirectly connected with the telephone and telegraph business. The response was highly gratifying and the Society has flourished like a green bay tree. The Committee has succeeded in getting together, year after year, excellent series of papers and the heads of several Departments have in turn held office. The membership still includes all grades of the staff. There can be no question whatever that the aims of the organisers of the Society have been attained. Members are, through the medium of the meetings gaining an ever-increasing knowledge of the activities in other Departments, and the efficient conduct of the Post Office work as a whole has no doubt been assisted.

Presumably all who attend the meetings do so with the desire to learn, and having learnt something to make use of the knowledge on the first opportunity. The views expressed and applauded sink into the sub-conscious minds of those present and influence their actions on some future occasion. Say, for example that the Engineer-in-Chief is present and is struck by some remark, probably some future instruction or action of his, will be influenced by that remark, and in this way good is done even though it may not be immediately apparent to the audience in general. Some humble officer may have been present, say, at Sir Henry Bunbury's address, and had impressed upon his mind that the successful man is he who finds out something about the other fellow's job, and went away with the intention of getting out of his head the idea that his own activities —without regard to their influence on the work as a whole—is all that matters to him. Here again something has been gained.

Advice Notes.

It may interest some in other Departments to know how the particulars of subscribers' telephonic requirements are conveyed to the Engineering Department.

After the preliminary negotiations between a would-be subscriber and the Controller, L.T.S., have been completed, the particulars of the type of installation to be provided are notified to the Engineering Department on a form known as an Advice Note.

Until the middle of June of the present year it was the practice for the particulars to be copied in the Engineering Department on to a number of works forms.

There are many officers concerned with the provision of a telephone line and each must have his instructions and means of recording particulars of time spent on the work, plant installed, &c. The late National Telephone Company's system was to type several copies of the Advice Note and to circulate one copy to each branch concerned—the distinction of each copy was determined by its colour. The advisability of re-introducing such a system and thereby saving the cost of typing works copies as a second operation was considered in the early part of the present year. The requirements were rather more difficult to meet than under the Company's organisation, but a satisfactory scheme was evolved and has been working smoothly since it was put into operation.

In the case of a new line 6 copies are typed at one operation, a white copy remains in the Advice Note Book. A blue copy which may be considered to be the master copy is forwarded to the Fitting Office, and is eventually returned to the Controller bearing information that he requires to have from the Engineering Department. A pink copy is sent to the Exchange Traffic Staff and by them to the Test Clerk after having been endorsed with details of telephone number and the position that the line is to occupy on the switchboard. A buff copy goes to the Test Clerk and is sent by him to the Fitting Office after he has proved the circuit with the external foreman. A yellow copy and a white copy go to the External Engineer, the former for office purposes and the latter for the workmen.

With some classes of service fewer copies are needed—for example—in the case of internal extensions the External Engineer has not usually to do any work, and therefore does not require the white and yellow copies.

The entries on the various copies provide amongst other things for the upkeep of apparatus records in the Test Room, the records of external plant provided or spares used, time spent by the workmen, &c., and the printed entries are designed to ensure that no step or information is overlooked. As an example a fitter requires to know what type of protector to fit, he looks at his copy and sees whether the external workman has provided the circuit by an overhead or underground wire and if by overhead whether the line crosses the power wires or not.

The system meets the very onerous conditions obtaining in the London District and caters in the simplest possible manner for all the complications that are to be met with in such a congested and complex area.

Pneumatic Street Tubes.

It is possible that few readers of this JOURNAL have but the barest idea of how faults in the pneumatic street tubes are localised and cleared. Miles of these tubes, which are of lead and protected in iron pipes, run beneath the streets from the Central Telegraph Office to the larger post offices and cable companies' offices in the City and West End. Many of the tubes are veterans of the very early days of the C.T.O., and despite their years are giving excellent service.

It will be readily understood that the very heavy vehicular traffic these days is a severe test of the construction of the tubes and occasionally the weaker places give way under the strain. The result is an obstructive dent in our tube, or more frequently a fracture and leak is caused at a joint in the older tubes.

In either event a complete stoppage may occur and carriers containing telegrams be held up in the tube. Such defects of course may be the result of damage through the operations of excavators working in the roadway, but in such cases the exact locality of the fault would be easily ascertained and the fault removed by exposing the tube at that point.

Generally, however, it is very desirable to locate the position of the trouble in the most direct manner and by disturbing the minimum amount of usually expensive paving. In the past it was the practice to locate such faults by taking pressure and vacuum time tests to and from the testing point and then sub-locating the obstruction by means of sweep's rods. This entailed a series of street openings and absorbed much valuable time.

Now, however, by a rapid but careful consideration of each fault as it arises it is often possible to determine directly by test the precise position of the fault and thus minimise the number of openings.

To facilitate localisation and to reduce the length of the sections between test points, inspection troughs are being introduced on all new tubes.

When carriers are imprisoned by an obstruction in the tube, it is sometimes possible to release them by suddenly applying vacuum if the tube normally works on pressure or *vice versa* if worked on vacuum. If the tube is clear of carriers then the exact position of the defect can often be found by allowing a carrier to which is attached a light line paid out from a hand-winch to be blown or sucked up the tube. By means of the line passing through his fingers the experienced man can feel every bend and dent in the tube as the receding carrier passes over them. The exact length of the line to the fault is then known and by measuring off on the sealed route plans the roadway can be opened with the assurance that the obstruction is below within a few feet. In this manner as much as 750 yards of line has been paid out and the fault located.

A similar method is employed in locating bad air leaks, but it will be appreciated that though long straight sections of tube may be dealt with in this manner, where there are several bends in the route the sensitiveness of the "fishing" line to the movement of the captive carrier is much reduced.

There are other methods of locating leaks employed in the C.T.O. Section. One is the use of a metal cylinder shaped like a carrier encased in soft rubber. Connected to this is a long length of light rubber tubing. This "stopper," as it is known, is drawn into the faulty tube under vacuum and the rubber tubing paid in after it. When in a sufficient distance the stopper is expanded by forcing air through the rubber tubing this effectually sealing the tube against the passage of air. The section under consideration is then pressure-tested by means of an air pressure gauge connected to the tube, and a noticeable falling off of the reading when the pressure supply is off tells us that our leak is in that section.

REVIEW.

"*Wireless: Popular and Concise.*" *By Lt.-Col. C. G. Chetwode Crawley, R.M.A., M.I.E.E., Deputy-Inspector of Wireless Telegraphy, General Post Office. Messrs. Hutchinson & Co.* 1*s.* 6*d.*

A clear and careful survey of the present position and future possibilities of wireless telegraphy and telephony, without bias and free from mystifications, this book should command a ready sale amongst those who desire a general knowledge of the subject, but do not wish to be troubled with the multitudinous technicalities which so readily grow up around a new science. As an author of a popular treatise Col. Crawley is careful to confine his readers to the effects produced where the causes are at present unknown or largely a matter of surmise. We have no hesitation in recommending the work to our readers as one of the best popular books at present on the market.

No doubt the Grimsby Station, which according to the map on page 60 has been driven by storm to the Firth of Forth, will return to its proper haven on the Humber in time for the next edition. Possibly its exposed position led to its present detachment.

"TALK OF MANY THINGS."

"The Lying Loadline."

LOAD Line Records! Not a very romantic subject, you will say; but this article in no wise smacks unduly of officialdom. Perhaps it will shed a new light on the true usefulness of records. Every telephonist is only too familiar with the rule which appears periodically in the rule book, announcing the fact that a Loadline Record will take place on such and such a day and that telephonists will record in the usual manner. Each girl, as she signs the rule, indulges in a shrug and a sigh and a thought of pity for misguided officials who labour under the delusion that any reliable facts concerning traffic can be really obtained by such a means. Under the heading "What Every Supervisor knows" could be written the history of the sad fallacy of the Loadline.

For weeks we poor telephonists work breathlessly, unceasingly, handicapped by short staff. Slogging—there is no other word to describe it. The horrid little winking opals glow on the switchboards like the evil eyes of a malicious hydra-headed monster. No sooner is one extinguished than a dozen others glow into being in malignant derision. Of course the Powers-that-Be realise that such things cannot be permitted to endure. The fair and fragile maidens in their employ must not work at such a tension. Accordingly they cast around for means whereby they shall decide how much work is to be accomplished and how many telephonists shall be employed on it. Instead of taking the testimony of supervising officers—those officers who have been trying to make ten girls go into seventeen positions—those officers who *have* to "get girls out" for lunch and tea—those poor officers who have continually to rob Peter to pay Paul. Instead of listening to the results of bitter experience, a Loadline Record is ordained to take place on a certain day.

Holidays, motor shows, general elections, racing, and seasons may follow each other in quick succession each adding its quota to the task of the already overburdened telephonist. On the day of the Loadline Record, everything stops as if by magic. It seems as if all the world knows that *our* exchange is taking a record, and conspires to refrain from using numbers thereon. Racing ceases, shows come to an end, people go out of town, and offices close down. The result of the Record is that there are twenty girls proved to be too many and fifteen positions must be closed down. In due course this takes place and by the time the staff is fully depleted, a war, or something equally awkward, takes place and upsets the calculations of City 2000.

Nothing in this world is entirely without use we are told, so we endeavour to find the use of the Loadline Record. As work drops automatically when a Record is taken, cannot we have them more often, say once a week? It will at least ensure *one* day when telephonists may cease from their labours—a sort of rest-cure. It is just the same when high officials visit an exchange. One moment we will be ravingly busy. The next, when they arrive, it will seem as if a spell has been laid on all our subscribers. Never a calling signal glows. We sit idle, plug in hand "anticipating" and praying for some excuse for our existence. When a lamp *does* glow, three telephonists rush to answer it and even then there is a chance that it will be "teamed" from under our very noses! If they visited us more often, perchance we should ward off many a nervous breakdown.

Seriously, though, can anybody suggest something really efficacious in this matter?

DOROTHY TURNER.

A brilliant and most successful fancy dress social and dance was held on Oct. 12 by the Liverpool Trunk Telephonists in answer to an urgent appeal for funds from the Liverpool Children's Infirmary. A ladies' orchestra gave their services and supplied the latest dance music. Musical items and recitations of the highest order were rendered by the Misses Talbot, A. L. Jones, Simcoe, Lewis, Tittensor, G. Johnson, and Warrinder, each artiste receiving a well merited encore.

The parade of fancy dress exceeded all expectations for artistry, humour, and originality, and prizes were presented by interested friends and awarded to Miss Fidler, prettiest costume (Persian Lady); Miss Warriner, most humorous (Lady Slavey, "some 'opes"); Miss Dixon, most original (1850 jumper); Misses Mahoney and Dutton—most suitable and taking couple. Two suprise prizes were awarded to ticket holders bearing lucky numbers.

Miss Johnson, Chief Supervisor, in the chair, carried out her duties in a most able and charming manner, and in a neat speech outlined the generous support given by the telephonists to this urgent appeal. During the evening, a visit was paid by our well-esteemed Postmaster and Mrs. Simpson. No effort was spared to realise money—all necessaries, including refreshments, being supplied by telephonists and friends.

It afforded great satisfaction and pleasure to hand a cheque for £50 to the Treasurer of the Fund.

Some mention should be made of the untiring efforts of Miss Talbot in her heavy role of chief organiser.

(LIVERPOOL.)

The Exchange Alphabet.

(Lines suggested at a farewell gathering at Stockport.)

A is for "Answer," a prompt one's required,
B is for "*B.B.*" which makes us all tired.
C for "Call Office" where good people go
To ring up their friends, whose "speed" is "dead slow."
D is for "Dials," yes, *sometimes* they fail,
E for "Engaged" when subscribers grow pale.
F "Fire Alarm"—how we all love the drill!
G for the "Gaffer" who makes us sit still.
H is the place where we all have to go
When we're put on "Enquiries"—at least, we think so!
I is the "Ink" with which we sign on,
J is the nib with which it is done.
K is for "Kettle," a good friend and true,
L is for "Locker," which holds things to chew
M is for "Monitor," working so hard
N for the "Numbers" she writes on the card.
O is for "Order Wire," shirk it who can,
P is *the* Party (our best thanks to Fan).
Q is for "Questions," of which we get many
R for "Relief"—ten minutes, if any!
S is for "Sallie," that friend of our youth,
Who gets somewhat "Breezy" when told the plain truth.
T is for "Teas," let's all have another,
U is for "U" whom we love like a brother.
V is for "Vanish," which you will soon do
From switchboards and telephones—wish we did, too.
W our "Wishes," so true and sincere
That you may have Happiness, Health and Good Cheer.
X for "Xchange" with staff so select,
Y for the "Youngsters" in "Glad Garments" decked.
Z is a puzzle which we will give up,
So let's all be merry, and pass round the cup.

(STOCKPORT AUTOMATIC EXCHANGE.)

The following pathetic lines (inspired by the fresh air sex) were contributed by a male reader:—

The Open Window.

Sing a song of tuberculosis!
Petrified feet and frozen noses.
Wat'ry eyes and husky gizzards,
All through sitting in Arctic blizzards.

Sing a song of influenza!
How you meet your latter end's a
Matter you have small concern in—
Might as well die cold as burnin'.

Sing a song of double pneumonia!
Such a death is surely only a
Swift transition to life eternal,
A glad relief from draughts infernal.

Sing a song of harp and halo!
Cloven hoofs and the devil's tail oh,
A chilly Heaven may suit the ladies;
I'm in the mood to appreciate Hades!

L.T.S. SWIMMING ASSOCIATION GALA.

To which a member of the F.A.S. replies:—

And the Closed!

Sing a song of Phthisis,
Deadly Bacilli,
Half-a-dozen "fair ones"
Baked—they know not why.
Not a window opened,
Coughs—both loud and strong;
Isn't that an atmosphere
To *breathe* in all day long!

Sing a song of Microbes,
Mouldiness and frowst;
Half-a-million fatal Germs
Snugly fed and housed.
Faces white, unhealthy,
What a noxious set;
Aren't men the stuffiest
Race you ever met!

By the kindness of a reader of our column, we are enabled to present half-a-guinea to the winner of the First Prize in the Amusing Incident Competition. We are, therefore, extending the time limit to Dec. 31.

The Road to Advancement.

The only road to advancement is to do your work so well that you are always ahead of the demands of your position. Keep ahead of your work, and your work will push your fortunes for you.—HAMILTON W. MABIE.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

On Wednesday, Nov. 22, the second meeting of the session was held, when Mr. H. L. Pountney read a paper on "The Opening of New Exchanges." A full account was given of the multitude of items that need attention before, at the time of, and immediately following the opening of a new exchange. Mr. Pountney confined himself to the field of activities in which the local traffic staff are chiefly concerned and described the process stage by stage from the time the advices are received giving particulars of the subscribers' circuits involved.

In a congested area like Central London, it is inevitable that when a new exchange is opened a large number of existing subscribers are required to change their numbers, and many difficulties arise, first of all in persuading recalcitrant subscribers that the transfer of their circuits is for the ultimate advantage of themselves and others. The large majority of subscribers accept the position without comment if without enthusiasm, but there are always a few who object, some to the name of the new exchange, others to the numbers it is proposed to allot them and some, it is feared, for the sheer joy of objecting. Such objections shed a light on the necessity for the judicious selection of the names of new exchanges and the careful allocation of telephone numbers.

Time did not permit an account being given of the part played by the Engineering Department, but it was mentioned that so accustomed had we become to its delivery of the goods and so much is its work done behind the scenes (and down manholes) that it seldom receives the general praise it deserves.

Mr. Pountney went on to describe the steps taken to train the operating staff in the use of the new equipment. Coincidently the apparatus is tested as frequently as possible with the two-fold object of detecting faults and giving the telephonists practice on the new equipment.

Many other items were mentioned which have to be attended to before the great day arrives when the exchange takes its place in the system.

The paper was concluded with a description of the opening ceremony.

In the discussion which followed, Mr. Pink said that he thought Mr. Pountney's paper would serve the useful purpose of inculcating keenness into every one concerned in an exchange opening. He gave us, too, as Mr. Buckeridge remarked later, another glimpse of his vision—a splendid vision of future growth. He touched also on the difficulty of naming new exchanges—so many factors having now to be taken into consideration before a name is finally chosen.

Miss Bott, in intensive, indignant phrases, told a tragic tale of thwarted enthusiasm. It appears that the whole staff is prepared to be wildly excited when a new exchange is opened; but by the time that *five* abortive attempts have been made to get a supply of designation strips for the new junctions, "the tumult and the shouting dies," and hopeless resignation sets in. It is to be hoped that steps will be taken towards the prompt supply in future of all the mundane requirements of an exchange opening, in order that this praiseworthy initial spirit may be fostered and maintained.

Miss Davidson expressed succinctly her views with regard to Traffic Instructions, which she would like expressed succinctly! She quoted Hamlet—"Brevity is the soul of wit." This thought was formulated still earlier (about B.C. 446, in point of fact) by the gentleman named Sophocles—"Many wise things are bound up in short speech;" and if the Lord High Traffic Instructioner will take this for his motto—substituting "few words" for "short speech" he will earn Miss Davidson's undying gratitude.

Miss Davidson then told a tale of a Civil Servant who, on being called on his private wire on an official matter at 9.30 a.m., exclaimed: "Good heavens! Have you fetched me out of bed to tell me that!" The breath of sheer horror expelled at this juncture by the meeting, was happily *dis*pelled when Mr. Dive (who seemed to have an uncanny inner knowledge of the whole affair) explained it by saying that we all must realise that the Civil Servant in question had been wrestling all night with a tough intellectual problem connected (naturally enough!) with the Service, had gone to rest at 8.45 a.m., and had almost immediately been awakened by the harsh sound of the bell.

A pleasing innovation was a musical half-hour before the meeting. Mr. L. G. Hawker gave a Pianoforte Recital which was much appreciated by those who came early. It is the intention to repeat this feature at all future meetings.

L.T.S.S.A. Social and Prize Distribution.

The Swimming Association held its Social at the Horticultural Hall, Westminster, on Friday, Nov. 3. There was a good attendance, and an early start was made with dancing. Later on there were songs by Mrs. Hunter and Messrs. Alfred Cracknell and Robert Barry.

Halfway through the evening the music and dancing was relegated to second place, which time Mrs. G. F. Preston very graciously handed the prizes to those who won them at the two galas. Several of the recipients made more than one journey to the platform and all received a few well-chosen words of praise from Mrs. Preston, who on these occasions, and later in a charming little speech, gave an admirable exposition of the "smiling voice."

The Controller brought the ceremony to a close by responding to a note of thanks to Mrs. Preston.

Mr. E. A. Pounds acted as M.C. assisted by an able body of workers.

L.C.C. Lecture Courses.

The series of Lecture Courses arranged for the staff of the London Telephone Service by the L.C.C. City Literary Evening Institute during the early summer months, was well supported, and the L.C.C. have made arrangements to provide a similar series of lectures, including several additional subjects, for the winter months. Lectures have been provided in the following subjects:—Psychology, Elocution, English Literature, Art Appreciation, Economics, French, Public Health, Social History, Music Appreciation, Greek Literature, Country Dances, Choral Music, and Physical Exercises. Over 200 students from the London Telephone Service have enrolled.

Culled from the Exchanges.

City Exchange.

The above exchange held their first dance of the season on Armistice Night at the Stationers' Hall. The "great day" was celebrated in a festive manner and balloons, toys, hats, streamers and Carnival balls were in great evidence, and the din at times took one's mind back to "Zero hour." Further dances are being held at the same hall on Jan. 15 and March 10 and those desiring to be present should book their tickets from Miss Eastell at once, as the demand for tickets for these dances has so far always exceeded the supply.

Victoria Exchange.

On Tuesday night, Sept. 26, at St. George's Baths, the Willow S.C. (Victoria) held their first gala. The Hon. Sec. Miss O'Connor, Hon. Treas. Miss Tripps (who was also chief whip), and indeed all the members of the committee should be commended on the way they co-operated to make the evening such a success.

The enthusiastic support given by the President, Miss Ashmead, Chief Supervisor, and Vice-President, Miss Lucking, was much appreciated by all.

The chief events were those open to the whole Telephone Service. The Supervisors' 30 yards Race was won by Miss Hare (Victoria) off scratch. It was one of the most popular victories of the evening, only gained, however, by inches, from Miss Stansfield (Avenue), with Miss Osler (Central) a good third.

The 60 yards Open Handicap produced a close contest, particularly in the final, in which one yard covered the first three. Miss Hawley (Hammersmith) 19 secs., Miss Phipps (Regent) scratch, and Miss Andrews (Hammersmith) 19 secs., finished in order named in 1 min. 17 secs.

The Plate Diving Competition was won by Miss Fern (Victoria) with Miss Amos second. In the Open 120 yards Team Race, Regent (Misses Phipp, Broomsgrove, Amos, Cole) won by 6 yards from Victoria (Misses Fern, Hare, Johnstone, Amos), the latter finishing 2 yards in front of Central (Misses Cole, McNee, Knight, Millbank), time 1 min. 43 2-5 secs.

The Club Learners' Race was won by Miss Mann, Miss Dyer being second.

The Club 30 yards Handicap resulted, Miss Hare, 7 secs., 1; Miss Fern, 1 sec., 2; Miss Amos, scratch, 3. Inches covered the three. Time 44 secs.

The Engineers' 60 yards Handicap resulted, Mr. Bremer, 1; Mr. Allen, 2. The result of the Water Polo match arranged between the City of Westminster S.C. and Fire Brigade S.C., was a victory for City of Westminster S.C. by 4 goals to *nil*.

Miss Ashmead then distributed the prizes accompanied by cheers from the enthusiastic onlookers. A word of thanks is due to the Regent Exchange Orchestra who supplied the musical interludes, adding the finishing touch to a most delightful evening.

City District Dance.

The event of the season in the City Traffic District took place on Nov. 4 last when the Annual Dance was held at the Royal Horticultural Hall, Westminster. Last year the dance was held at Australia House, when the demands for tickets far exceeded the number issued, and in order to avoid similar disappointment this season, early arrangements were made to obtain a larger hall.

Five hundred and fifty dancers came to "Chase the glowing hours with flying feet," assisted by the excellent music of Leonard Coombs' Orchestra, specially augmented for the occasion, and the Horticultural Hall with its midsummer exhibition of flowers could hardly have looked more happy and gay.

The affair was announced as a dance but before the orchestra struck up it was apparent that the description was inadequate and King Carnival took things in hand. Most elaborate fancy head-gears were distributed and either by the most extraordinary chance, or what is more likely by impish design, some very grotesque results were observed, especially amongst the "heads." Toy "musical" instruments were also distributed and added to the fun, the performers obviously enjoying it most.

All the arrangements were excellent, and the promoters are to be congratulated on their success in organising a most enjoyable and memorable evening.

Regent.

On Oct. 27 the Regent Swimming Club held a Social, when the prizes were presented to winners of club events. It was a very jolly affair and heartily enjoyed by all who attended. Mr. Pounds was M.C. During the evening he made a happy speech, in which he mentioned the prowess and exploits of the members of the Regent Swimming Club. The latter has now many trophies to its credit, not the least of which is the Pounds Challenge Cup.

A bran tub, with its irresistible lure of mystery, added to the merry-making—and the proceeds—of the evening.

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WIRELESS COMMUNICATIONS.*

BY LIEUT.-COL. C. G. CRAWLEY, R.M.A., M.I.E.E.

THE second meeting for the present session of the Edinburgh Telegraph and Telephone Society was held under joint auspices with the Edinburgh Radio Society, on Nov. 7. A large and representative audience filled the hall of the Philosophical Institute, and in introducing the lecturer, the Chairman, Brigadier-General Price, said that the association of the two societies for the mutual furtherance and discussion of a technical and scientific subject of such world importance as wireless telegraphy was exceedingly gratifying. He added that great as the advance had been in the spheres of the theoretical and the present-day practical application of wireless, we were as yet only on the threshold of what would ultimately be achieved by present and future generations, but in welcoming Colonel Crawley that night they had an opportunity of hearing an authority on the subject of world and Imperial Wireless Communications.

With the aid of a chart, maps and indicator flags, Colonel Crawley proceeded to take the audience over the scheme of wireless communications as they had developed before and since the war, touching upon the problems that had been set and in most cases overcome, and explaining those which remained to be solved.

Referring to wireless broadcasting, the lecturer said that this was a subject of wide interest at the moment, especially to all who have themselves embarked on wireless communication in one form or another.

Broadcasting was quite new in this country. In the United States of America they had been broadcasting for over two years; and there they had been working with almost no restriction, broadcasting and receiving just as they liked. But while this might be done in America, which covers such a large area, it would be quite impracticable in England; and even in America many difficulties had arisen. It was therefore decided in this country that regulations, which the lecturer explained at length, should be made for the broadcasting services in addition to those for what might be called genuine experimental work.

In referring to the Imperial Wireless Chain, the lecturer said that it might be said to have really started in October, 1900, when the Marconi Company commenced the erection of a high-power station at Poldhu in Cornwall, the first large station in the world. It was erected to transmit messages to Newfoundland, and the idea was ridiculed by many—even by some of our leading scientific men who proved that signals could not be sent so far, for various reasons, such as the curvature of the earth. Marconi succeeded, however, in sending signals to America in 1902, and in the following year a wireless service was started to ships, a service which is still by far the most important work carried out by wireless.

In 1904 the Poldhu station commenced a commercial service to Cape Cod in Newfoundland. This was our first Imperial link, and was forged by Senatore Marconi and his enthusiastic assistants. Later Marconi decided to build another station, at Clifden in Ireland, which opened up a service with a station in Nova Scotia. An agreement between the Post Office and the Marconi Co. for the construction of a chain of stations throughout the Empire was signed in 1913.

The War, however, upset completely this scheme for providing an Imperial Wireless Chain. Wireless was required to serve strategic ends only, and control was taken over by the Admiralty, who erected over a dozen ship and shore stations for strategic communications throughout the Empire. Other countries had no such strategic need. They had not world navies nor world empires. Point-to-point communication was more necessary for them. France has now, therefore, five high-power stations, and nine stations abroad, many of which were started during the War. Italy has two at home, and two abroad. Germany has three at home, and had two abroad—one in Togoland and one in South Africa. The United States of America have about 15. Germany sent messages by wireless for ships, &c., to Africa, where they were received and sent broadcast, an arrangement which was of very great assistance to her at the beginning of the War. In this country at the moment we have only two high-power stations, largely owing to our War policy. One is at Carnarvon, the Marconi Company's large Trans-Atlantic station, the other is near Oxford, the Post Office high-power station which works with Cairo and carries out press services to Halifax, India, and ships, as well as broadcasting Government news messages for reception all over the world.

In 1919 the Imperial Wireless Telegraphy Committee was appointed to consider the whole question, the basis of their recommendations being that two chains were to be established, one from England to South Africa *via* Egypt and Kenya Colony, the other to the East *via* the second station in Egypt. At that time it was not considered practicable to have a commercial service over such long distances as between, say, England and Australia, but developments have been so rapid that the intention of erecting a station in Kenya Colony and a second one in Egypt has been abandoned, while

* Paper read before the Edinburgh Telegraph and Telephone Society.

the erection of stations at Singapore and Hongkong is deferred, at any rate, for the present.

A large Government station is to be erected by the Post Office in England, and its site is now being selected. The South African Government has entered into an agreement with the Marconi Company for the erection of a station in South Africa. In India, the matter of the erection of a station is being arranged between the India and Home Governments. The Australian Government has decided to put the erection of their station in the hands of a local commercial company; while a Canadian Government representative is now in London discussing the question of a Canadian station.

A brisk discussion by the audience followed the lecture, several questions in regard to broadcasting matters, the law of copyright, wave lengths, transmitting, licences, &c., being raised, which Colonel Crawley dealt with in reply.

Votes of thanks to the lecturer were moved by Mr. Percy Morris of the *Scotsman*, and by the Vice-President of the Edinburgh Radio Society, while Major Jayne summed-up and moved the vote to the Chair.

The next meeting on Dec. 5 will be addressed by Miss Nora Milnes, Director of the School of Social Training and Study, on "The Economic Position of Women."

HOW THE TELEPHONE WORKS.

BY A. CROTCH.

IV.

The cycle of operations involved in "getting through" are shown in Fig. 13. Where a lamp is shown full black, it indicates that the lamp is actuated or is glowing. First, as stated near Fig. 10, when the subscriber lifts his receiver he bridges the two lines of his loop by his induction coil (one winding) and transmitter.

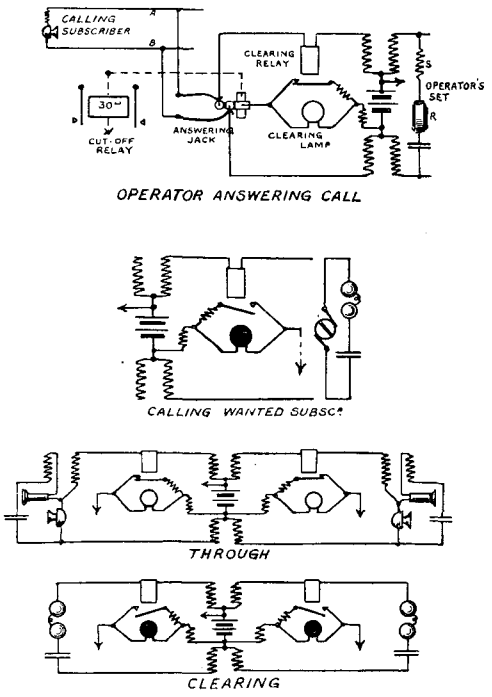

FIG. 13.

This allows the current from the common battery to flow round the circuit, through the contacts of the cut-off relay and coils of the line relay. The latter is actuated and causes the calling lamp to glow. The operator inserts the answering plug of a pair in the subscriber's answering jack and we have the conditions shown in the first part of Fig. 13. First, the shank of the plug being in contact with the bush of the jack, current from the battery passes through the clearing lamp to the coils of the cut-off relay. The latter is actuated and its contacts open, cutting off the line lamp and relay and the battery. The latter, however, is restored by means of the tip and ring of the plug. The current passing through the clearing relay closes its contact and puts a shunt on the lamp, diverting sufficient current to make it cease to glow. The operator's set, it will be seen, is in the position to be occupied later by the wanted subscriber and is through to the calling one. On hearing the number required, she takes the calling plug of the pair, but before inserting it, touches the bush of the wanted subscriber's jack with the tip to see whether the latter is free. If free, nothing happens, but if already engaged, the negative pole of the battery will be connected to all the bushes of that subscriber. The tip of the plug having the positive pole connected to it, an impulse of current will pass to the operator's set, and will give the warning click. Assuming the wanted subscriber's line to be free, the plug is pushed home and the generator applied. The supervisory lamp on this side of the cord circuit glows through the earthing of the shank of the plug through the bush and cut-off relay of the wanted subscriber; the relay receiving no current, its armature is unaffected and allows the lamp to glow. When the subscriber replies he sets up a path across his lines which allows the current to flow: this actuates the relay and the lamp is put out. This is the "through" position shown in the figure. When the two subscribers have finished and hang up their receivers, each disconnects his loop and puts the supervisory relay on his side out of action. The current in the lamp is then restored to its normal value and the lamp glows and gives the signal to the operator to clear.

Fig. 14 shows the speaking circuit, cleared of all apparatus except that necessary for speech. C. B. is the common battery

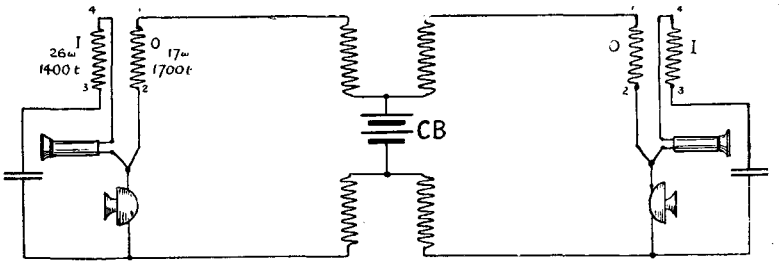

FIG. 14.

at the exchange, with its repeating coil. At the subscriber's end, one winding of the induction coil, plus the receiver and the condenser, are placed as a shunt across the transmitter. Normally a steady current flows. All the changes involved in speech resolve themselves into the rise or fall of resistance of the transmitter. Imagine that this suddenly falls: there is an immediate rise in the value of the main current on that side which will traverse the O winding of the home induction coil in the direction 1—2. Further, the lowering of the transmitter resistance reduces the potential difference across its terminals and this is followed by the freeing of a certain amount of the charge in the condenser. This portion of the charge passes through the I coil in the direction 3—4 (and through the receiver) and the inductive effect of this impulse is to set up another in the O coil in the direction 1—2. But this is in the same direction as the original impulse of increase, that is, both effects are additive and the combined result is a flick of current through this side of the repeating coil in the same direction as the main current. The inductive effect on the other side of the repeating coil is an impulse in the opposite direction, opposed to the direction of the permanent flow. This passes through the O winding of the listener's induction coil inducing an opposite impulse in the I winding, which actuates the receiver. The condenser tends to sharpen up these impulses.

TELEGRAPHIC MEMORABILIA.

To all engaged in the worthy art of Telegraphy, and its estimable sister, Telephony, A Happy New Year! A trite saying but none the less sincere. Whether these arts are conducted by the medium of physical circuits, phantom circuits or the still more elusive medium of the ether matters not. Once again, then, A Happy New Year! At home or abroad let the sincerest message fly and that, as our correspondence and subscribers' list show, is to the far corners of the earth, if really there be corners on a terrestrial globe, which quibble may be admitted when one's pen scribbles a hopeful paragraph at the commencement of another year. What developments in the dual arts of telegraphy and telephony are likely to materialise in the coming twelve months it is perhaps wiser to refrain from putting down in b'ack and white. It is much safer to prophesy for the centuries than for the months to come, and very unwise to fix the dates of future new discoveries. So we will wait and plod on in patience, alert to new ideas and new methods, with just that tinge of sane conservatism which recognises that *all* that is old need not necessarily be obsolete any more than anything that is modern may merit the scornful designation of "new-fangled."

Telegraphy during these long months of depression has followed the curve of reduced trade and its approach to stagnation as it must of necessity do seeing that it is a true indicator of the business pulse of all nations. There are, of course, other factors which so far as the British Post Office is concerned, are local changes of the habits of our people and the methods of administration which have of late years affected the amount of Press matter directly dealt with by Government hands. One does not nowadays see column after column of House of Commons speeches and rarely is even a Minister reported verbatim. We have reached the era of "Scrappy Bits" and selected morsels as far as Parliamentary reporting is concerned and the nights when "News" ran into thousands and thousands of words the sittings of the "House" regularly extending beyond midnight and the newspapers going to press at 3 a.m. and later are practically no more. Editorial and compositorial Fleet Street goes home to bed much earlier than was at one time the case, and there is no longer any necessity for special licences of certain hostelries. The transfer of much of the dissemination of news to private combinations has also added its quota towards reducing the special Press nights in the C.T.O. to events of the past, although the leasing of the wires to private enterprise has naturally done something towards assisting the credit side of the Telegraphs ledger.

The snow-storm which struck Germany in mid-December caused an interruption of the London-Berlin direct telegraphic communications which lasted for two or three days. Fortunately the town of Dusseldorf proved to be one of the few remaining connexions and as the latter was equipped with Siemens' apparatus London was very quickly utilising this emergency route. The London—Berlin Wireless Service also rendered useful assistance but the delay from certain countries beyond Berlin at times ran into 36 to 48 hours. It is feared that the method adopted of perforating a large quantity of Siemens slip and then in the event of bad working or complete breakdown, waiting for hours for restoration of the actual interrupted line before transmitting the traffic instead of diverting in approximate code turn by other routes is a temptation too great to be withstood by certain foreign administrations. It is as though they considered "perforated slip" as *transmitted* telegrams. Close adherence to the serial numbering of telegrams for each individual circuit appears to necessitate the destruction of the original slip and the reperforation of the entire series of telegrams is apparently another cause which naturally forces the traffic organiser of any office to hesitate to take this latter step, and to re-perforate perhaps some scores of telegrams; consequently telegrams arrive in an irregular order of code which would shock the British Traffic Director beyond recovery. This may be the reason why Hamburg, the great German port and commercial centre, prefers a multiplex system as against an automatic telegraph installation of the Siemens type excellent as the latter may be. The former clears as it goes. Cologne wireless also did good work during the breakdown so that the diversion of traffic through other countries also rather hardly pressed for German communication was reduced to a minimum. Fortunately—or should I write unfortunately—the traffic with Germany was much lighter than usual or the breakdown would have proved a much more serious affair to business.

An announcement was recently made in the London Press in connexion with the contracts for new cables and the laying of the same by the Pacific Cable Board. The following particulars are excerpted as a matter of interest to the general reader. One new submarine cable of 1,313.75 nautical miles to be laid between Auckland, N.Z., and Suva Fiji. Also 539 miles between Sydney, N.S.W., and Southport, Queensland.

Kalabaskraal, near Cape Town, is reported as being the site for the new wireless station already mentioned in these columns. It is also stated that the new wireless rate will be eightpence less per word between the Union and the British Isles than the present cable rates.

As a Government official one welcomes the following words from the present president of the I.E.E., Mr. F. Gill, who has thrown himself so wholeheartedly into the duties of his post of honour. Coming from the lips of one who is a prominent official of a huge private electrical combination, his words come with special force and form a rather novel view-point, at least from the commercial and public side of British life:—

"Other things being equal, the nation best equipped with the means of production, communication, and transportation, will enjoy a great advantage in the race for commercial supremacy, and perhaps also in the search after national well-being. It follows, therefore, that a great responsibility is laid on those to whom is entrusted the means of communication, or who control those means, particularly so because it is at last generally recognised that competition is not an aid to efficiency in this business. In return for the grant of facilities to carry on its work, each grantee authority must ultimately recognise its duty to the public and must diligently and actively search out new means and facilities and also set about educating the public with regard to their need for communication. Efficient communication is the life blood of commerce and of national and international understanding and amity.

"The passive attitude of merely satisfying public demands must be abandoned and an aggressive attitude take its place.

"The assumption that lack of profit-earning robs a Government of the stimulus enjoyed by a public company; also that a Government department should not earn any more money than is necessary for it to be self-supporting, are both fallacious. Only let it be realised that communication means something real—that it is a tool for the benefit of the nation, a necessity—and who is more vitally interested in obtaining the fullest possible utilisation of that necessity that a Government? The stimulus of profit-earning to produce development is small compared with the stimulus which comes to a public department as trustee for the nation.

"But it seems also wrong to reason that a Government department should not earn something more than just enough merely to pay its way. With a large staff it is unhealthy that the idea should prevail that profit-earning is of no account. Without a surplus of income over expenses, there is no margin for unforeseen contingencies; service trials and research are likely to be adversely acted upon, and capital will be raised with greater difficulty. Further, there seems no reason why a Government should not include in the rentals a sum plainly intended to be a contribution towards revenue; it is difficult to see any reason why it is permissible, for the purpose of raising revenue, to tax, say, food, but not telephones, or why it is proper to make a considerable surplus on postage, but not on telephones. It would seem that the correct course is for the Government, if it operates the telephones, to raise from them something towards the National Revenue, and to pay such a return on the capital invested in the business as to make certain its ability to raise whatever money may be required to extend the business."

The coming twelve months will see some notable gaps in the ranks of the superintending class of the C.T.O., several outstanding figures being amongst those who will reach the age-limit during that period. Oh, no, I am *not* going to risk naming those who are considered "outstanding." That would be a greater peril than being on a "Devolution" or "Promotion" Committee. They are, of course, all *outstanding, ipso facto*, of their rank!

The number of experimental *broadcasting* licences was over 18,000 up to the end of October or an increase of 10,000 since March 31, 1922. The London *Times* states that owing to "Fire Risk" the St. Pancras Estates Committee recommends "that applications from tenants of flats in the Council's dwellings to fix wireless installations be not acceded to."

A correspondent of the same newspaper complains that the Corporation of the City of London has refused him permission to erect an aerial on a building which is the property of that body. The building is a large block of flats of which the roof is flat and put to many uses by the occupants of the dwelling. The view taken by the Corporation was that if one such request were granted no similar one could reasonably be refused. The erection of a forest of aerials would make it impossible to use the roof for other purposes, but it is not to be assumed that an objection would be raised to putting an aerial on a roof of one of the Corporation's buildings if the amenities of the place were not thereby impaired, subject to the approval of the fire insurance company concerned.

Radio telephone broadcasting is about to be inaugurated in Cuba according to the *T. & T. Age*.

We gather from several sources that the Cunard Steampship Co. has decided to maintain its radio branch, so that every member of the crews shall be subject to the company's discipline. Hitherto the 50 operators in the company's fleet have been employees of the Marconi Co. The Cunard operators will wear a specially-designed uniform, and a senior operator will rank equivalent to a second officer of the navigating branch; junior operators will be graded as officers. The White Star and other lines do not intend, at present, to follow the Cunard example, but will rely on the Marconi Co. and other radio firms for their operators and installations.

The Soviet Government have given the officials of the Great Northern full liberty in the re-establishment of their lines across Russia to the Far East. They have permitted them to establish food centres, for example. All telegrams for East Asia by the company's route will be forwarded from Omsk. At present two lines, *via* Irkutsk and Peking and Kiachta and Harbin, are working, and telegrams from London to Shanghai can now get through in two hours. There has not been very great difficulty in repairing the lines, the damage done having been less than was expected. Danish engineers have examined the whole route, accompanied by Russians, who have learned to use the apparatus. Telegram rates in Russia were not raised during the war; most of them are unchanged, but some have been reduced. The Danish company expects that there will be great telegraphic traffic to the East *via* Copenhagen as soon as the new Russian stations are opened.

The first following paragraph is published on the authority of the *Financier* and the second on that of the *Morning Post*:—

CABLE COMMUNICATION.—In order to maintain cable communication throughout the British West Indies, an agreement has been entered into between the British Government, the Dominion of

Canada, the Crown Agents for the Colonies, and the West India and Panama Telegraph Co., allowing the company to increase its charges. The agreement provides for increases in the existing maximum rates of 6*d.* per word on "through" rates, and an increase of one-third, with a maximum of 6*d.*, for inter-island rates. Deferred Press and Government telegrams are to be carried at half the ordinary rates. These increased rates are authorised until March 31 next, and the future rates are to be decided by circumstances.

The Treasury considered various proposals to prevent the cessation of the company's system, including its purchase by the Governments concerned, but decided on the above policy.

According to *Le Petit Journal* of the 18th ult, M. Paul Laffont is about to submit to the Chamber of Deputies certain propositions in connexion with international and trans-continental telegraphy and telephony which that gentleman hopes will considerably ameliorate the present unsatisfactory working of these all-important communications.

The emphasis which the *Journal* places on these projects is rather on the condition of the telephones than on the telegraphs, but one can only add one's hope to that of the French Postmaster-General that the condition of the conductors of both systems will come very seriously under consideration.

Le Petit Journal with no uncertain voice drives home the facts of the growing practical isolation of France owing to the unsatisfactory state of her communications and clearly points out to the French public the possibilities of England obtaining trans-continental communications across Europe by circuitous routes *via* Belgium, Germany and Switzerland, thus cutting out even the possibility of income from way-leaves, not to speak of the loss to French commerce of the necessary facilities for rapid communication. It accentuates the present position by showing also that telephonically while Germany has connexion with Warsaw, Prag, Vienna and Budapest, France so far as these centres are concerned remains dumb!

Red Tape is a sure sign of age—red tape in both mind and manners. The ability to disregard red tape is the sign of vigour, honesty, and youthfulness, and will be so for all time.—Richard King in "Silent Friends."

J. J. T.

AN ADVERTISEMENT.

As a New Year's gift, the "School of Orators" is prepared to offer a *complete course in speech-making at half the usual fees.*

We can compile anything from addresses for Bands of Hope to Presidential speeches.

We specialise in "*skins*" and T. 18's; we can answer these with an eloquence that will favourably impress the sternest martinet.

If you contemplate making a speech as chairman or president of any Trade Union, Telephonists' Society, or the like, write to us for specimens.

We give below an abridgement of one of the speeches found in our publication "Half-a-dozen Inaugural Speeches for Students," including those entitled "What are we doing?", "How are we going?", "Why are we doing?", &c., &c.

"What are we doing?"

"Telephonists, yours is a noble calling! . . . Let each of us answer this question to-night, 'What are we doing?' Taken literally (like that renowned one 'Where are we going?') this question could be very easily answered. Let us consider it—if only for this evening—in its moral aspect. . . . How many are there, I wonder, who see nothing save uninteresting toil, yea, drudgery, in a telephone exchange? . . . The daily activities of an operator *are full of wonderful possibilities. . . . Think of the unique personalities* it is your privilege to come in contact with; take, for example, the subscriber—a most interesting personality; always ready with an instructive or pithy remark . . . Again, the supervisors—do you really appreciate all that you possess in your supervisors? I doubt it! Yet they are always willing to give you the benefit of a wide and varied experience in making your life at the exchange one of intense pleasure—always anxious to clear up any little misunderstanding that may arise between subscriber and operator. . . . Once again, the engineers—the men that have given their lives to the cause of science. I am sure you will agree that these are men of most attractive personalities—patient, polite, obliging, sympathetic, conscientious, always of a sunny temperament. . . . Do you appreciate it? If all operators only appreciated the honour of their calling we should have conversations on the 'order wire,' and elsewhere, free from all trace of malignancy, virulence, and malediction. . . . What are we doing? . . . Whatever you are doing you could, no doubt, do more. . . . Yours, telephonists, is a noble calling: be worthy of it."

Should you not require a presidential speech, you will certainly require an answer to a T. 18, therefore, write to our London Principal for particulars of courses, &c.

"CIVIL" (Gerrard).

EFFICIENCY IN THE TELEPHONE SERVICE.*

BY T. G. TUTTY, Telephonist (*Leeds*).

EFFICIENCY is the parrot-cry of the age and, regarded superficially, savours rather of the nineteenth century slogan "The survival of the fittest." In reality it means scientific management and scientific management means efficiency.

I want to talk of efficiency *in* the Service, rather than *of* the Service, because the latter is the direct result of the former. America, Germany and Japan have studied efficiency until they have made it a science. We in England are rather slow to adopt new methods, because of insular prejudice perhaps, but many English firms now realise the industrial importance of efficiency. I have often heard the Telephone Service of Sweden quoted in a way prejudicial to our own, but it is not a fair comparison when the conditions and methods of working are different. There is no real reason why we should not have the finest Telephone Service in the world, but it is necessary first that we should have a clearly defined ideal and a true conception of our work and its aim.

As a State-controlled industry the telephones are primarily a public service and not a profit-making concern. We must try and keep sight of that important fact in spite of the present expensive economy campaign.

Efficiency is not dependent on one factor but on many. Everyone in the Telephone Department from the head of affairs to the youngest probationer, is responsible in a greater or lesser degree for the Service. The equipment, the subscriber and the staff are the "Big Three" of the telephone world. With the first two I will only deal briefly.

Up-to-date equipment is essential and it must be sufficient to meet normal and abnormal needs and also be kept in perfect condition. This of course is the work of the Engineering and Maintenance Department.

A subscriber has a telephone installed as a means of quick and direct communication, but in many cases he defeats his own object by delay in answering his telephone. Subscribers do not realise the importance of training one person for this particular work and thereby ensuring greater speed and accuracy in business transactions over the telephone. In speaking of the staff I am going to confine myself to the side I feel most competent to deal with—the exchange side. Many of my remarks, however, are capable of a general application. First and foremost there must not only be sufficient staff to meet ordinary traffic but an ample reserve for emergencies. The personnel of an exchange is, I think, one of the most important factors in the Service, and it is therefore essential that we should obtain the right material in the recruitment of our young telephonists and probationers, because amongst them are the controlling officers of the future. I think the Selection Committee should include a representative of the manipulative staff. I do not altogether advocate the American "once-over" system, but those who interview candidates should have some knowledge of psychology. The present system of enrolment at the Labour Exchange, would, I think, be well replaced by direct recruitment from the schools. The present method of education does not always give a proper preparation for an industrial or business career; but valuable information could be obtained from the school principals as to the efficiency and suitability of a candidate by a personal visit of the school matron. Whether the candidates when chosen become efficient officers depends on the training and the moral atmosphere of an exchange. I am not in a position to criticise the school training as I have not studied it closely, but I do think a practical knowledge of the switchboard first, would be helpful when receiving the theoretical instruction. Teaching is only successful when it interprets actual experience.

In speaking of the moral atmosphere of an exchange I am using the word in its broadest sense. We all radiate an influence of some kind, and consciously or unconsciously we are all affected by each other's personality. It is these accumulated influences that create the moral atmosphere. Here again we see the importance of having the right material at first. In selecting staff of any kind, but particularly for positions of responsibility, there is need to keep an even balance between intellect and character. The *dominating force lies with those in authority*, and we must not underrate the force of example and the influence it exerts. The foundation of an efficient service must be individual efficiency. It is of paramount importance therefore, that the head of an exchange shall be an efficient officer—a consistent disciplinarian—an exponent of justice and a student of human nature.

Industry cannot afford to be inhuman. An officer with the qualifications mentioned, would have none but efficient supervisors and the staff, as always, would reflect the influence of their controlling officers. Discipline is essential to efficiency, especially where the staff is large. I advocate discipline with this qualification—it must be exercised for a specific purpose and not for its own sake. Pushed to extremes it is soul-destroying. Discipline must apply to all, and is not the dictation of one to another, but the observation of rules drawn up for the Service. No person should be in a position to exact discipline from others who cannot exercise self discipline.

It is a great thing if controlling officers are gifted with imagination, coupled with broad minds and sympathies, so that while carrying out their higher duties they do not forget they were once operators. A controlling officer should be a specialist in the work she supervises and should be alert to detail while noticing the essential features of the work.

* Paper read before the West Yorks Telephone Discussion and Social Circle.

In the interest of the Service, a supervisor should see that no operator is exposed to undue strain, and to this end the load on each position should be equalised as far as possible. A telephonist should not be kept more than three hours at a stretch on a very busy position. Efficiency is not measured by a stop-watch and accuracy should not be sacrificed to speed. It is in the Department's interest as well as the telephonists' not to speed up to a point of fatigue and overstrain. Standardisation is necessary to efficiency, but to arrive at a workable basis an average of the capacity of the whole staff must be arrived at. It is merciless to expect the whole staff to attain the maximum of the quickest telephonist. Observation is superior to theory, but if the two are combined better results are achieved. The aim of the Service should be to ensure accuracy and a maximum speed with a minimum of exertion and discomfort to the staff concerned. Dealing with the staff generally, I think their work should be varied as far as possible, because routine destroys initiative and gives rise to a dread of responsibility.

The Service has become so bound up with regulations and the rule of thumb that there is no room for originality. If the Service is to be the best possible the health of the staff must be considered. Overwork is detrimental to health and therefore overtime should be eliminated as far as possible. A supply of disinfectant should be kept in a place easy of access for the use of telephonists going off duty. In this way much sick leave would be avoided because at the end of each duty the telephonist would disinfect her 'phone and make it clean for use next day. The work should be made as congenial as possible and the comfort of the staff provided for, so that they may get the full benefit of any rest periods or intervals between duty. Many officers look upon their work as a necessary labour and a nuisance, but if interest in the work were aroused there would be an immediate increase in efficiency. Interest eradicates monotony to some extent, and a knowledge of the relationship of the work performed to the rest of the Service would engender interest. There must be perfect organisation in our exchanges not only of time, material and energy, but of ability.

We must study the potentialities of the staff, and those officers who are selected for special duties should be shown the best and easiest methods of performing the work required. Exchange records should be kept up to date and every officer should be cognisant of new instructions. Official instructions are not by any means as clear or concise as they might be. They are non-committal and equivocal and are therefore liable to misinterpretation. The staff should not have to read instructions while engaged on other duties but be given time to peruse carefully and, if necessary, a superior officer should explain the precise meaning of the new regulation.

Records and returns play an important part in efficiency. They indicate variations and tendencies of traffic, due either to trade fluctuation or a change in methods of working. Inaccuracy not only makes a return useless but may lead to serious miscalculations in equipment and staffing. Without the knowledge of the relationship of one return to another and to the Service as a whole, a record loses its full value. Statistics are essential to the working of an exchange but they should be coupled with observation and practical knowledge to make efficient use of them. The faults and difficulties of the Service will be revealed by a minute analysis of the Monitors' dockets.

The Monitorial Board is not only an information bureau but a "First Aid Dept.," and it is therefore essential, that the staff on these positions should have a complete knowledge of the work, coupled with tact, diplomacy and patience. Directories and index cards should be up to date and easy of access.

The duty of tracing is an important adjunct of monitorial work, and the staff should not be allowed to perform this duty as they like, but trained to do it scientifically. It is essential that the tracing staff shall be both efficient and sufficient to ensure a complete investigation—accurate information, and a speedy reply to enquiries.

It is in the interest of efficiency that exchange managers shall be on duty in the exchange the greater part of the day, not only to deal with emergencies, but to have a complete knowledge of traffic, staffing, and working conditions. All offices should be kept as bright and airy as possible, because environment materially affects the staff and therefore the Service. Subscribers should be encouraged to visit the exchanges to get a more intimate knowledge of telephone working. There should be co-ordination between each section of the Service as they are all inter-dependent.

In conclusion, efficiency in the Service depends on perfect organisation. A perfect organisation will remember that the human element plays the most important part in industry, and will therefore study the principles of hygiene and psychology, including aptitude, temperament and interest; and the laws governing expenditure of energy and fatigue. There must be a harmonious adjustment of every branch of the Post Office Telephones, in the endeavour to realise the true conception of a public service.

Pessimists will say this is an impossible ideal but people of that kind never made anything efficient. I would remind you that an intelligent optimist is so, as much by determination as temperament.

If we all work in the right spirit and with sufficient determination, we can make the English Telephone Service the finest in the world.

IT may perhaps be of interest to our readers to know that the new book *Elementary Determinants for Electrical Engineers*, by H. P. Few, and the new (second) edition of *Electric Bells, Alarms and Signalling Systems*, by H. G. White, have been included in the Works of Reference recommended by the examiners of the City and Guilds' of London Institute.

LONDON ENGINEERING DISTRICT NOTES.

FROM the Staff of the London Engineering District to all co-workers—Greetings! May the year 1923 prove a very happy and prosperous one to all!

Unit Construction Cost.

Probably there is no combination of words so irritating to the average worker in the Engineering Department as that which heads this paragraph. It is believed that much, if not all, of this irritation would disappear if the reasons for the introduction of the system were fully understood.

There are some who believe that it was specially designed to irritate men and to change them from steady manual workers with a high output to composite beings, neither mechanics nor clerks, who spend one-quarter of the day doing a job, and the other three-quarters of the day in writing little tales about it to satisfy certain theorists at Headquarters who would not be tolerated in a private concern. Yet the greatest and most successful of the private concerns are those that pay the most attention to "costing" systems. In these days of fierce competition there is no room for the happy-go-lucky methods of the past. Every item of work must be analysed to ascertain exactly what each operation has cost. Wasteful and inefficient methods must be eliminated and replaced by scientifically sound and economical processes.

It is interesting to hear what Mr. Henry Ford says when writing about the Ford factory:—

> "I think one hundred dollars would buy all the office equipment in the factory—outside, of course, the cost department."

There is very great significance in the exception that is made, although it would readily be conceded that a cost department without manual workers would be useless, yet the usefulness of the workers may be increased many times if the cost department is properly manned, equipped and directed. Mr. Ford is as shrewd a business man as can be found to-day and he has no doubt about the importance of securing accurate costing methods. It is impossible to determine accurately the lowest price at which an article can be sold until the exact cost of manufacturing the article is known. As soon as the exact cost of manufacture is known methods of reducing that cost will be suggested. This will tend to reduce the selling price and lead to increased demand. The application of all this to the telephone industry will be apparent. The Department wishes to create a big demand for telephones, and with that end in view is adopting similar methods to those which have proved their worth in other branches of industry.

Economics.

The Engineering staff in London prides itself on knowing something about the theory and practice of economics. Every engineering operation performed can be justified from an economic standpoint. If it is found necessary to incur a cab fare rather than a train fare the traveller will be prepared to prove that the cost, having regard to all factors, is less, although the fare is more. A letter headed, "The Unpopular Taxi-cab" in one of the evening papers must have shocked every P.O. Engineer who read it. The letter explained the need for the present high taxi charges as follows:—

> In pre-war days the fare was eightpence a mile. To-day it is a shilling.
>
> With the extra fourpence per mile the taxi-cab proprietor has to meet the increases on expenses as follows:

1914.	1922.	Increase.
Cost of cab £375	£700	86%
Road tax £2	£15	750%
Petrol 10*d.*	2*s.*	140%
Garage 17*s.* 6*d.*...	23*s.*	31%
Accessories and spare parts ...	—	45%
Repairs	—	80%
Compulsory overhaul	—	80%
Wages	—	80%

> This makes an average increased expenditure of 129 per cent. to be met by an extra 50 per cent. in fares.

How 129 per cent. is arrived at is not clear. If the average of the percentages is taken—161 per cent. is obtained. No attempt has been made to weight the percentages, and the increased first cost of the cab is thrown into the "per cent." pool without any attempt to reduce it to an annual charge. It is a good thing that such arithmetical methods were not adopted by the Post Office when working out the increases on the telephone tariff.

Loud Speaking Telephones.

Since "Wireless" has become a household word quite a crop of "loud speakers" has been introduced. Several of these are based on a principle patented by Sir Oliver Lodge so far back as 1898 and described in Specification No. 9712 which was registered on April 27 of that year.

The objects of the invention were described as follows:—

> The chief objects of my invention are to provide means for the audible detection of extremely feeble fluctuating electric currents such, for instance, as may be caused in a closed, or practically closed,

circuit by another very distant circuit supplied by alternating currents; to magnify the telephonic effect of feeble currents by successive specially designed relays until the sound is sufficient to act as a "call" summoning the operator to attend to receive the message; to magnify the telephonic effect of speech so that conversation transmitted round one circuit may be heard inductively in a different circuit provided with proper instruments; and generally to improve the conditions under which telephony is carried on so as to magnify enormously every fluctuation of current and thus produce a loud sound from a feeble stimulus for any useful purpose.

The basis of the invention was a light wire coil supported elastically in strong magnetic field in such a way as to be thrown into vibration under the action of an alternating or intermittent current traversing the coil. The inventor built up a series of relays by attaching a coil to a transmitter diaphragm and arranging the circuit so that the current in one transmitter circuit was passed round the suspended coil of the next relay in the series. At the end of the series the coil was attached to a diaphragm suitable for imparting vibrations to the air and so to the ear. Sir Oliver Lodge gave a demonstration of his amplifying apparatus at the Institution of Electrical Engineers, and the voice of a speaker in the basement was heard clearly by the whole audience.

The objection to such a device was of course the distortion due to the inertia of the suspended coil. However light the coil is made—it was constructed of aluminium ribbon on a frame of the same metal—distortion is apparent, and the greater the number of stages of amplification the more apparent is the distortion. The modern loud speakers built on the same principle have the same defect.

Some 15 years ago the writer of this note conducted some experiments with apparatus built up on the Lodge principle. Music over an electrophone circuit from the Palace Theatre was amplified, the coil in the last unit being suspended from a large wooden diaphragm mounted at its nodal points. The result was not good for the reason already mentioned; volume was ample but articulation poor. The introduction of the thermionic valve with its inertialess action put all mechanical devices out of court. Until a loud speaking telephone independent of a suspended coil or similar part subject to the laws of momentum is introduced the perfect loud speaker will not be available.

Gas Masks Required.

Cigars have been so plentiful lately that non-smokers are requisitioning gas masks. Others are becoming bilious in their endeavours to show their appreciation of their colleagues' success by smoking cigars of a quality to which they are unaccustomed. We trust that the rumours of further promotions will not end merely in smoke.

THE GENERAL ELECTION AND THE C.T.O.

By W. H. J.

HOWEVER justified the statement may be that the British Public took but a passing interest in the recent General Election, the Telegraph service certainly is not allowed to assume the same tranquillity in regard to this great national event.

With the progress of time many changes are produced, one notable change being that the average citizen does not now remain out-of-doors until long after midnight to hear the Election result in his particular constituency; he much prefers, and wisely too, to keep to his normal hours of retiring to bed, confident that the morning newspaper will contain the majority of the Election results from all over the country. Changes too have taken place in the Telegraph service, generally, in matters connected with a General Election and this is nowhere more noticeable than in the Central Telegraph Office. For the purpose of comparison, we must go back to the General Election of 1910; the General Election of 1918 differed from all others as the counting took place a fortnight after the Elections to allow of the inclusion of the overseas votes. Twelve years ago Press Agencies and newspapers were in keen competition to be the first to receive and distribute the speeches of notable Ministers and leading members of political parties, and proud was the reporter who could add to his telegram the words "first message handed in." At that period reports of speeches were in the main, dealt with, telegraphically, by means of the Wheatstone, a system which compared with more recent developments and improvements, appears laborious necessitating as it does numerous wire lengths and a large staff to prepare the Wheatstone slip at one end and in transcription of the Morse slip at the other. With the comparatively recent developments of the Creed, and installations of the Baudot, together with the combined organisation of news agencies, newspaper copy is transmitted and delivered much more rapidly.

By way of illustration, a verbatim report of Mr. Lloyd George's speech at Glasgow, comprising 105 pages in all, was transmitted to the C.T.O. over the Baudot system and delivered to the Press Association within ten minutes of the time of handing in of the respective pages. It seems but a few years since, on the occasion of a speech by Mr. Asquith at the same town, newspapers and agencies would be enquiring at 2 o'clock in the morning for the concluding pages of the speech.

Nov. 4 was the day fixed for nominations, and immediately after 12 noon on that date nominations began to pour into the C.T.O. from all parts of the United Kingdom, and within 90 minutes of the closing hour for nominations the whole of the nominations were delivered to the Press Agencies.

The results of the Elections in London, English Boroughs, and a few counties, were received in the C.T.O. for delivery on the night of Nov. 15, and the remainder, with the exception of the Universities and the Orkneys, were received on the 16th.

These results were almost immediately received back from the Agencies, in the form of Press telegrams for distribution to Provincial agencies and newspapers. The transmissions were made by means of the Wheatstone system and in the majority of cases, simultaneously to a number of towns in circuit on the same wire length.

A much wider field of communication was possible on this occasion; some 4,000 words of Election results being transmitted to Canada and Australia by means of the Imperial Cable.

An interesting feature of this General Election was that telephone exchanges not only informed subscribers of the result of local elections, but, by the courtesy of the Press agencies, were enabled to give information regarding the state of the parties and of the elections in which prominent politicians were concerned. This information was obtained by the Central Telegraph Office and communicated to the telephone service.

It is only to be expected with the growth of the telephone service, and of its nationalised character since the Elections of 1910, that much greater use should be made of the increased facilities afforded by that service, yet, despite this, there appears to be but little diminution in the use of the telegraphs for general distribution of news. It is, therefore, not surprising that the C.T.O. regards a General Election as an occasion requiring much thought and preparation, and that a special section was organised to work out the details of the necessary organisation and to ensure its proper working.

It would not perhaps be proper here to pay tributes to the successful organising to deal with the General Election pressure in the C.T.O., or to the manner in which the whole of the staff co-operated to efficiently carry out the work incidental to this great national event, but we may perhaps be permitted to mention that the Press generally have expressed their high appreciation and satisfaction of the manner in which the telegraph department had dealt with all Election news.

CORRESPONDENCE.

THE WAR SEAL FOUNDATION.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

Two years ago you very kindly published a letter from me in which I mentioned the wonderful support accorded us by the staffs at the various London Telephone Exchanges and appealed for support from the Provincial Exchanges.

One result of that appeal was the prompt, and since, continuous support from the Newcastle-on-Tyne branch of the Telephone Service and from which, to date, we have received the very handsome total of £56 18*s.* 0*d.*—no mean contribution in view of the many calls which we know are made on the staffs of the Telephone Exchanges for support of charitable works.

I may mention that, in addition to the 72 residential flats and treatment rooms erected in 1919, we are now hastening the completion of a further 65 flats on an adjoining site, the freehold of which has been given to us by our Founder and President, Sir Oswald Stoll.

Should other Provincial Exchanges care to follow Newcastle's good example, I shall be happy to accept what they have to offer.—Yours faithfully,

W. J. ROBERTS, Secretary.

P.O. ENGINEERING DEPARTMENT ANNUAL DINNER 1923.

THE Committee has arranged for the Annual Dinner to be held on Friday, Feb. 9, at the Connaught Rooms, Great Queen Street, W.C.2. Major Thomas F. Purves, O.B.E., will preside. A cordial invitation is extended to all members of the Engineering staff and also to any visitors who may wish to attend.

The Committee will esteem it a favour if you can see your way clear to make a small announcement in your JOURNAL drawing attention to the function with a view to making it as widely known as possible.—Yours faithfully,

H. J. LONEY, *Hon. Sec.*

Engineer-in-Chief's Office, G.P.O., E.C.

TELEPHONE DEVELOPMENT.

BY A CONTRACT MANAGER.

THE Government's proposals to counter unemployment may, or may not, include intensive extension of the telephone exchange system, but before I read the report on the "Government Works Plans" in the daily Press on Dec. 1, I had formulated the following remarks; and I still beg to submit them for serious consideration of those whom it concerns.

The present demand on all sides for improvement in trade and employment leads me to think that the telephone service can here play a part with far-reaching consequences.

It is a platitude to state that communication is the soul of business, but daily contact with a truth sometimes robs it of its significance. Telephony is foremost in the art of communication, and it seems natural, therefore, to assume that if the soul of business is improved, the result will be a revitalised industry, and the much-hoped-for state of affairs will be achieved; as instance:—with adequate communication agriculture can market her wares with less loss than marketing blindly. The consumer may demand goods at the time of need or fancy; the merchant may get direct contact with the manufacturer, and so on down to the basic source of supply. If time is money in business, then by saving time surely we must accumulate wealth, business must become stronger and surer and provide the much-needed employment as a natural consequence.

This is one side of the question. The other I consider to be of equally, if not greater, importance. By stimulating the use of the telephone, and by greatly extending the number of subscribers, the labour market is affected directly, and the demand for skilled engineers as well as unskilled labour is immediately apparent in the increased construction and fitting. The use of poles, wires, cables, insulators, telephones and switchboards in abnormal quantities immediately creates the necessity for placing further contracts to restore the balance of material. New trunk routes and new exchanges follow local development, and so on *ad infinitum*, and therefore many, and almost all of the allied electrical and engineering trades would be brought into play. Briefly, it seems to me to be a question of national importance at the present time that anything that makes for commercial efficiency is assisting towards the solving of our greatest problem. National efficiency cannot be more readily affected than by means of an improved and extended telephone system. The money expended would not be lost, as in the case of many schemes advanced for the cure of unemployment, but would be a permanent asset to the State, and an investment of a remunerative character. The orders necessary to extend the telephone system can be obtained by the Contract Department if given the right assistance. Double the staff for the next twelve months would mean practically double the orders. The cost of obtaining each order may be higher than normally, but it needs no words of mine to describe the effects of such returns. Of course, I am not alone in this matter, by any means; the possibility of telephone development throughout the country is tremendous, if properly tackled and catered for, and I recommend with all seriousness and earnestness of purpose that the time is ripe to undertake at once a continuous and intensive canvassing campaign so that remunerative work may be provided for at least some thousands of the workless. Many, I know, may indulge in a tolerant smile at such a proposal, but I know from experience of sixteen years' continuous canvassing that we are at present only touching the fringe of our possibilities.

PRIZE GIVING AT HOLLOWAY FACTORY.

AN interesting function took place at the Holloway Factory of the Stores Department on Tuesday, Dec. 5, when the Right Hon. H. Pike Pease presented the prizes to the members of the Holloway Factory and London Depot Technical Classes. Mr. Pike Pease although no longer officially connected with the Post Office, still takes a warm interest, which is deeply appreciated, in the lads' work, and again offers two prizes for competition. Mr. W. H. Allen, the Controller, in a happy speech compared Mr. Pease with Abou ben Adhem who loved his fellow-men;- and then Mr. Pease, after a kindly and encouraging address to the boys, in which he urged them always to give of their best and to help others as they had been helped, presented the prizes. Mr. Geo. Morgan, the late Controller, whom everyone was glad to welcome, also addressed the assembly. Amongst those present on the platform were Mr. E. Raven, Sir Henry Bunbury, Mr. G. Slater, Mr. H. Sparkes, Mr. G. F. Mansbridge, Mr. F. L. Henley, Mr. A. Parsons, Messrs. Ingram and Thomas of the L.C.C. Education Dept., and Mr. C. E. Fenton, Staff Officer in charge of the Factory.

The prize-winners were:—

Factory Boys.

Rt. Hon. H. Pike Pease's Prize (£1 1s. 0d.)

E. A. Thorogood.

Examination Prizes (9s.).

A. W. Brooker, S. H. Dean, S. J. Wheatley, T. E. Dean.

Prizes value 4s. 6d. awarded for General Good Work.

C. S. Clark, B. F. Marsh, W. E. Cullen.

Depot Boys.

Rt. Hon. H. Pike Pease's Prize (£1 1s. 0d.).

H. Leadbeater.

Prizes value 5s. for Consistently Good Work.

F. B. Plumb, L. H. Stokes, H. S. Lawson, C. W. Lockwood, F. Bradford, L. J. Bayfield, A. W. Gugnoni, A. R. Burr, C. E. Lafosse, E. Allsup, H. S. Turner.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE total number of stations in use in the Post Office system on Oct. 31 last was 1,011,591. Of this total 362,345 were connected with exchanges in the London telephone area, and 649,246 with provincial exchanges. The net increase in stations during the month, viz., 5,818, was up to the average of recent months.

A large number of new call offices was opened during October, the total at the end of the month being 15,962, making the net addition for the month 124. This constitutes a record. Public Call offices in street kiosks numbered 344.

A further appreciable addition to the number of rural party line stations was made during October, the net increase, 388, being also a record. The total number of stations at the end of the month was 5,579, as compared with 2,711 a year ago.

The record of calls taken at exchanges with 300 or more direct lines during the week ended Oct. 28 last, indicates a slight improvement in the local call traffic, the average calling rate per line being higher than for any record since the introduction of the new tariff in April 1921. Compared with the corresponding record of 1921 the increase in the calling rate per line was 5.5 per cent.

The trunk traffic also continues to show signs of improvement, the number of trunk calls originated during the first half of the current financial year being considerably higher than in the corresponding period of the previous year. Excluding from the 1921 figures the calls originated in Southern Ireland the increase in traffic amounts to over 13 per cent.

Some statistics showing the general development of the service during the 7 months ended October are given in the appended table:

	TOTAL AT END OF—						
	April.	May.	June.	July.	Aug.	Sept.	Oct
Exchanges ...	3,112	3,116	3,115	3,113	3,114	3,116	3,121
Exchange stations ...	942,671	947,534	953,931	957,476	962,852	969,126	974,959
Private wire stations ...	36,960	36,934	36,810	36,627	36,578	36,647	36,632
Call offices (stations)...	15,405	15,487	15,573	15,667	15,755	15,838	15,962
Call offices in street kiosks	275	289	305	317	327	335	344
Rural party line stations	3,747	4,101	4,408	4,671	4,894	5,191	5,579

Progress continues to be made in the development of the main underground trunk system and during the month of November new cables were completed and brought into use between Walsall and Wolverhampton and also between Darlaston and Wednesbury. Within the same period 20 new overhead trunk circuits were completed and brought into service, and 76 additional circuits were provided by means of spare wires in underground cables. A new exchange has been opened at Buxton.

TELEGRAPHS.

Baudot equipment has been provided for the Birmingham—Newcastle-on-Tyne—Hull, Cardiff—Liverpool—Newcastle-on-Tyne, Glasgow—Birmingham, and Central Telegraph Office—Preston—Edinburgh routes, bringing the total number of Baudot installations up to 53.

The
Telegraph and Telephone Journal.

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Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

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1922.

DESPITE a year's bad trade, which, of course, re-acted directly on telephone development, a fairly satisfactory increase in the number of stations in operation in Great Britain and Ireland was attained in 1922. At the end of 1921 the total number of telephone in the Kingdom was 997,805 ; at the end of 1922, as nearly as we can estimate, writing in the middle of December without complete official returns before us, the total should be about 1,057,800, or an increase of almost exactly 60,000 for the year. Of this total 1,022,000 are connected with the Post Office system, about 19,000 with that of the Irish Free State, and about 17,800 with those of Hull and Guernsey. The increase in 1921 over 1920 was only about 11,000, so that we have to congratulate ourselves on a very noticeable improvement in the rate of increase.

There are expectations that next year will see an improvement in trade conditions and we may look for an increase in the number of telephones installed which will surpass that of 1922. Many large schemes which were delayed by the War are now nearing completion, and it will be possible to join up new subscribers more rapidly. We expect an increase in the number of telephones in 1923 of at least 75,000.

The year has been marked by the opening of new exchanges in many important towns whose needs had outgrown the accommodation of the existing exchanges, notably Tottenham, Sidcup, Barnet, Maryland (Stratford), Wembley and Maida Vale in the London District, and Ramsgate, Canterbury, Aldershot, St. Albans, Bolton, Fleetwood (automatic), Dunfermline, Falkirk, Inverness, Guildford, Ascot, Stroud, Winchester, and several others in the provinces.

Great progress has been made with the main underground trunk system, of which, in addition to a number of shorter lengths, the principal extensions completed are those between London and Manchester, London and Ipswich, whilst the second London—Brighton cable is practically ready for use.

The development of the rural party line system is proceeding at the rate of about 300 stations a month, and the total number in the country had doubled itself during the year by the end of October last. The increase in the number of rural call offices, extending the telephone service in each case to some small village remote from busy towns, was over 400 for the year.

Some 50 exchanges serving new districts, had, up to the time of writing, been opened in London and in country towns, of which 27 were in England (6 of them in Norfolk), 4 in Wales, 15 in Scotland (3 in Wigtownshire and 3 in Aberdeenshire) and 4 in Ireland. Few places of any importance are without the telephone nowadays, consequently not many well-known towns figure in the list, except perhaps Thurso and Didcot. The only county towns in Great Britain at present without a telephone exchange are Kirkwall and Dornoch, and possibly the coming year may see them in the enjoyment of a service.

As our readers are aware, the laying of a telephone cable to Holland was completed in the summer, and Amsterdam, Rotterdam and the Hague were placed in communication with London. Three circuits are now working between the two countries, and the service has been extended to places on the further side of Holland such as Nijwegen, Leuwarden and Groningen. Negotiations have already been concluded with the Netherlands for the provision of an additional cable, and furthermore a third cable to Belgium is expected to be provided next summer.

As regards the inland telegraph service, the past year has not been without its disappointments in that the gradual decline of telegraph traffic which has been evident for two or three years past has not been arrested. Still, there is comfort in the fact that the decrease as compared with last year is comparatively small, and we have some reason for hoping that the turning in the lane is not far off. But the year has been far from being a disappointing one in other respects. It has, in fact, been a markedly successful one as regards improvements in the machinery and methods of the service, and the Telegraph Service is ready to face the increase of traffic, which, it is hoped, will come in the near future, better equipped in every way than it has ever been in the past. Foreign telegraphs have steadily improved in quality of service, and have held their own in the competition with rival bodies. The wireless to Rome has been inaugurated as a duplex ; services are working by wireless to Amsterdam, Posen, Cologne and Halifax (Nova Scotia) ; the Imperial Cable route has seen the addition of a second cable. Altogether this aspect of the Telegraph Service has developed steadily to meet the more complex commercial and social needs of the time.

There has been also during the past year an extraordinary development in the public interest in wireless due to the introduction of broadcasting as a means of private entertainment. At the time

of writing there is no evidence that the boom has yet even reached its height and we shall watch progress in the new year with interest. One of the most important possibilities is the increased interest in the art of wireless which the boom is imparting to the coming generation and so far that is all to the good.

HIC ET UBIQUE.

THE following letter addressed by Mr. Robbins of the Press Association to Mr. A. R. Kidner, the Assistant Secretary in charge of Telephones, is an interesting tribute to the efficient service rendered by his Department during the recent General Election :—

DEAR SIR,—Let me put on record our high appreciation of the efforts made by the Post Office Telephones Department to serve us in connexion with the results of the General Election. As you may be aware, we organised a Service of Results in conjunction with the Exchange Telegraph Company, and the reports which we have received from our centres express great satisfaction with the facilities which were provided for them by the Department. I am informed that the lines were connected punctually at the times they were required between our centres—Birmingham, Nottingham, Manchester, Bristol, &c.—and also from the centres to the various newspaper offices; and we were allowed to hold them indefinitely until we announced that they were no longer required. We desire to thank the heads of Departments and the staff for this very efficient service.

We refer to the part played by the Telegraph Department elsewhere.

WE have received the following original Christmas card from the staff of the Holloway Factory, Post Office Stores Dept. :—

We take the opportunity of wishing all our readers a very Happy Christmas and prosperous New Year.

A MINNEAPOLIS attorney, Mr. George S. Grimes, has secured a verdict of £200 damages from a jury consisting of seven women and five men for losses sustained through inefficiency of telephone service. He sued for £600 for time lost between 1917 and 1920 in getting wrong numbers, waiting for "central," and answering calls not intended for him.

The North-Western Bell Telephone Company is appealing against the verdict on the ground that it is not liable for damages when it gives as good a service as it can in the circumstances. The only fly in the ointment, from the Press point of view, is that the damages were given against a commercial company, and an American one at that, instead of a Government Department. At least one English paper breaks out into apologies for the company and assures us that things in America are not so bad as would appear. Greater sensitiveness to shortcomings, we are told, exists in that country than here. Personally, we do not think the case reflects so much on the service in America as on the vagaries of the law. As to sensitiveness, all people in all countries are very sensitive to wrongs which can be compensated by heavy damages.

WE tamely drew attention a month or so ago to the fact that a new exchange had been opened at Ramsgate: but we are afraid we have only half learned our trade. Two Kentish journals recorded the event, one with the heading, "'Number please, girls' visited," and the other with "Hullo-Girls' new Home."

THE first exchange in New York worked by machine switching, "Pennsylvania," was opened on Oct. 16 last. 1,741 lines were involved in the change-over and 8,853 stations. Of these 1,088 are on individual lines and 7,765 are served through private branch exchanges. A regular campaign for the instruction of subscribers and P.B.X. attendants in the use of the automatic system was undertaken before the opening of the exchange, 1,477 individuals in all receiving instruction. Modification of 55 local and toll manual exchanges was necessary in order to render them able to co-operate with the automatic exchange, and 580 operators and supervisors were taught the new method of handling the dials. 15 "A" telephonists are retained at Pennsylvania to handle toll and special calls, 25 "B" telephonists to deal with incoming calls from manual exchanges.

A GOOD deal of disparaging criticism has been levelled at the rural telephone development of this country; but from a return recently issued, it appears that out of 1,005,773 telephone stations existing at the end of September last, 48,527 were connected with rural exchanges. Few people have an accurate idea of the small ratio which the rural bears to the urban population. In England and Wales, for example, over 30,000,000 of the population dwells in urban areas and only 7,850,000 in rural districts.

WHITLEYISM AND CONTROL*

BY MR. J. W. BOWEN (*General Secretary, Union of Post Office Workers*).

WHILE there is a widespread desire that the workers in a given industry should assume control, not necessarily in their own personal interests only, but for the general benefit of the consumer and community, it cannot be claimed that Whitleyism as practised, and control as desired, are synonymous terms; advocates of the latter see advantages in the former, which are likely to afford opportunities of such development as will lead to a much clearer view of the power of control than is just now possible.

We can, however, profitably examine the present position, and consider what practical value has accrued by the establishment of Whitley Councils, what are their weaknesses, and what is immediately practical to meet in greater measure what I consider to be the legitimate demand of millions of workers for a much larger share in the management of the industries which their labours maintain. For this purpose it is necessary to note the circumstances which led to the formation of Industrial Councils which afterwards took the name of the present Speaker of the House of Commons, the Rt. Hon. J. H. Whitley. He presided over a Committee set up by the Government which reported in March, 1917.

The necessity for reconstruction after the War gave rise to much anxiety in the minds of those engaged in industry. War time relations between employers and employed were often strained, and there were numerous disputes. Practices of dilution, variation of agreements, suspension of Trade Union principles in workshops, substitution of men by women and a variety of other difficulties, all had their disturbing effects. The rise of prices and the tardy and inadequate rise of wages to meet economic difficulties of the workers, all bred resentment against many captains of industry who were known to profit considerably at a time when the nation was experiencing unparallelled trial and affliction. There was no lack of condemnation of such bodies of men as now and then threw off the choking grip of those who, by accident, or by custom or what is worse, by tradition, had found themselves in places of authority and who exercised, with more force than good judgment, the power they possessed over the workpeople. The latter awoke to a

* Address given to the Post Office Telephone and Telegraph Society of London, on Nov. 20, 1922.

sense of their own economic power, and this found its reflex in the minds of the men who later returned from the War. This mentality might easily have led to very serious national difficulties; fortunately, this was realised by the Government and by courageous representatives of the workers who devoted long and anxious periods of time to arrive at some solution of the nation's post-war industrial difficulties.

There was at that time a general recognition of the need for machinery :—

(*a*) To restore men to industry.

(*b*) To encourage good relationship with a view to reconstruction.

(*c*) To meet the demand for more recognition of the workers' interest in industry.

(*d*) To allay the industrial unrest and prevent stoppages.

(*e*) To provide for the need for consultation between the Government and chosen representatives of employers and workmen on vital questions concerning industries most affected by war conditions.

The task of examination of these questions was entrusted to the Committee presided over by Mr. Whitley which included such well-known men and women as Sir G. Carter, Chairman of the Shipbuilding Employers' Federation, Professor S. J. Chapman, Professor of Political Economy, Manchester University, Sir Gilbert Houghton, Chairman L. & N. W. Railway, Mr. J. R. Clynes, M.P., Mr. J. A. Hobson, Miss Susan Lawrence, L.C.C. Women's T.A. League, Mr. J. J. Mallon, Secretary National Anti-Sweating League and Warden of Toynbee Hall, Sir Thos. Radcliffe Ellis, Secretary, Mining Association of Britain, Mr. Robert Smillie, Mr. Allan Smith, Chairman, Engineering Employers' Federation, Miss Mona Watson, N.H.I. Commissioner.

Their terms of reference were :—

(1) To make and consider suggestions for securing a permanent improvement in the relations between employers and workmen.

(2) To recommend means for securing that industrial conditions affecting the relations between employers and workmen shall be systematically reviewed by those concerned with a view to improving conditions in the future.

It was reported in a Government publication that the Committee found that the best way to deal with the first point was to settle the second; they recommended "means," &c., as the best way of "securing permanent improvement, &c."

Their proposals were to create Joint Standing Industrial Councils :—

(*a*) *As Joint Councils*: to bring employers and workers together.

(*b*) *As Standing Councils*: to ensure regular meetings for discussion of matters of common interest.

(*c*) *As Industrial Councils*: they would throw into relief questions concerning each industry; as a whole, foster a common feeling for the industry, and help both sides to realise the social importance of the industry as distinct from their private interest.

Further, to produce an atmosphere in which disputes, when they arise, could be settled by an appeal to reason before feeling could be excited. To reduce mutual misunderstanding and unnecessary suspicion to a minimum.

The structure of such Councils was to be (1) National (2) District, and (3) Works or Office Committees.

The relative importance of these Councils or Committees would vary in industries.

Mining and cotton industries as compared with the Post Office or Railway systems would produce different machinery, but the principle in operation was to be the same.

The functions of the Councils were to be on broad lines, embracing questions on remuneration, regularisation of employment, industrial training, utilisation of inventions, industrial research, legislation affecting workshop conditions—all of which were formerly left, in the main, to the employers. There was the very important proviso of the recognition of organisation on both sides and Trade Unionism was encouraged.

The Government's attitude was expressed in a sentence :—"One organisation should speak with one voice when the Government wishes to ascertain needs and opinions."

The Government adopted the report and issued an invitation to industries of the country to organise themselves in this way for their own benefit and *for the benefit of the country.*

Criticisms of the scheme were to be expected. Some employers declared it would be the means of causing more trouble than ever. It would be the medium of complaints from one side.

Employers' initiative would be hampered.

I am reminded of a Postmaster who once told me that Post Office organisations actually encouraged complaints; without them, there would be very few, if any troubles.

Some labour leaders said it would provide merely consultative bodies without power. It would be too slow and would rob trade unions of effective speed. It would be an entangling alliance and it would be the recognition of a permanent place for Capitalism.

To these criticisms there is the simple reply that very much depends upon the constitutions agreed upon for the various bodies concerned.

Many Councils are in operation, and even allowing for present abnormal conditions, much good has resulted as shown in the decline of disputes and strikes. This effect will be beneficial all round and the organisation of labour can claim a large share in producing it.

Without organisation, a workman's trouble is seldom settled satisfactorily to himself. He usually fails to get to his employer and an argument with his foreman *has only one end.*

Contrary to the much cherished idea in the minds of prejudiced people a labour leader's job is more that of settling disputes than of provoking strikes. He is paid not so much to foment agitation as to watch, protect and advise his members, and in this capacity has ample opportunity of seeing movements which give him an insight into the industry in which he is engaged quicker and more clearly than is realised by many other responsible persons; certainly his position is better for the purpose of judgment and the exercise of initiative than the worker who might fear the wrath of his employer or superior officer.

Trades Unions so equipped function on Whitley Councils with marked effect. With such Councils operating satisfactorily and on broad lines, there is less fear of the breaking of agreements. This enables Trade Unions to devote more time to constructive effort in the industry and employers benefit by more freedom for trading.

These remarks apply, in the main, to wage questions. On general conditions of labour there is enlarged scope for Whitley Committees which has not yet been fully utilised.

But this means that the power of such Committees should be more determined. Councils which are merely advisory are non-effective. The refusal of the National Joint Committee of the Civil Service to accept the report of the Committee presided over by Sir Thomas Heath and which offered no more than opportunities to express opinions was due to a recognition of the futility of allowing *one side* to have complete power.

To give the workers' representatives only an opportunity to offer suggestions, or to exhaust their indignation over grievances, real or imaginary, to receive such representations with studied contempt, or to reply with a reticence slightly modified by the adoption of a patronising attitude on the part of the employer is neither considerate nor honest. Such a condition of affairs will simply lead to further difficulties, more bitterness and a decline of interest in the industry on the part of the worker, a result which every well-wishing reformer must deplore.

It is, therefore, highly desirable that our Whitley Councils should so operate as to encourage the maximum of confidence in them and that their power of decision should increase, not decrease. Employers can reasonably be expected to bear in mind that without the labour of the worker their own position would be untenable. A policy of opposition or of stupid "stonewalling" will not help in the development of the Whitley spirit. Distrust or fear of ultimate control by democracy will not avail employers or their representatives in consideration of matters relegated to Whitley Committees.

A study of our Councils should be from the point of view that they can accept more and more responsibility, not merely for the improvement of relations between employer and the employed, but as a means of securing such improvement in the industry as will lead to more efficiency in the general interest of the community. I want that to apply in goodly measure to our National and Post Office Whitley Councils.

It is interesting to note that the constitution of a Council covering the industry of Messrs. Rowntree, York, dated 1917 has this clause :—

> "No decision of the Councils, either sectional or departmental, will take effect until confirmed by a Director."

I admit I cannot understand why a director could not be a member of the Council to take first hand responsibility for the Directorate before decisions are reached.

Similarly, our own national and departmental constitutions are notably weak in so far as a veto might be applied to any agreement reached and this "in recognition of the overriding power of Parliament."

While I am prepared fully to recognise and support any claim that Parliament is all powerful, I find it difficult to reconcile the claims of the late Government in this matter with the attitude and policy they pursued on a number of other questions of national importance. Take the recent case of the Eastern trouble, when the lives of thousands of our fellow-countrymen were endangered and millions of pounds spent from the national purse; *all without consulting Parliament.*

Our national and departmental Councils have functioned for three years, and while one can point to many important matters which have been settled by agreement, it is a matter for grave concern that the will of Parliament has been so interpreted by the Government as to lead to their making a radical change in our machinery by the scrapping of the Civil Service Arbitration Board. This was done without consultation with the staff side, and no redress has been obtained although strong protests have been made by the staff side representatives. I regard this as a serious and unwarranted interference with our Whitley machinery, coming badly from men who at one time were much concerned with the need for conciliation. I claim that damage must be repaired before the machine can be regarded as reliable and satisfactory. The official statement that the presence of an Arbitration Board prevents agreements being reached is a travesty of the actual facts. The alternative of executive action in certain cases where the staff side cannot accept an official proposal, which has already been put into operation, is a reactionary step which all those responsible for the creation of the Whitely

Councils view with apprehension. I hope the new Government can be brought to realise the seriousness of the position.

The very carefully drafted formula expressing the position of the Government in regard to the power of Parliament is worthy of repetition here :—

> "While the acceptance by the Government of the Whitley system as regards the Civil Service implies an intention to make the fullest possible use of Whitley procedure, the Government has not surrendered, and cannot surrender its liberty of action in the exercise of its authority, and the discharge of its responsibilities in the public interest."

But the inconsistency of this by contrast with other actions of the Government stands out with striking clarity. They have accepted the principle of arbitration in the formation of the League of Nations. They agree to the reference of certain questions for judgment by Law Lords. There should be no real difficulty of referring industrial disputes between the Government as employers and their employees to an impartial tribunal. To be frightened by prejudiced critics in the House of Commons is not recognising constitutional authority so much as yielding to despotism of the most truculent character.

It is hardly to be expected that any body, be it a Government, a Civil Service, or a Trade Union organisation, will be infallible in all its judgments. It is not human always to expect love and kisses in a Whitley Council, however amorous and peaceable it may be. I think, then, it is at least sensible that in order to remove suspicions, and to promote the fullest possible desire for settlements without friction, when serious disagreement arises on important questions such questions should be referred to Arbitration if desired. That is the essence of conciliation in industrial disputes. It is "an appeal to reason before feeling has been excited."

In taking stock of the results of three years of Whitleyism in the Civil Service, and particularly in the Post Office, I want frankly to say that I see an improvement in the relations between employers as represented by the higher officials and the employees. The recognition now given to employees' representatives is without limit in that capacity. I, personally, receive the fullest consideration, and the most courteous attention on the part of the Secretariat as well as all other representatives of the official side. I very much appreciate this as an indication of the desire of the official side to fully understand the views of those for whom we work. There has been a thaw of the old official iciness. The traditional reserve of the one time bureaucratic mind has gone and we can now get discussions which permit the fullest possible expression of opinion on both sides. I go further and say that while we on the staff side have had many disappointments and not a few disillusions, it can be recorded in favour of the spirit of Whitleyism that many good results have followed the efforts we have made in tackling many important subjects. Decisions have been reached on matters which have awaited consideration for a long time, and discussions continue on others, which I trust will lead to settlements satisfactory to the staff side, which naturally I hope for, but I further desire that such settlements shall prove advantageous to the Department and to the public which we are proud to serve. Included in these matters are such important questions as wages, bonus, re-organisation of the clerical classes, hours, future education, promotion, discipline, classification, sorting standards, telegraph standards, development of the Service, &c., &c.

On the other hand, I could refer with a good deal of uneasiness to disagreements which appear to indicate the disinclination of the official side to move too fast. A traditional tranquillity is more than disturbing to a spirit still full of political prowess after fighting and failing at two elections. I could refer at length to the power of the Treasury, the unbending, uncompromising opposition, to proposals for improvement on the ground of cost, the insuperable difficulty of argument when there is a firm hand on a clasped purse, but I resist the temptation. I can, however, feelingly deplore the decision of the Treasury to apply wage cuts after disagreement with the staff side, and their refusal to go to arbitration; but as I have already referred to this principle at some length, I need not pursue the matter further now.

We are entitled to claim that the strengthening and development of organisation on the staff side has been an important factor in the progress of Whitleyism in that representatives are able to speak in a larger corporate capacity and with the fulness of knowledge and experience which the organisations have been able to apply to a study of conditions of labour in the Service and to the more complete recognition of the needs of the Service itself. The more thorough the preparation of the staff side is, the more competent is it to meet the official side on equal terms, and in proportion to the development and concentration of the sections comprising the staff side will the ability of the latter be more and more demonstrated, not only to win concessions from the official side, but also to become real guides to, and directors of public policy. The experience gained in this connexion has been most valuable, and its worth has become very marked in those who have shared in consideration of problems dealt with by the Councils, or by their many Sub-Committees.

In so far as these activities indicate progress in part control we can view them with a good deal of satisfaction; they demonstrate the capacity of the staff side for greater responsibilities.

The staff side has not used the Post Office Council "only as a vehicle for complaints." Constructive efforts have produced some most useful results. But there are recurring complaints of the limited scope of Committee work. The limitations of office Committees and the restrictions imposed upon Postmasters and other Departmental heads call for revision if the Whitley machine is to function with greater utility.

A wider devolution of local authority would, I feel sure, make for closer interest in the work of the service. Local discussions would be more free and decisions could be made earlier.

The official fear of development on the part of the staff is quite natural, having regard to the traditional distrust of movements from the bottom; but the evidence of a Trade Union official speaking of the Bourneville scheme may be useful in showing that such distrust is not justified. He said: "The question of output has been one of mutual concern. Through development of the suggestion scheme workers are as desirous as the technicians of improving methods. The health of the factory has improved, avoiding loss to both firm and workers alike. Discipline is increasingly becoming a matter of mutual concern, and the habit on the part of the worker of accepting responsibility is spreading. There has been an outburst of new life in the works' activities." Similarly, the acceptance by the Post Office man and woman of larger responsibilities would lead to improvements in the Service, but there should be departmental recognition of the improved worth of the worker.

Depression in trade has, unfortunately, lessened the power of Trade Unionism in outside industries, and employers, who, when they were threatened by a revolution, hastened to accept means of conciliation, are, to-day, intent upon exertion of their own power which cannot but have a boomerang effect in the near future. I hope the new Government will recognise this and encourage further development of the principle accepted by many of their representatives in the late Government :—

> "To meet the demand for more recognition of the workers' interest in industry."

They can do this best by setting an example in the Post Office and the General Civil Service.

Our Whitley Scheme is not perfect. I am frankly disappointed with the limitations of the present system and the restrictions imposed upon the staff. It is not a final solution in regard to the position of the workers, but time and experience will bring improvements. A larger share of control is imperative to future peace and progress, but while that is being secured I believe that the development of the policy of control of industry by the workers will be a matter of evolution. For my own part I am willing and ready to help in speeding up that process.

In acceptance of the *principle of control*, there will be many theories as to the most practical steps to achieve the objects. The Post Office as a Guild is a proposal presenting many features of real practical worth. Other theorists point to the Douglas analysis and capitalisation of the nation as a principle, which would affect all industries and include the Post Office in its scope.

State Socialism or a Co-operative Commonwealth with the motive of social service rather than personal gain, also provides interesting studies, but above all, I claim we must have such a system as will provide for the workless. Whitley schemes do not fully take to account that fatal defect in our social life. The Government, and our Civil Service Departments, are not exempt from a charge of neglect in this connexion.

The prospect of a broad system of control by workers is fair. Questions which arise as to a concise definition of the word "control" should not prevent recognition of the right, and the desirability of workers having a larger and larger share in the management and control of the machines for which they supply the power; but there is need for more and more education and organisation, need for greater development of the brain power and energy which are now allowed to remain latent in many of our services, a task which can be undertaken by Whitley Councils. I shall be greatly dissatisfied with any Whitley schemes that do not promote activity of the "Whitley" spirit, and which do not provide for the salvation of the industrial soul.

With the stimulation of interest in craft and the condemnation of craftiness; with goodwill and faith in humanity, we can safely encourage the well-ordered evolutionary progress of government of industry by the people who, in the future, will be concerned less with profit and more with the real prosperity of the Nation as a whole.

I think "Whitley" is a helpful step in that direction; we must add to its strength and efficiency by unremitting attention to its machine. Small efforts need not be despised, but we have now sufficient experience to warrant our going much further, in that I am much encouraged by helpful words of the late Rev. Silvester Horne, who once said: —

> "The law of progress is the law of losing your present gain for a larger gain that lies beyond. That is the law of progress, that when you have with great effort, and struggle, and hardship, gained your summit, you should lose it for the summit there is beyond."

OBITUARY.

WE regret to record the death of Mrs. Waite, the wife of the District Manager of Telephones, Cardiff, after a long illness. Much sympathy is felt for Mr. B. Waite and his daughter in their bereavement. Evidence of respect in which the deceased was held was shown when the funeral took place at Penarth. A large number of friends were present, including representatives from the various departments of the Post Office.

SUGGESTIONS TOWARDS THE IMPROVEMENT OF THE SERVICE.

BY MISS J. M. DALLEY (*London Telephone Service*).

IT is with some trepidation that one ventures to write upon such a subject as the heading of this paper indicates, knowing that there are so many officials whose duty, wholly or partly, consists of probing into all the questions and difficulties which arise in the Telephone Service with a view to future improvement; it is difficult indeed to convince oneself that any suggestion herein given can be of any value. In all probability the points set out in this paper have already been discussed, but no originality is claimed for them. It is only hoped that perhaps a new view may be given in favour of the adoption of the various points herein raised, which may ultimately lead to a practical application.

At the present time when changes are all about us, when new ideas and methods are constantly replacing those which have grown with us and which we are loath to part with, it behoves us to bear in mind that progress along any line brings change in its train, and old ideas and methods must be set aside if true progress is to be made.

In the Telephone Service which has been so heavily criticised recently there must be room for improvement and advancement in more than one direction, and it is necessary that all officers of that Service should carefully scrutinise all possible points, with a view to improving the Service generally.

We all know that from the most insignificant beginnings have sprung some of the most wonderful of our inventions and concerns. Therefore, it behoves us all to maintain a critical attitude towards our particular duties, considering no point too small or unimportant to be worthy of examination.

With regard to the following points which I am bringing forward for your consideration, it is proposed to divide them into two sections, dealing first with those suggestions which affect the actual operating, and secondly with those affecting the Service generally.

The first suggestion is one which would, if adopted, prove of great value to the "A" telephonist, but depends entirely upon the engineering aspect of the question. As I cannot pretend to a knowledge of engineering difficulties I will but explain the point in question with regard to its value to "A" operating. The "A" telephonist when one call overlaps another is often hindered in completing the second call by having to test the junction allotted for the first call, the speaking key of the second call having to be placed in a normal position before the telephonist can enter circuit on the first call and establish the connexion by testing and picking up the junction allotted. The necessity for the testing of junctions before connecting is understood, when one's attention is repeatedly drawn to the number of cases of a third subscriber being connected, which is undoubtedly due to the failure of the "A" telephonist to test correctly the junctions allotted. It is suggested that the "A" positions in an exchange should be so constructed that the telephonist should be able to test all lines and junctions with her speaking key in a normal position. All incoming junction positions and signal junction positions are so constructed and a great saving of time and errors would be the result if such a method could be introduced on "A" positions.

The "nine" panel multiple is a big grievance to the "B" telephonist, and contributes largely to the wrong number trouble, to the mishandling of cords, and is often the cause of a third subscriber being connected. The greater the number of telephonists concerned in one connexion the greater the chance of error. To the average telephonist the "nine" panel multiple is too wide a stretch, and the idea that the adjacent telephonist can help to connect and disconnect has proved a fallacy. It is often impossible for a "B" telephonist to wait for the adjacent telephonist to complete a connexion, with the result that the telephonist makes a frantic dive for the number, and often, due either to the distance, when the "fives" marking is not so visible, or to the confusion of cords, a wrong number is connected, or more annoying still to the subscriber, the plug has not been pushed home, with the result that the called subscriber receives a ring, but is unable to make himself heard.

Regarding the mishandling of cords, the "B" telephonist with most of her cords in use, will often allot a junction on which a "clear" is given before disconnexion from the multiple is made, in which case, if the cord is out-of-reach, and the adjacent telephonist is too busy to attend, the junction is often cleared by a violent pull of the cord, instead of the correct clearing by handling the plug only. Also, on a keyless ringing position, the picking up of a junction before disconnexion from the previous call, rings the subscriber connected, thus causing the subscriber to complain of receiving a ring and being advised "not wanted." When the adjacent telephonist is available to connect a required number which is out of reach, possibly, before the connexion can be completed, her own position is requiring her attention, with the result that a hurried connexion is made, often resulting in an engaged line being taken, as the engaged test cannot be detected if the connexion is made too rapidly.

The foregoing reasons are those concerning the disadvantage of the "Nine" panel multiple in its relation to the service given to subscribers; there is also the telephonist's point of view, which is, that excessive stretching is most injurious to health, not to mention injury to wearing apparel.

The above reasons, I consider, are sufficient proof against the introduction of further "nine" panel multiples in exchanges, and a big improvement in the Service could, I am sure, be effected, if those in use could be altered. As that is impossible, I strongly urge that an "eight" panel multiple should be considered the widest stretch of multiple which can be correctly worked by the telephonists.

The testing of distant exchange junctions used on a "no reply" call, which matures later.

The duty of testing junctions in the above case rests at present with an officer at the Information Desk. This duty could be performed with better result, if tested by an operator from the same strip of the junction multiple as was used for the original call. The monitor, when testing junctions, has to test *via* the "A" telephonist, and uses whichever junction to the "A" telephonist is clear, or most easy of access; therefore, if there should be a fault in that section of the multiple used for the original call, it is impossible that it should come to light, unless the monitor's circuit should happen to terminate on the same position as that of the subscriber disputing the "no reply" call, which case would happen only very rarely.

I suggest that all junctions requiring to be tested, should be tested from the position from which the call was originally passed, and not from the Information Desk, to ensure a more complete test, and to remove all doubt of the possibility of a "one section" fault existing.

The further suggestions I have to offer are such as would tend to a smoother working of an exchange, but do not concern the actual operating procedure.

Firstly, I would like to suggest that a simplified copy of Traffic Instructions could be compiled. All senior telephonists and supervisors have grappled with those existing, and no doubt have won in the end, after wandering through a maze of repetitions and technicalities which are confusing in the extreme to the novice. I do not wish to cast any reflections on those who are responsible for the Traffic Instructions now existing, on the contrary, I am quite ready to admit that they are most admirably put together, and no doubt serve the purpose for which they are issued. But I wonder if those responsible have ever seen some of the notes taken by the supervisors-on-probation and senior telephonists on the Traffic Instructions? Concise, is hardly the word for these notes. To see pages of a Traffic-Instruction cut down to one small sheet, is more than startling, and yet the gist of the matter is there. I do not think these notes would satisfy all concerned, but I would like to suggest that a happy medium might be struck, and the Traffic Instructions necessary be issued in a more simplified form.

The local observations are a subject of much dissatisfaction to some telephonists. These observations are not brought home to individual telephonists, but concern a section collectively. If the observations of a section happen to be above criticism, well and good, few comments are heard from the telephonists, but let there be one or more irregularities, and the section as a whole blamed for them—the comments *then* heard show a vast amount of dissatisfaction.

Is it not possible for the praise or blame, arising from local observations, to be borne by the telephonist responsible? There is much satisfaction and impetus to further good efforts in receiving praise when due, and also censure when necessary has its salutary effect. The supervisors of the sections also, would feel a greater satisfaction in knowing the telephonists responsible for the good or bad results of the local observations, and could deal accordingly, with much better result than at present.

The diversity of working at exchanges is a point which could be discussed with advantage to the Service. The few items under this heading have come to notice during periods spent at three exchanges, and no doubt could be well supplemented if other exchanges added their quota.

One of the most prominent features under this heading is the keeping of a "carried over" record of faults on exchange apparatus. A "carried over" list of faults on subscribers' circuits and on junctions is kept by the testing telephonist in all exchanges, and is considered necessary for the clearing of these faults. It should be just as necessary that the unregistered exchange faults should also be carried forward each day until satisfactorily dealt with. This would tend to a more prompt clearing of faults, which is absolutely necessary if the telephonist is to work without hindrance. This "carried over" list of unregistered exchange faults is a complete success at one exchange, and would give satisfaction to telephonists and supervisors alike if introduced in others.

The marking of the "fives" in the multiple is also different in exchanges. In one exchange the "fives" will be marked by a double row of white dots, one row on the left hand, and the other on the right-hand side of the "five" jack. In another exchange the "fives" will be marked by one row of white dots only on the left-hand side. This I have found to be very confusing to a telephonist transferred from one type of exchange to the other, and also to telephonists loaned to other exchanges for Sunday duty. This difference of marking has been repeatedly the cause of wrong numbers being connected. If the marking could be made uniform, I feel sure an appreciable drop in subscribers' complaints would result.

Another difference in practice existing, is the coupling of a telephonist's duty with a position number, which means that a telephonist allotted a certain duty is responsible for the position which is attached to the duty. This practice is weak in working, telephonists having to be moved continually to avoid those of the same seniority sitting next each other. At other exchanges the Duty-Chart is made out irrespective of position numbers, and the telephonists follow a rota which is based on the number of telephonists required in the section, the sectional supervisor being responsible for the placing of the telephonists in the various positions. This last mentioned practice is a real help to the sectional supervisor, who knowing the individual capacity of the staff under her control, is able to place them to the advantage of the Service.

A further practice worthy of discussion is the pegging by means of paper spills of certain subscribers' circuits in the "B" multiple, where subscribers have complained of poor incoming service, or of being continually called in error.

When a telephonist receives a call for any circuit so pegged, her supervisor's attention is drawn to the call; the supervisor then listens in circuit and notes the call, and any difficulty which may occur. The above procedure supplements the interception of calls on the Information Desk, and is only brought into force when all the interception circuits are in use. The call is not interrupted in any way, but if found to be an error can be quickly traced and taken up by the supervisor attending. The notes of all calls observed can be referred to whenever necessary. This practice I have only seen in use at one exchange, and is of great advantage in tracing any trouble of which the subscriber, whose circuit is so pegged, complains.

It is suggested that this method of observation could be introduced into all exchanges with advantage.

I should like to suggest that these minor points be fully discussed with regard to their adaptability for general application.

I now come to my last point—the equipment of the Information Desk.

The Information Desk is equipped with a smaller amount of apparatus than an "A" position, and is considered an economical way of dealing with irregular calls, thus leaving the telephonist free to take a higher load of straightforward calls. Such is the explanation given, in Traffic Instructions, Division E, Section E3, for the "Introduction of Monitors, and the Information Desk." Also in the same instruction one reads the following:

> "Monitors come into immediate communication with subscribers who are in difficulty with their telephone service. It is therefore essential that a monitor should be able to grasp promptly the nature of such difficulties, and to appreciate, from the subscriber's point of view, the annoyances caused thereby. She must be business-like, resourceful, tactful and able to convince the subscriber that he is talking to someone in authority, who is able and anxious to help him."

After reading the foregoing, anyone unaware of the limited facilities of the Information Desk, would consider that everything possible has been provided to help the monitor to satisfy the subscribers with whom she comes in contact, instead of which the equipment supplied to enable a monitor to satisfy subscribers is limited in the extreme.

I wish it to be clearly understood that I am referring principally to the monitor who deals with subscribers' complaints.

The subscriber who complains has usually reached the limit of his patience, which limit varies according to the type of subscriber. The best means of pacifying him or her, as the case may be, is by the speediest possible connexion to the required number. Therefore it means that the monitor's position should be equipped to this end: if anything, the position should be more fully equipped than that of the "A" telephonist. We find instead, a position devoid of the principal means of connexion, viz.:—Order wires and junctions to distant exchanges and the local multiple. Every connexion has to be made *via* an "A" operator in the case of distant exchange calls, and *via* the "B" telephonist for connexions to local numbers, which may mean, and very often does, that the monitor experiences the same difficulty as the subscriber is complaining of, thus causing a double delay, and often calls forth the remark that the supervisor is as bad as the operator.

The monitor, if trying to complete more than one call at a time, has constantly to move to and from the lines connected, until the distant exchange answers, as the supervisory signals do not act on cords connected *via* the "A" telephonist. This lack of supervisory signals is a big hindrance to the monitor, and is often the cause of long delay in completing calls, as the distant exchange supervisor often answers when the monitor is not in circuit and *vice versa*.

To the monitor who realises her responsibility toward the subscriber, who is complaining bitterly of the attention given, the Information Desk is a trial, and an obstacle in the way of giving satisfaction to the subscriber, and the constant realisation of inadequate equipment does not tend to a smooth and even-tempered performance of her duties. If the Information Desk has been so equipped for the sake of economy, surely it is a false economy, and is at the expense of giving satisfaction to subscribers, which should be the chief aim of the Service.

I would like to suggest to remedy the short-comings of theInformation Desk working, that, in all exchanges, one position at least on the Information Desk should be supplied with "order wires" and junctions to the distant exchanges, and also a local multiple. It would be found to be a big asset, as the monitor would be enabled to deal with a much heavier load, with great satisfaction both to the subscriber and herself. With regard to new exchanges this suggestion could surely be considered seriously. To most of the exchanges at present existing, the suggestion would be most difficult to apply. I should like to suggest for these exchanges, that an unused "A" position could most easily be converted into a position from which a monitor could deal with subscribers' complaints, with much benefit to the Service generally. Complaint lines could easily terminate on such a position, and all facilities would be to hand for the speedy connexion to distant exchange numbers, also the supervisory signals would act on such a position. Delay, consequent on the connexion *via* an "A" telephonist would be obviated. The call when completed should also be more satisfactory as regards hearing, as there would be at least one connexion less in the call.

Another suggestion with regard to the Information Desk working which I would like to urge, is the using of the direct lines to distant exchanges for the completion of calls on which undue delay has been experienced. These direct lines are or should be used only in cases of emergency, and are used very rarely if this rule is adhered to. I should like to suggest that when clear these lines may be used for completing calls, if by so using them the subscriber is saved further delay and annoyance.

The foregoing suggestions have been awaiting an opportunity to be presented, and I hope through the medium of this paper they may reach the officers concerned, and be considered by them in all their bearings with the knowledge that they have been brought forward in the hope that they will ultimately benefit the Service.

THE FIRST COLONIAL REPEATER STATION OF THE BRITISH POST OFFICE.

BY E. G. FURNEAUX.

ON July 1 last the British Post Office staffed its first colonial repeater station. This interesting event took place at Harbour Grace, Newfoundland, where four men from the home repeater stations relieved the Western Union staff who had been working the Muirhead Gold Wire repeaters connecting the two cables between Ballinskelligs, Ireland, and Halifax, Nova Scotia.

Early that morning a cable ship left Halifax to divert that end from the Western Union Cable hut to the Imperial. This work was completed on the following day, but in the meantime the Irish Irregular forces had declared war on the Imperial land lines between Ballinskelligs and Dublin, and communication between Halifax and TS *via* Imperial Cable No. 2 was held up indefinitely.

The cables were laid during the years 1874-76 by the Faraday, the Irish section being 1,994:17 knots in length and the Canadian section 687.96 knots, the conductor resistance of the former being 2.61 ohms per knot, and the latter 2.86 ohms. The capacity of the longer cable is 787 mfds. and that of the shorter 271.5 mfds. An average working speed of 115 l.p.m. to Halifax and 110 l.p.m. to Ballinskelligs is maintained with duplex conditions.

Harbour Grace is situated on the shores of a fine natural harbour, nearly three miles long and opening into Conception Bay. A long low rock stretching across the entrance acts as a natural breakwater and a lighthouse is situated on its northern end. The city is connected to St. John's by a railroad operated by the Reid Newfoundland Co. It is a narrow gauge single track, and the builders avoided all inclines possible with the result that the track winds in and out amongst all kinds of beautiful scenery. It creeps along the sea-shore, through miles of pine woods, skirting beautiful lakes and crossing some of the smaller ones with the wheels barely out of the water. Rushing streams and lonely swamps are all included in its itinerary. The Harbour Grace branch leaves the main cross-country line at Brigus Junction, which is about half the total distance of the 70 miles between the two cities. The trains are drawn by a typical American engine fitted with cow-catcher and searchlight. A large bell is suspended between the chimney and the footplate and this is rung when the train nears a station. The scheduled time for a trip from St. John's to Harbour Grace is 5 hours 10 minutes, but the train being a mixed freight and passenger one and time of little importance, passengers congratulate themselves if they arrive only an hour late. During the winter the trains are often snowed up for several days and the unlucky passengers either try to reach the nearest village for supplies or break open the freight. As the harbour also gets frozen over and its mouth packed with ice floes, when the severe weather is on, Harbour Grace is usually cut off from the outer world for several days each winter.

A Roman Catholic cathedral gives Harbour Grace the title of city, and the inhabitants are very proud of its designation, and newcomers get frequent reminders of its standing should they refer to it by any lesser term. Although it is the second "city," it is not now the second largest town, but ranks third as the population is diminishing. According to the 1921 census it has about 3,800 inhabitants and as trade is bad and no new industries are starting, the population is gradually drifting away. At present a large number of men are employed at the Labrador fisheries, going there

about the middle of May and returning again at the end of October. Seal and cod are the mainstays not only of Harbour Grace but of the colony, and in the past men would earn sufficient during the season to maintain themselves and families in comfort for the year. This does not apply nowadays and last winter there was considerable distress amongst the fisherfolk.

There is a seal oil factory and also two small boot factories in the city. There are a few small farms on the outskirts on which potatoes, turnips and cabbages are the main crops. Soil is very poor and stony and not much trouble is taken with the cultivation.

The post office is one of the largest buildings in the city, not only housing the postal section but also the Customs offices. The telegraph office is also in the building, but not under the control of the postmaster. Mails are received and despatched from and to St. John's once a day. On receipt of the mail bags the letters are sorted into the private boxes of the box renters. The public side of the boxes is locked, the owner keeping the key. When mail time comes a crowd gathers to await the distribution of the letters. Those who are not renters of a private box either call for their mail or wait for it to be delivered when one of the sorters and counter clerks has enough spare time to go out with such correspondence. The front of the counter is enclosed and business is done through a pigeon hole, similar to English railway booking offices. The savings bank section is totally enclosed in a large wire cage, business being transacted through a pigeon hole in the wire front. The telegraph section also does its business through a pigeon hole, which is normally closed. Customers rap on the door, obtain a form, write out their message, pay the cost, affix no stamps, have a chat with the operator-counter-clerk and depart.

The Harbour Grace—St. John's circuit being an omnibus one with eight stations on it, the operator waits his code turn and hopes none of his colleagues up the line will leave their switch over as the line is worked on the "closed circuit" system. The American Morse code is used and the apparatus is also American and of poor structure.

The Imperial Cable station is connected to the telegraph office by private telephone, over which cablegrams *via* Imperial are dealt with. Both the post and telegraph offices close for meals throughout the colony—time not being a very important factor with the Newfoundlanders.

The Anglo-American Telegraph Co. have offices in all the larger townships and secure a large share of the traffic. As they have their own lines to St. John's they are able to deal with their work expeditiously.

When Harbour Grace was originally laid out as a city it was hoped it would become the future capital and seat of government. Thanks to this hope of their forefathers, the present generation are blessed with one of the best water supplies in the colony and can also congratulate themselves on the fairly good roads in the immediate vicinity of the city. The streets have no pavements, the "side walk" being strewn with gravel and the centre is not even tar coated.

Flocks of geese, herds of goats, and a few cows wander at their own sweet will in the main streets of this decaying city of Harbour Grace.

ABERDEEN NOTES.

A meeting of the District Manager's staff was held on Friday, Nov. 24, to recognise the completion by Mr. Clow of twenty-five years' service as Chief Clerk.

Mr. Storrie, District Manager, presided, and expressed the high opinion he had formed of Mr. Clow as a man and a Chief Clerk, and, in the name of the staff, presented him with a selection of books in an oak book rack. Mr. Brodie, Contract Manager, Mr. Davidson, Assistant Traffic Superintendent, and Mr. Scott, Overseer, also spoke of Mr. Clow's popularity with all the Departments in the office.

Mr. Clow, who was completely taken by surprise, replied in a reminiscent speech, thanking the staff for their gift, which, he said, would always be one of his most cherished possessions.

Miss M. C. Longmore, Shorthand Typist, District Manager's Office, Aberdeen, was presented by the staff on Nov. 25, with a silver centre piece and silver side vases on the occasion of her approaching marriage.

"TALK OF MANY THINGS."

REFERRING to the report of the Committee of the Union of Postal Workers, in which it is alleged that Manchester telephonists often faint under the strain of the work, a London supervisor is reported as saying: "*We* don't faint, and we don't weep. We cannot speak about Manchester, of course, *but it is a terrible handicap to live in Manchester any way* . . . The London girl makes the most efficient operator."

We shall be glad to have the views of our Manchester colleagues on this somewhat controversial subject.

Up to the date of going to press, *all* the entries in the "Amusing Incident" competition have been from the Provinces. "Stands *London* where it did!" We hope to publish the names of the winners in the February JOURNAL. It is gratifying to know that our column is read by so many of our Provincial colleagues, and they are to be congratulated on the high standard of their contributions.

Might one Suggest.

Might one suggest that just for a change,
The pow'rs who aver that our load
Is all insufficient to keep us employed,
Should try for a month, say, our mode
Of whiling away the sweet dreamy day,
Plug-pushing!

Of course, each wise man should forget for a month,
The wage he deservedly earns,
And gratefully grasp on each week's golden (?) day
What is proved by the "Low Cost of Living Returns,"
Too much to ask, for so easy a task, as
Plug-pushing!

Religiously punctual they daily must be,
(They sternly demand that *we* are);
And daily must wrestle, like you, or like me,
To obtain a small space on a train, bus or car,
Punch on, and be well in their seats by the hour,
Plug-pushing!

And calmly, when shrieked at, or (whisper it low),
E'en sworn at by subs. in a rage,
They must answer politely, like so and like so,
(Little Green Books I cannot remember the page),
Which says, "Be polite," tho' your wrath's at its height,
Plug-pushing!

And patiently sit with a small key depressed,
Depressed in their spirits as well,
While feebly they try midst the yells of the rest,
To obtain a clear junction for just a short spell,
Might one suggest they'd enjoy a month's *rest*,
Plug-pushing?

J. ISOM, Victoria Exchange.

We print a reply to the verses "The Open Window"—"And the Closed"—published in last month's JOURNAL. We shall be pleased to receive the views of other sufferers—for and against.

DEAR EDITRESS,

I am not usually given to standing up for the sterner sex (except when I am obliged in the Tube of a morning); but I really have a kindred feeling for the intrepid male who found his way into our exclusive columns last month.

Fresh air, of course, is eminently desirable; but I wonder why, in the name of all that is comfortable, it cannot be administered without draughts. Telephonists particularly can speak most feelingly on this subject. For the most part, the matter of ventilating and heating exchanges is a dark blot on the more or less fair escutcheon of the G.P.O. It is a patch-work sort of an arrangement. In the self-same exchange, some people will be dying of suffocation whilst neighbouring colleagues will be dying of exposure. For

my part I prefer suffocation—it s quicker and does not have to be assisted by mustard plasters and linseed poultices. Moreover, when one is harnessed to a certain position, with a draught playing with one's hair like a typhoon over the pampas, one cannot take one's work and retire to a sheltered corner —it just *has* to be endured—ugh ! I am resolved—if ever I am rich, or if I earn my marriage gratuity before the various Councils and Commissions decide that I really owe *them* a trifle instead, I shall have a house built on the Thermos flask principle. Then I shall make myself warm to a comfortable degree, go right in, and stay there. After a time, I shall thus hope to counteract the frigid effects of many chilly years as a telephonist.

Yes, I am glad the intrepid male had the courage to protest—I wish him a happy and warmer New Year.

With cordial wishes for the continued success of the Telephonists' column.—Yours sincerely, STIFF NECK.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

THE PUBLIC SERVICE.

BY H. MORGAN.

THE criticism which is from time to time heaped upon the Civil Service arises in a large measure from a mistaken impression as to its functions. It is desirable therefore to consider the principles which are essentially operative in service under His Majesty's Government and which rightly understood ensure efficiency and economy.

At the outset it is well to observe that the late war created difficulties in administration of public service never before experienced, and that the aftermath has caused confusion in the minds of the public generally as to the functions of Government Departments, and prejudice as to the commercial ability and acumen of its administrative officers as well as rank and file. This prejudice and confusion of thought has been accentuated by a Press campaign in which misrepresentation has been clearly discernible.

The organisation and methods of giving effect to Departmental requirements, *in the interest and service of the public*, must of necessity widely differ from those appertaining to purely commercial and dividend-earning establishments. In the former case the principal desideratum is to render service in the national interest, and for public benefit and welfare, commercially and otherwise—such service to be of a character in keeping with the particular Departmental activities concerned, whether revenue-earning or otherwise. In the latter, the entire effort of the establishment is made to tend towards the definite object of securing gain for those interested, the chief end being dividend.

The first principle to be observed in all Departmental activity of a Government and public character is that it is a service *to* the nation *for* the nation, and not for any particular coterie, federation, clique, or party.

Reverting, at this point to the statement set out in the second paragraph, we are able to readily comprehend the causes which have operated. Departmental procedure follows sequentially along definite lines and in accordance with well-thought out plans and operation, and although this has a tendency to stultify initiative it has proved to be eminently satisfactory, and previous to the war was held up as a pattern by a Press which was at that time vilifying private enterprise (particularly of a telephonic character) and designating it "pirate" enterprise, only, it should be stated, because the differentiation between private and public interest was not perceived or preserved.

Climacteric conditions of course necessitate emergency measures, and the public services were during the War subjected to administration partly by staff whose whole training, outlook, and perception of duty was "service" and partly by gentlemen introduced for special purposes, and with unlimited spending powers whose life training had tended solely to "commercialism."

It is doubtful whether it has yet been recognised by the public that the administration of a Government Department for the purpose of winning a war under terrible emergency is distinct and different from that required for the conduct of a similar Department when such calamitous happenings are absent, and in these circumstances the terms "profit and loss," "profligacy and parsimony," "fair-dealing and cheeseparing," "efficiency and redundancy" need to be restated and re-valued.

In all commercial enterprise and public administration "service" and "profit" are closely associated; commercially, by reason of the fact that service badly rendered, or commodities served to the purchaser in unsatisfactory or unserviceable condition, have a direct effect on sales, output, and profit; administratively, because of the very important bearing that the service rendered has upon the commercial activities and general welfare of the nation as a whole.

A public Department does not, as is erroneously supposed, exist to make profits in the ordinary dividend earning sense, and it should be evident that any profit made by it in financial transactions, apart from that of the profit of general benefit to the community, is a profit derived from the community by the community. It is clear, therefore, that the relationship of the two factors is distinctly different when viewed from the two aspects cited, and that the profit accruing to the State by reason of service efficiently rendered by its servants, cannot be computed and set-out in monetary terms in a "statement of account" or balance sheet.

It follows, therefore, that the *rendition of service* is the objective in the training of public servants, and how well this has been achieved was, it is thought, fully set forth during the period of world-wide crisis.

Nelson's famous signal is becoming like his flag, a bit threadbare, but it is nevertheless not inapplicable to the present day, and although service faithfully rendered may perchance receive somewhat tardy recognition, its punctilious and conscientious fulfilment has a full and rich reward in the personal satisfaction consequent upon duties well done and tasks successfully accomplished in the endeavour to maintain a clean and efficient public service.

CONCERNING EFFICIENCY.*

BY T. A. BECK.

EFFICIENCY of high degree is the end in view of all earnest workers no matter what their walk in life may be. The ways and means of arriving at that desirable state must of necessity vary: firstly, according to what might be called one's natural gifts; secondly, by determination to succeed backed up by honest endeavour; and thirdly, by opportunities of acquiring experience and proficiency.

It is not the rule but rather the exception, I think, for people to find themselves engaged upon a career that fulfils their early aspirations, so that for most of us much honest work is necessary before we become really efficient.

So far as the arts such as music, literature and painting are concerned it is probably true that those engaged in them are following their natural inclinations, and therefore the path to high achievement, although steep, is not strewn with the difficulties which confront those who drift into commercial or industrial pursuits. Artistic vocations seem to provide more scope for inspiration and joy of labour for its own sake than do the more mundane but nevertheless very necessary occupations. Not that the motives of those who are engaged upon the latter are purely mercenary.

Each profession or trade has its own fascinations and none more than that of telephony. The new entrant to the telephone service, particularly in the manipulative section, finds that very little of the experience which may have been gained elsewhere is of much value so far as the details of her new task are concerned. The first step, therefore, in the progress of a telephonist towards efficiency is the course of training at the schools where a thorough ground work is provided in the rudiments of the art of switching. It was not always so. It is not many years since it was the practice to send learners direct to an exchange, and they acquired the whole of their knowledge in the rough school of experience. Since it is easier for us to impart our bad habits to others than whatever good habits we possess, it was only natural that with the rapid development of the telephone system more scientific methods were evolved, with the result that the present system of training could perhaps hardly be bettered.

Assuming that the embryo telephonist has passed the successive ordeals of the process of selection, which in itself are severe, and the preliminary training, I propose to dwell for a moment on some of the qualities which one expects to find and which are necessary parts of the equipment of an efficient telephonist to be. Mention will be made of four qualities which in the opinion of the author are essentials, for ultimate efficiency depends upon the degree to which they are possessed and developed.

The first is an even temperament. In the course of a day's work the telephonist comes into touch with a multitude of people, each one making some demand upon her services. Imagine for a moment what that means. She holds conversation with a variety of persons whom it would be well-nigh impossible to find collected together at any one place, so different are their interests. From first to last their emotions probably extend over the whole range of human emotions. The voices one after the other indicate success, failure; grief, joy; fury, complacency; haste, leisure; insult, courtesy; command, invitation; and so on.

Whilst the telephonist cannot be altogether disinterested in the emotion or passion in the voice of the caller which reaches her through the medium of the receiver, yet her temperament must be such that it keeps her from becoming influenced to the extent that the atmosphere of one call is permitted to disturb her treatment of another.

In one call she may be accused in no uncertain fashion of having ruined a bright and prosperous career beyond hope of redemption by failure to gain attention from a required number. On another she may be condemned to eternal torture because the subscriber required is so inconsiderate as to be making a call on his own account instead of leaving his line disengaged for the benefit of the caller.

It is not intended to give the impression that telephonists are continuously harassed at their work, but the effect of the harmless and useful telephone upon some natures is such that the flood gates of anger, sarcasm and, I fear, abuse, sometimes are opened wide, and it is the telephonist who bears the brunt of it. A very human impulse in these circumstances would be to show resentment and a desire to retaliate, but the trained telephonist refrains.

One's efficiency would suffer immediately if a sense of injustice was fostered, and it is at such times as these that an even temperament is of the utmost value in maintaining a high degree of personal efficiency. Those not fortunate in the possession of an even temperament must draw upon their measure of self control.

*From an address given to the London Telephonists' Society.

Another essential quality is agility of mind. This may sound strange to those who regard the work of a telephonist as very largely mechanical. That view is demonstrably erroneous.

There is not a movement in the handling of a telephone call that does not call for a mental decision first.

A few examples will illustrate the point. The moment a subscriber calls starts the mental process. The telephonist has to translate the lamp cap marking, of which there are commonly about 12 in use, into the class of service to which the subscriber is entitled. She has then to be prepared to sort out into proper form the number demanded by the subscriber. The name of the exchange required has to be connected to code and the position of the order wire key and junctions determined. Then the significance of glowing and darkened supervisory signals has to be determined according to the progress of the call. Similar conditions on two or more signals do not necessarily call for the same action. Sufficient has been said to show that the mind has to be constantly working at a high speed.

Agility of mind, however, would be of little use unless combined with the facility of translating rapidity of thought into equally rapid actions. Speed and precision of movement *can* be developed to a degree that become akin to the mechanical, but only if the same movement or sequence of movements are repeated.

In factories where articles of standard pattern are turned out in large numbers, it is possible so to organise the production that they pass from hand to hand, each worker performing certain functions constituting a part only of the complete process, and the work is mechanical. A telephone call cannot be handled in such a way. The telephonist handling it has to build it up from beginning to end, seeking the assistance of others when necessary, but never losing control.

The physical actions must necessarily be decided upon according to the circumstances of the moment and the most efficient telephonists are those who have developed the twin qualities, agility of mind and of action, to a high degree.

One other quality I will mention as an essential to the telephonist's vocal expression. I can imagine nothing of greater value to the telephonist than a voice capable of a wide range of expression. The quality of the voice is of course of considerable importance, but as the utterances of telephonists are mostly in the form of set phrases, the amount of expression put into them is most important.

A glance at the list of standard expressions immediately impresses one as giving wide scope for the display of flexibility of vocal expression. Many are the instances in which subscribers have expressed their appreciation of the sympathetic treatment received at the hands of the exchange staff in times of distress, and there can be no doubt that the telephonists who were concerned were able to modulate their voices according to the circumstances.

All the ordinary courtesies given and received when we meet face to face should not be abandoned when we communicate by telephone, and although shorn of the assistance of eyes, hands and facial expressions, the voice can be made to express full measure of sympathy and understanding. The fortunate possessor of a well-modulated voice must surely find her efficiency less impaired at the end of a long and trying day than does her more unfortunate colleague who lacks this important quality.

It is not without a feeling of timidity that I pass on to a brief consideration of a few of the attributes one expects to find in those who wish to climb the ladder of success.

In the first instance there must be ambition. The desire to get on ; to excel. But it must be honest. Not of the kind that seeks preferment at the expense of others, but the honest aspiration to succeed in healthy rivalry. There is a danger, I think, that unbridled ambition creates a tendency to self-aggrandisement. We tend to become blind to deficiencies which are only too obvious to others. Instead of steady endeavour there is an inclination to become crafty, and the best efforts are reserved for occasions when there is an influential audience. Such a state of mind is to be abhorred. On the other hand an ambitious person cannot afford to be timid. Self-reliance is also necessary.

There should be a quiet steady confidence in one's own powers. Tasks which may be new and strange should be tackled with a will and steadfast assurance to succeed. Doubt in our own ability courts disaster. Whilst self-reliance is a very estimable quality it has a counterfeit which is to be avoided. I refer to conceit. We so often detect it in others, but I am afraid that it is a case of having first to remove the beam from one's own eye.

There are other qualities I can only mention in passing, such as imagination, power of concentration, grasp of detail, power of controlling others, self-control, sense of humour and tact, but I would like to enlarge upon just one other. That of individuality.

Those who are employed upon work of a routine character may find it difficult to preserve their individuality, because their task seems to give them no opportunity or scope for exercising it. Unless such a person's character is strong, there is a tendency for one's individuality to become subordinate to one's surroundings instead of rising superior to them. To make such a surrender is fatal ; if we let go our individuality then with it goes initiative and originality, and we become just copies of somebody else.

We may be chagrined because others appear to be making better progress than ourselves, but they succeed because they are using their natural gifts to the best advantage. They have not thrown their personality overboard.

The greatest measure of personal efficiency is to be obtained not by imitating others, but by the full development of our own character. To mimic others is flattery to them, but a poor compliment to ourselves.

LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

ON Friday, Dec. 1, at the Society's third meeting of the Session, Mr. A. O. Gibbon, of the Engineer-in-Chief's Office, gave a lecture on "Wireless Telephony and Telegraphy." The lecture was a "popular" one, free from technical complications. With the aid of some very interesting lantern slides the lecturer gave a short history of the development of wireless telegraphy. The subject was led up to by a description and pictures of the Central Telegraph Office, and by reference to men of science who have been prominent in assisting to make possible the very latest scheme of "broadcasting" to our homes. The latter part of the lecture consisted of illustrated descriptions of various types of wireless apparatus. Mr. Gibbon charmed his listeners by his intimate manner, and to say that he gave a lecture scarcely describes the case. It was more like a chat by one's own fireside.

For the demonstration which followed, Messrs. Burndept, Ltd., the Wireless Engineers, of Blackheath, very kindly loaned one of their Ultra III sets. It was on one of these sets that a concert broadcasted in America had been heard in London the previous week.

Promptly at 8 o'clock the concert broadcasted from 2 L.O. (Marconi House) was picked up and was reproduced on a loud speaker, an affair like a gramophone without the works. The wonder of transmission and reception of music by wireless was well demonstrated, but it seems to be a fault with loud speaking devices that a mechanical effect is produced. In the headgear receivers the reproduction was perfect.

Mr. Gibbon misjudged his audience when he thought they had had enough by 8.45 p.m. There were unmistakable sounds of disappointment when the end of the demonstration was announced. During the evening an interesting experiment was tried of using a number of the audience as the aerial. First, a dozen or so of the ladies joined hands for this purpose, followed by a chain of the sterner sex. Hopes had begun to run high that a mixed aerial would be tried, but it was not to be.

At the conclusion a very hearty vote of thanks to Mr. Gibbon was passed for the instructive and interesting evening he had provided. In reply, Mr. Gibbon expressed his indebtedness to Mr. Read of Messrs. Burndept, Ltd., and to Mr. Winstone of the Post Office for their assistance in connexion with the apparatus.

For half-an-hour before the meeting there was music provided by Miss Gall at the piano and Messrs. Cracknell and Beck with song.

The annual dance is being held on Saturday, Dec. 30, at the Bishopsgate Institute. All the tickets were disposed of immediately the announcements were out.

The next business meeting will be on Friday, Feb. 2, when the winning competition papers will be read.

* * * *

Langham Choral Society.

On Wednesday, Nov. 22, the first concert of the session was held at Queen's Hall. The performances of Coleridge-Taylor's "Tale of Old Japan" and excerpts from Berlioz's "Faust" were well up to the Society's standard of excellence. The program contained also some orchestral items and songs, two of the latter being compositions of the conductor, Mr. Hugh Marleyn.

The attendance was a fairly good one but the Hall was not sufficiently full to make the evening a success financially. The anxieties of the Committee would be much smaller if more men would join the Society. There is plenty of room too for instrumentalists of all kinds. The Hon. Secretary, Mr. W. R. Child, will be pleased to hear from vocalists and instrumentalists. They may write to him at 102, Dean Street, W.1, or better still attend at the Ranger's Hall, Chenies Street, Tottenham Court Road, any Tuesday evening at 6.30 p.m.

A popular concert in aid of the funds of the Society will be held at King George's Hall, on Thursday, Feb. 15. The tickets will be 2*s.* 4*d.* and 1*s.* 3*d.*

* * * *

A Retirement.

A familiar figure is missing from the G.P.O. South Building in the person of Mr. A. H. Stanley who retired last month. Mr. Stanley was on the staff of the Office of Works and was responsible for keeping the furniture and fittings in good order. If anything went wrong with a door or a drawer, if a window would not open or would not shut there was instant demand for "Old Stanley," as he was affectionately called. As an expression of appreciation of his never failing courtesy and consideration for the comfort of the staff a cheque for twelve guineas was sent to Mr. Stanley. Unfortunately Mr. Stanley was not well enough to attend a little reception. Here's wishing him a speedy return to vigorous health.

* * * *

The City Literary Institute.

The lecture courses arranged by the City Literary Institute in connexion with the L.T.S. have so far proved most successful, over 250 students being in weekly attendance. The opening of a new term on Jan. 8 will be a convenient opportunity for additional students to enrol. The subjects include Literature, History, Economics, Aesthetics, Ethics, Psychology,

Appreciation of Art, Music and Architecture, Modern Languages, Orchestral and Choral Music, Country Dancing and Physical Exercises, &c. Several students have asked for a class in Astronomy, and the Principal invites enquiries from others interested. Detail particulars and forms of admission may be obtained from Mr. T. G. Williams, M.A., F.R.Hist.S., City Literary Institute, Graystoke Place Training College, Bream's Buildings, Fetter Lane, E.C.4.

* * * *

Western District Contract Office.

The fourth annual dinner of the Western District Contract Office was held at Pritchard's Restaurant, 79-81, Oxford Street, W.1, on Nov. 17, 1922. The District Contract Agent, Mr. W. V. Pegden, in the Chair, was supported by the following guests :— Major G. F. Preston C.B.E. (Controller, London Telephone Service), Mr. W. A. Valentine (Deputy-Controller), Mr. J. Stirling (Assistant Controller), Mr. W. Bold (Superintendent of Accounts), Mr. W. F. Taylor (Superintendent of Contracts), Mr. F. J. Phillips (Sectional Engineer, West External). A most enjoyable evening was spent and an excellent dinner was followed by a musical programme contributed by members of the staff and visitors, the artistes being Messrs. W. V Pegden, G. Pollard, T. Poland, H. G. Evans, H. Neil, W Horlock, S. W. Swain, C. F. Bradshaw, W. R. Child and F. J. Evans. A display of sleight-of-hand by Mr. J. E. Williams was also much appreciated.

Between the items the following toasts were honoured :—The King, the Western District Contract Office, the London Telephone Service, the Visitors and the Chairman. The work of the London Telephone Service during the past year, with especial reference to the Western District Contract Office, was brought under review and excellent speeches were given by Major G. F. Preston, C.B.E., Messrs. W. A. Valentine, W. F. Taylor, F. J. Phillips, W. V. Pegden, W. Glenny, and T. Poland. A very successful evening closed with the singing of "Auld Lang Syne."

* * * *

Culled from the Exchanges.

Avenue Exchange.

A bazaar in aid of the London, Westminster and Shadwell Children's Hospitals, organised by the Avenue Exchange staff, was held on Saturday, Dec. 2, in the Aspland Hall, Hackney. The bazaar was opened by W. A. Valentine, Esq., and Mrs. Valentine, who were presented with a buttonhole and bouquet respectively, of red and white carnations, by little Miss Marie Rowe.

Miss Newman introduced Mr. and Mrs. Valentine in a few well-chosen words, and the announcement of a donation of £5 towards the bazaar funds from H.R.H. the Princess Mary, was received with cheers by all present. Mr. Valentine in a brief but telling speech, made reference to the splendid work done by the three hospitals and the London Children's Hospital, Shadwell, Westminster, which were to benefit by the bazaar, and concluded by commending the stalls and their contents to the notice of all prospective purchasers. A vote of thanks to Mr. and Mrs. Valentine was proposed by Miss Metcalf, and seconded by Miss Marlow (joint organisers) which was carried with acclamation.

As a result of this effort, £100 was realised, and this will be distributed as a Christmas gift to the hospitals mentioned.

Our tame poet, who on this occasion refuses to be suppressed, has perpetrated the following account of the proceedings :—

OUR BAZAAR

Thank you, dear reader, whoever you are
If you patronised our grand bazaar.
Our gratitude just overflows
Toward all who helped—especially those
Who came in such a gracious way
To officiate upon "the Day."
The stall-holders gratefully bear in mind
That their interest was of the practical kind,
For they subsequently toured the hall
And made a purchase at every stall.
Truly a wonderful show was there,
'Twas like an old-time Christmas Fair.
The prevailing colours were red and white—
Each stall with bunting and ribbons bedight.
We'd like to mention, first of all,
The artificial flower stall
Whose tinted blossoms and foliage rare
Were made by the cripples in John Groome's care
Its attendant fairies too, were decked
In chaplets of flowers, with charming effect.
The toffee-apple stall below
Stuck to its guns and made brave show,
Whilst the weighing machine just on the right
Plied a brisk trade, though out of sight.
The toy stall next entranced our eyes,
With dolls of every shape and size—
Not forgetting "Rufus the Red"
Who bore a price upon his head!
And then we came to the fancy stall
With dainty garments for boudoir and ball,
Of laces and ribbons so filmy and sweet
(To name them, I fear, would be indiscreet.)
The houp-la stall and the Christmas tree
Filled both young and old with glee;
Whilst the bran tub got us in its grip,
And we soon returned for another "dip."
The household, woollen and grocery too,
Claimed our cash as we hove in view.
And poorer, but weightier, we passed along
To the Christmas Cards, which were "going strong."
Then the fortune-teller, a gipsy bold,
Read the cards and our fate foretold.
Whilst the orchestra, to quell our fears
With strains of music charmed our ears.
From the sweet stall scarce could we break away,
For those sweets were all home-made they say,
And before our fascinated sight
Loomed marzipan fruits and Turkish delight!
To turn and flee seemed the only hope,
But the way was barred with scent and soap,
Perfumed bath salts and candle shades—
Offered for sale by beguiling maids.
The refreshment staff with its handmaids neat
Seemed to promise a safe retreat;
And the dainty teas which were served with speed,
Refreshing us in our time of need,
Were instrumental, we must confess
In making this effort a real success.
We think our Staff were simply splendid
And when their arduous day was ended
Their spirits rose by leaps and bounds
For their profits totalled one hundred pounds!!!
This good round sum will shortly drift
To hospitals, as a Christmas gift—
But the joy of giving will still remain,
To have lighted a way through the gates of pain.

Hence with a Happy New Year to all
Who helped our bazaar in the Aspland Hall.

C. A. S.

* * * *

City Exchange.

The City telephonists on Friday, Dec. 1, gave a concert at St. Mary Ward Settlement in aid of St. Bartholomew's Hospital before a very appreciative audience. The items included two amusing sketches "The Soup and the Savoury" and "The Wrong Flat." Also several songs, recitations, violin and pianoforte solos were included. Not forgetting the Jazz Band which gave finesse to the concert. The amount realised was £36 1*s.* 7*d.*

* * * *

Park Exchange.

On Tuesday, Dec. 5, the staff of Park Exchange held a social and dance to raise funds to provide a Christmas Tea for the poor children of the district. A very jolly evening was spent by nearly a hundred of the staff and their friends at Shearn's Restaurant, Tottenham Court Road. Dancing was the order of the evening, but for the pleasure of the non-dancers there were musical items, recitations and competitions. A palmist was mysteriously hidden behind a screen in one corner of the hall and her clients were many and varied to judge by the long queue continuously waiting their turn to consult her. A bran tub was not the least of the evening's attractions and was well patronised by all. At 9 p.m. an interval was called and everyone adjourned to partake of refreshments served in the supper room below. The revellers continued their merry-making until 11 p.m. when they very reluctantly departed homewards.

PERSONALIA.

LONDON TRAFFIC STAFF.

Resignations on account of marriage :—

Telephonists.

Miss M. MARKELL, Palmers Green.
Miss R. H. CHAPMAN, Paddington.
Miss E. RAMSAY, Woolwich
Miss E. J. Jeanes, Woolwich.
Miss G. A. SAYER, Holborn.
Miss C. E. ELGAR, Central.
Miss E. M. CARR, Avenue.
Miss J. BOWLER, Museum.
Miss R. L. C. FRESHWATER, Central.
Miss R. M. RUSSELL, Central.
Miss R. SUMMERCORN, East.
Miss E. KING, City.
Miss A. K. FISHER, Victoria.

CENTRAL TELEGRAPH OFFICE.

Miss E. R. WRIGHT promoted from Superintendent to Chief Superintendent.

THE

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CONTENTS.

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TELEPHONIC DEVELOPMENT OF THE WORLD AT DECEMBER 31, 1921.

BY W. H. GUNSTON.

IN the year 1921 some 950,000 telephone stations were added to the total for the world. As we should have expected, the bulk of this increase comes from North America, viz., upwards of 500,000, whilst Europe accounts for nearly 300,000. The total may be put at 21,798,000, made up as follows:

	1921.	1920.
Europe	5,560,000	5,248,000
Asia	585,000	507,000
Africa	102,000	95,000
North America	14,882,000	14,365,000
South America	307,000	286,000
Australasia	361,000	322,000
	21,798,000	20,823,000

The telephone stations of the United States increased by over 450,000, those of Germany by 100,000, and those of Canada and France by about 50,000 each.

It may be of interest to compare the development of the world at 1921 with that existing in 1911, ten years earlier. Despite four years of war in which all the chief telephone-using countries except Sweden and Denmark were engaged, and despite also ensuing years of comparative stagnation, an increase of 940,000 telephones during that period will be noted from the following table. The war and its effects told, of course, more heavily on Europe than on America, and increased the disparity already existing between the old and new worlds.

	1911. (*Thousands.*)	1921. (*Thousands.*)
Europe	3,156	5,560
Asia	204	585
Africa	36	102
North America	8,693	14,882
South ,,	88	307
Australasia	142	361
	12,320	21,798

Of the countries which now possess upwards of a quarter of a million telephones, the relative positions are as follows:—

	1911. (*Thousands.*)	1921. (*Thousands.*)
United States	8,357	13,875
Germany	1,514	1,915
Great Britain	701	998
Canada	302	902
France and Algiers	261	503
Sweden	199	390
Japan	159	370
Denmark	107	257
Australia	101	251

It may be observed that the number of telephones in Great Britain and Ireland at the end of 1922 (Post Office, Irish Free State, Hull and Guernsey systems combined) was about 1,060,000. In 1911 Russia occupied seventh place on the list, and the Austrian Empire eighth. Germany shows a good increase despite the decrease of territory which it has suffered, and France with the addition of Alsace-Lorraine has nearly doubled its figures. Sweden and

Japan have increased over 100 per cent., and Denmark and Australia 150 per cent.

In 1911 there were 102 cities with upwards of 10,000 telephones; in 1921 there were about 200, whilst the cities with 20,000 telephones and upwards numbered exactly 100. (*Vide* Table VII.)

A comparison of the development of some of the largest cities in 1911 and 1921 shews the following progress:—

	1911.	1921.
New York...	441,128	979,534
Chicago	279,383	605,495
Berlin (Greater)	177,854	347,735
London	220,782	345,797
Boston	140,153	313,295
Philadelphia ...	145,535	233,122
Paris	84,489	173,300
San Francisco	100,523	162,430
Los Angeles	86,922	162,118
Detroit	77,866	154,077
Cleveland	71,532	153,951
Pittsburg	71,249	129,436
Stockholm	73,600	110,095

It will be noted that the number of telephones in New York, Chicago, Boston, Paris, Detroit, and Cleveland has more than doubled, and that Berlin has nearly doubled its total. It is interesting to record that Los Angeles passed San Francisco during 1922 and that the latest available total for the London telephone area is 365,533.

Tables are annexed shewing the development of each country classified in continents.

TABLE I.

EUROPE.

NUMBER OF TELEPHONES.

	Dec. 31 1921.	Dec. 31 1920.	Population (Thousands)	Population per Telephone.
Austria (est.)	140,000	133,480	6,100	46
Belgium (see notes) ...	85,200	62,867	7,700	90
Bulgaria (est.)	5,000	5,000	5,000	1,000
Czecho-Slovakia ...	85,000	78,177	13,750	161
Denmark	257,672	250,000	3,283	12
Danzig (Free City) ...	12,807	10,322	356	30
Esthonia	4,594	3,218	1,250	272
Finland (see notes) ...	42,000	40,000	3,300	78
France	488,818	439,152	40,000	82
Germany...	1,915,717	1,812,341	65,500	34
Great Britain and Ireland	997,805	986,964	47,000	47
Greece (1920)	4,700	4,700	7,000	1,489
Hungary	68,000	57,009	7,500	110
Iceland	2,360	2,296	92	40
Italy	119,000	111,711*	38,500	329
Luxemburg	6,023	5,816	260	43
Netherlands (est.) ...	180,000	161,800	7,000	39
Norway	153,571	137,000	2,650	17
Poland (see notes) ...	75,000	70,450	27,160	362
Portugal (see notes) ...	15,700	15,000	6,400	400
Rumania...	27,445	20,000	17,000	620
Russia, Ukraine, White Russia, Lithuania, Latvia, &c. (est.) (see notes)	200,000	200,000	—	—
Serbs, Croats and Slovenes	19,439	15,312	11,600	600
Spain (est.)	80,000	75,871	21,300	266
Sweden	387,337	389,830	5,950	15
Switzerland	160,332	152,336	3,900	23
Turkey (est.)	8,000	7,298	—	—
Total ...	5,560,000	5,248,000	400,000	74

* June 30.

The ratio of population to telephones in Europe, is unfavourably affected by the poor development of the Eastern and Southern States. If a line be drawn along the eastern boundary of Scandinavia and Germany, and southern boundary of Austria, Switzerland, and France, and embracing Holland, Belgium and Great Britain. it will be found that 4,786,000 of the 5,560,000 telephones in Europe are comprised within that line, yielding one telephone to every 38 inhabitants.

NOTES.

Austria, Czecho-Slovakia and Poland.—Information relative to 1921 has not been received. The figures given have been estimated from those for 1920.

Belgium had 61,932 subscribers at the end of 1921. This figure has been converted into "stations," by assuming that the relation between subscribers and stations is proportionate to that existing in 1920. There were 23,800 telephones in Brussels and about 12,000 in Antwerp.

Denmark.—This is the best telephoned country in Europe. Of the 257,672 stations, 138,950 belong to the Copenhagen Telephone Co., 68,236 to the Jutland Co., 17,713 to the Funen Communal Co., and 13,023 to the South Jutland Co.

Finland.—The telephone companies of Abo, Helsingfors and Viborg had between them 21,944 stations. No other information is obtainable, but as these companies do not serve one-third of the population of Finland, this figure had been doubled to arrive at the total for the country.

France has added nearly 50,000 stations. Paris has 173,300, Marseilles 12,414, Lyons 11,891 and Bordeaux 8,285 telephones.

Germany.—103,376 stations were added during the year. Greater Berlin now possesses 347,735 telephones, Hamburg 95,534, Munich and Leipzig over 40,000, Cologne, Frankfurt, and Dresden over 30,000, Breslau, Düsseldorf, Stuttgart, Nürnberg and Hanover over 20,000, and Bremen, Mannheim, Essen, Chemnitz, Magdeburg, Königsburg, Stettin Duisburg, Dortmund, Elberfeld and Halle over 10,000.

Great Britain and Ireland just failed to reach one million stations by the end of 1921. This total was attained in the following January. 981,529 were connected with the Post Office system, 13,470 with the Hull Corporation exchanges, and 2,806 with the Guernsey system. London had 345,797 stations, Manchester 47,301, Glasgow 42,514, Liverpool 38,219 and Birmingham 26,391. Edinburgh, Newcastle, Leeds, Bradford, Sheffield, Dublin and Bristol all had 10,000 telephones and upwards.

Italy had 111,711 telephones at June 30, 1920, and 116,922 at June 30, 1921. It may therefore be assumed that there were 119,000 at the end of December. In June, 1922, Rome had 14,573 stations, Milan 19,938 and Genoa 8,161.

The Netherlands.—The total for 1921 has been obtained by increasing the figure for 1920 in accordance with the usual rate of development in these countries.

Portugal.—The Anglo-Portuguese Telephone Co. had 14,673 stations of which 10,741 were in the Lisbon district. The State system comprises upwards of 1,000 stations.

Russia.—Information relating to the States formed out of the late Russian Empire is difficult to obtain. Poland, Finland and Esthonia are dealt with separately. Information from Moscow shews that there were 133,280 telephones in 57 Governments in 1920, and 73,768 in 50 Governments in 1921. The former figures probably included States more loosely connected with the Soviet rule. If allowance be made for the Ukraine, Lithuania and Latvia, an estimate of 200,000 for Russia and these States will not be excessive.

Roumania.—Bucarest had 8,537 stations and Cluj 1,495.

Sweden still shews a slight reduction in her total, due, no doubt, to the effects of the amalgamation of the Stockholm Telephone Co. with the State system. Stockholm itself has gone back to 110,095 from 118,180. Gothenburg has 22,804 stations and Malmö 12,043.

Serbs, Croats and Slovenes.—The total has increased by 4,000. Zagreb has 2,569 stations and Belgrade 1,907.

Switzerland shewed an increase of 7,996 stations. Zurich has 21,000 telephones, Geneva 14,199, Basle 12,179 and Berne 10,205.

Spain.—See note on Netherlands.

Turkey.— „ „

(*To be continued*).

HOW THE TELEPHONE WORKS.

BY A. CROTCH.

V.

Automatic Telephony.—By the earlier term, "automatic working," was meant that in order to gain the attention of the exchange the calling subscriber had merely to lift his receiver from its hook. By the present term is implied a system by which the human operator at the exchange is dispensed with and suitable machinery installed there to perform mechanically all the operations of switching. The switchboard, with its jacks, indicators, plugs and cords, is superseded by mechanism, the centre and chief of which, in the system we are about to describe, is a spindle switch capable of vertical and rotary motion at the will of the subscriber.

Such a machine is shown, in principle, in Fig. 15. A spindle or shaft carrying some ten ratchet steps (circular in plan) on its upper portion and some other ten arranged in a series of vertical slots or teeth, is supported in suitable bearings. When the electro-magnet VM is energised, its armature, by means of a suitable pawl, lifts or strikes up the shaft one step. If a number of impulses (not exceeding ten) are passed through VM, the shaft will rise a corresponding number of steps. Similarly, if RM be now energised it will propel the shaft round one step and so on up to the limit of ten steps. Another pair of pawls or "double dog" DD, ensures the support of the shaft in the intervals. Further, as the shaft rotates, it winds up a flat spiral spring and it naturally rises against gravity. If the spindle is released (by the double dog) the spring will rotate it in the opposite direction and its weight will cause it to fall. The striking away of DD is the function of the third electro-magnet, Rel. M. When this is energised the spindle is allowed to rotate backwards, and then to fall to its normal position.

On the lower part of the spindle a pair of metallic arms are mounted, insulated from the shaft and from each other. Before these is a "bank" of 100 double contacts, arranged in ten layers of ten each, so as to form an arc of a circle, the centre of which is the spindle. These 100 double contacts are connected to 100 subscribers' loops.

The arms are normally just to the left of the bank and below it. A single impulse through the vertical magnet brings them to the level of the lowest row of contacts: two impulses will bring them to the second and so on. One impulse through the rotary magnet will then turn the spindle one step, and the contact arms, which are separated from each other by a very small space, will "wipe" or rub over the first pair of contacts on a particular row. Three impulses through RM will bring the arms over the first and second contacts and to rest on the third and so on. Now, if these 100 sets of contacts represent 100 subscribers (strictly speaking, 99, in order to keep to two figures) we can, by lifting and rotating the shaft, cause the contact arms or "wipers" to make contact with any one of those loops, the calling subscriber's line being connected to the wipers and thus through, *via* the contacts, to the desired subscriber. Thus, for number 63, we must cause six impulses of current to pass through the vertical magnet—which will lift the shaft to the sixth level—and three impulses through the rotary magnet, which will bring the wipers on the third position on this level, or on No. 63.

Now, since each switch or "connector" is under the control of a subscriber, the 100 double contacts on the bank of each must be multipled together, so that every subscriber shall have before him the whole exchange. Again, some means must be devised so that when any member is engaged at any one switch, an indication shall be given on all the other switches that this is the case. This is effected by fitting a second bank of 100 (single) contacts above the first, and another pair of wipers to engage with these, as in Fig. 16 which repeats the spindle. The two wipers of this pair are connected together so as to rub on both sides of the single contacts. We thus have a line bank of contacts and a "private" or local bank, all the latter being multipled together like the line banks.

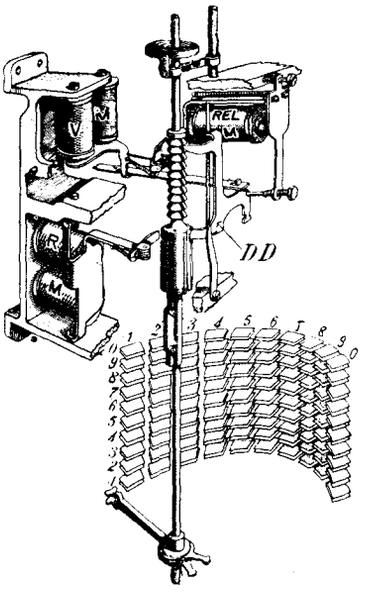


Fig. 15.

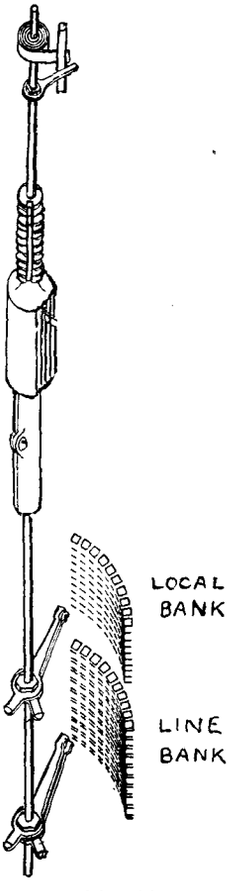


Fig. 16.

The analogy between these arrangements and those of the switchboard is easily seen. The wipers correspond to the answering switch-springs of the manual board, since it is on these that the calling subscriber appears; whilst the multiple (line) banks are the avenue by which the wanted subscriber is obtained. The local multiple banks correspond to the sockets of the jacks and sleeves of the plugs.

A simple way of sending the impulses is as follows:—At the subscriber's end, it will be remembered, a condenser and magneto bell are across the lines, for ringing purposes. At the exchange imagine one line to be brought to the vertical magnet and the other to the rotary, the battery being connected to both. By suitable means we can earth, at the subscriber's end, first the vertical line for the required number of times for the tens' digit and then the rotary line the necessary number of times for the units figure. Other means will, of course, be required to ring up the wanted subscriber or to indicate that he is engaged, the means of calling, clearing, &c.

Since each subscriber has one of these connector switches, there will be as many such connectors as subscribers. But if the whole of the exchange were busy at once, only half the connectors would actually be in use—those belonging to the calling subscribers. Hence half the number would be the *maximum* required for actual connection. But this state of things never occurs and a considerably smaller number will suffice. A much simpler piece of apparatus, the "line switch," is therefore allotted to each subscriber, and on the lifting of the receiver this is actuated and automatically "hunts" or searches for a disengaged connector. As regards these line switches, the connectors must be multipled to them, so that any line switch can pick out a disengaged connector.

Again, a 100-line exchange is very small: a three-figure (999) system will generally be the lowest practicable scheme. To bring in the third (hundreds) digit, an additional and simpler form of

connector is used. The connector proper is then utilised to pick up the units and tens figures and the new intermediate switch or selector is placed in series with it to select the hundreds digit. A four-figure (10,000) exchange will require two selectors and so on. We thus have line-switch, 1st (and 2nd, &c.) selector, and connector; or, in more formal terms, a pre-selector, 1st and 2nd selectors, and final selector. We shall, however, keep to the first terms and a three-figure exchange. This involves the line switch, to whose contacts the selectors are multipled: the selector, to whose banks the connectors are multipled, and the connectors themselves, to whose banks the subscribers' lines are multipled. The office of the first is to put the caller through to a selector, that of the latter to put it through to a connector, and that of the last to put it through to the required subscriber's line. The manner in which these operations are performed is as follows:—Imagine that No. 365 is required. The subscriber lifts his receiver and commences to "dial" the first figure. Before he does this, however, his line switch has been actuated and has picked up a disengaged selector. The signalling of the first figure (3) steps up the spindle of the selector to the third level and it immediately, and automatically, hunts along that level until a disengaged connector is found. The second figure (6) steps up the spindle of the connector to its sixth level, and the third figure (5) causes it to rotate to the fifth position.

The principle we have just outlined is the Strowger system of automatic telephony. We now propose to show how that principle is applied by the Automatic Telephone Manufacturing Co.

First, the dial switch on the subscriber's telephone, by which the impulses are sent to the exchange. The subscriber's circuit is normally interrupted by a condenser. When the receiver is lifted this circuit is completed through the subscriber's instrument. He then dials the required number, which we will assume to be 365. The dial, in returning to zero after each figure, disconnects the circuit of the loop a number of times—3 times for the first, 6 and 5 times for the second and third figures. The "impulses," therefore, are really short intervals of disconnection, that is, the circuit (receiver off) is normally closed and current flowing, and the return movements of the dial interrupt this flow the requisite number of times. This finishes the subscriber, and we now go on to the equipment at the exchange.

Rotary Line Switch.—One of these is permanently fixed to each subscriber's line. It is a combination of three parts: (*a*) a bank of 100 single contacts arranged in a semi-circle in four sets of 25; (*b*) four rotary wipers on a single spindle, each wiper making contact on one of the four sets of contacts; and (*c*) an electro-magnet. When a current of sufficient strength passes through the latter its armature is attracted, but in its movement breaks the circuit, so that if a battery were continuously applied, the armature would make and break like an ordinary trembler bell. On the shaft carrying the four wipers is a ratchet wheel, and on the armature a pawl, which, on the release of the armature, propels the wiper shaft forward one step. Further, each wiper arm extends both ways (on a diameter) and carries a wiper at each end, so that when one wiper leaves the last contact of the series (of 25) the wiper at the other end starts on the first contact of the series. There is thus no zero position and the wipers are always ready.

Two of the wipers carry the circuit (+ and −) and one the "private normal" or local connexion to the local multiple bank. The other is left disconnected, for reasons which do not concern us here. Each set of four contacts touched simultaneously by the wipers has three of its contacts taken to a selector, and the fourth left disconnected, as above. When the selector is engaged, its local contact, *i.e.*, the contact in the local multiple bank, is earthed. Hence, when the local wiper of the switch makes contact with it, the electro-magnet battery is earthed and the wipers propelled forward to the next position, on which is another selector. When a disengaged selector is found, its local contact is simply disconnected, the electro-magnet is not energised, and the wiper remains stationary.

(*To be continued.*)

TELEGRAPHIC MEMORABILIA.

IT was a personal disappointment that the writer could not be present at the Presentation Concert held in the honour of Mr. F. J. Muller (Assistant Superintendent of the C.T.O.) on Monday, Dec. 18 last, with Mr. G. T. Hutchinson, Plant Superintendent, and himself a veteran, in the Chair. That a "previous engagement" was the cause, it is hoped, will be accepted as something more than an excuse of the euphonious type. Thanks, however, to the kindness of a colleague our readers will not be deprived of an interesting if brief account of the proceedings. The Deputy-Controller, Mr. A. W. Edwards, at some personal inconvenience was present, and added to the representative nature of the send-off to our old friend "Fred," the celebration of whose retirement formed the centre-piece of the evening's function. Mr. Edwards showed his correct psychological appreciation of a function of this kind by making a brief and very interesting speech during the proceedings, and alluded to the exceptional number of retirements due to eventuate during the next two or three years.

The Chairman, unfortunately, owing to an anticipated long train journey was compelled to leave some time before the gathering broke up. He did so, however, with complete confidence that he was able to hand over his duties to a most competent "Vice" in the person of Mr. C. Sanderson (Master of Statistics!) His confidence was not misplaced as all had anticipated. Before Mr. Hutchinson left, however, he presented a time-piece to our mutual friend and colleague on behalf of the many well-wishers and admirers of the latter. "Fred" duly replied and was evidently deeply moved by the many expressions of affection and esteem. He may rest assured that even the things left unexpressed or expressed, as he said, *to his own dissatisfaction*, were well understood and appreciated by everyone present sympathetically attuned as they were to some of those thoughts which would naturally surge through the mind of our kindly colleague at so momentous a milestone of life.

The musical programme was under the competent guidance of Mr. R. Comben who provided specially good fare by the aid of many old friends and well known artistes, Messrs. C. Oberst, Frank Hudson, Gould, Bert Sainsbury, Brereton, Orchard, Culley, Mr. Comben himself contributing to the general delight of the audience. Mr. Dowson gave a delightful rendering of the "Intermezzo to Cavaliera Rusticana" on the violin, while Mr. Bonnor as accompanist, maintained his usual high excellence.

Yet another retirement took place towards the end of last year which, though not *on* the Traffic staff of the C.T.O., was yet most decidedly of it. Mr. Hunt, Skilled Workman, Class I, was a well-known figure of the Engineer-in Chief's Department. He was one of those quiet unassuming personages, attached to "Maintenance"—with which the C.T.O. engineer has been blessed by not a few, who knowing their work thoroughly are never unduly disturbed by the queries and obstacles at times—unwittingly be it said—may be placed in their way by some of us of the Traffic side.

In so large an office as the C.T.O. where modern developments are causing almost daily changes, it is impossible, certainly at times, not to miss some new detail of construction, lay-out, &c. One never appealed in vain to Mr. Hunt for help or information who would however always make light of any service thus rendered. Many happy returns of your retirement date, Mr. Hunt! May your *lines* always fall in pleasant places; may you never come in *contact* with misfortune and may your *voltage* keep steady to the last.

The retirement of Mr. H. E. Dauncey, Assistant Superintendent, on the 7th ult., at the age limit is also to be noted, and his withdrawal from C.T.O. activities will be felt in no circle more than in that of the P.O.T.A. Society of which he was Branch President.

Presentations have likewise been well to the fore of late, to Mr. H. A. Longhurst, to Mr. E. J. Dawe, and Mr. Joe Kellaway, for example, all showing the spirit of sweet remembrance and good comradeship of old colleagues of the Telegraph Service.

Indicative too of the same spirit of kind thoughtfulness was the collection of the U.P.W. to provide Christmas dinners for children of the unemployed, as also the collection for that smaller fund to present each of the thirteen orphan children elected to orphanages by means of the C.T.O. Benevolent Fund, with the sum of 10*s.* as a Yuletide gift.

In International Telegraphy one is used to receiving telegrams by all possible combinations of devious routes, but during the month of December, owing to a certain breakdown of wires, a small shoal of Americano-British traffic reached London from the United States *via* the Continent, which if it led to complication in International accounts certainly showed excellent co-operation between the various wireless organisations of America and Europe. Thus traffic from New York, Philadelphia, &c. reached London *via* the new French wireless station of St. Assisse near Melun, not far from the forest of Fontainebleau, thence to the chief office of the company in the Rue Haussman, Paris, and thence, it is believed, by pneumatic tube to the Central Telegraph Office in the Rue Grenelle, and lastly, by direct line to the English capital. Some of this traffic had again to be diverted eastward by cable. Other traffic reached London *via* Berlin wireless, and yet a third portion of the diverted telegrams reached this country *via* Stavanger wireless. Thus round-about journeys of certain telegrams were noticed, such as one from Jersey City to Bombay which came from the U.S.A. by wireless to Norway, thence by cable to England, where it was handed to the Eastern Telegraph Company on a cable jaunt of another few thousand miles.

Successful wireless trials were carried out between the C.T.O., London, and the High-Speed Telegraph Laboratory, Berlin, during the early part of

last month by means of Hughes' printing telegraph apparatus. The arrangement was for simultaneous two-way working, London controlling the aerial of the Stonehaven wireless station by an overhead low-resistance line of about 500 miles in length. Konigswusterhausen's signals controlled by Hughes' apparatus at Berlin were picked up by the Central Wireless Office, Roof, C.T.O., and passed down by means of a relay to the Hughes' receiver in the Cable Room. Arrangements may shortly be made to put this new method into daily practical use. Should the result prove satisfactory, there is considerable probability that wireless communication between England and Germany may take another step forward in the direction of a higher speeded type of telegraph printer.

The *Electrical Review*, in paying tribute to the late Sir John Gavey, who died during the fading days of 1922 at the ripe age of 80 years, records as follows the list of other notable names in electrical and kindred activities who have passed to the Great Beyond during the year recently closed. Our contemporary says :—" Such familiar names as J. J. Easton, R. E. Graves, Dr. Edward Hopkinson, Dr. J. T. Merz, G. G. Ward, Sir John Benn, B. S. Broadhust, F. E. Hesse, Dr. Gisbert Kapp, H. W. Miller, Sir A. K. Rollit, and Sir R. Vassar Smith all carry with them suggestions of various specialised departments of activity in which the men who bore them performed a leading part in this country, while the death of Graham Bell, of telephone fame, was a world loss, and the disappearance of Dr. Walther Rathenau by a murderer's act removed from the stage one who seemed to be destined to do much to put Germany upon her feet as well as to organise her electrical and other industries for future expansion."

What *The Times* calls "a radio express telegraph service has been opened between Berlin and Budapest. This is said to be the first occasion upon which Siemens telegraph instruments giving a speed of about one hundred words per minute have been employed in an international radio service."

Successful trials across the Atlantic have, however, been made between Berlin and New York by the same type of high-speed printing telegraph apparatus.

The development of wireless by the German authorities demands the careful attention and study of all interested in wireless matters, and the following condensed report from a recent number of the German *Telegraph und Fernsprech Technik* will be read with interest by most of our wireless readers, all indeed who are keen for the future of the craft of telegraphy.

From about a year or less after the Armistice Germany has been organising a wireless system which already consists of a central post at Berlin ; 17 provincial stations, the principal having multiple transmitters and the secondary simple transmitters ; 75 receiving stations ; 7 meteorologic receiving stations, and 2 coast stations—at Norddeich and Swinemunde. The central post at Berlin comprises a transmission installation at Konigswusterhausen, and a receiving installation at Zehlendorf, both controlled from the Berlin central telegraph office. The equipment at Konigswusterhausen consists of one 32-kW Poulsen ; one of 5/10 kW ; two tube transmitters of 5/10kW ; five tube transmitters of 2×500 W ; and five transmitters of 500 W. All these transmitters are furnished with separate antennae, and can work simultaneously with distinct wave-lengths. The big tube transmitters consist mainly of 10 tubes of 1.5 kW each. For the chief provincial posts, the transmission apparatus is separated from that of reception (by from 1 to 2 kW), and is worked on the duplex system.

Although a belated item, it is as well to place on record the fact that "In the French Chamber on Dec. 23 an amendment by the Deputy, M. Lambert, to authorise the telephone service being transferred from the Government to private hands, was rejected by 397 votes to 170. The Postmaster-General declared that such an amendment, if passed, would lead to gross abuse on the part of speculators.

Further, that the French Chamber, on Dec. 27, continuing the discussion of the Posts, Telegraphs, and Telephones Budget, the Under-Secretary of State of the P.T.T. said that State cables would not be ceded to private companies. With regard to the Brest-Dakar-Pernambuco cables, it was stated that the prolongation of the Dakar-Pernambuco line in South America was being investigated. It had not yet been decided whether this new line would be developed by the State or by a private company, and the question would be settled by Parliament. With regard to the request made by M. Loucheur for the reconstruction of the Paris-London, Paris-Strasbourg, Paris-Lille, Paris-Marseilles, Bordeaux, &c., cables, the Under-Secretary stated that his suggestions were to be carried out."

Equally interesting is the report, issued by the Treasury of the Pacific Cable Board for the year ended March 1922. The salient features are as follows :—" The receipts exceeded the ordinary expenses by £210,257. From this must be deducted a special contribution of £100,000 to the Reserve and Renewal Fund for cable duplication. Traffic receipts were £521,643 or £98,409 less than those of the preceding year. This was largely the result of the re-instatement of cheap services, especially week-end telegrams. The Board has recently placed a contract with the Telegraph Construction and Maintenance Co. for the laying of cables between Suva (Fiji) and Auckland (N.Z.)—a distance of over 1,300 nautical miles ; and between Southport (Queensland) and Sydney (N.S.W.)—about 540 nautical miles. The cable steamer *Colonia* will lay the cables by August next, it is hoped."

This apparently is but the beginning of the duplication scheme which, when completed, will probably cost from £250,000 to £500,000.

The longer section—that from Bamfield to Fanning Island—is to be taken in hand later. Important experiments by the Telegraph Construction and Maintenance Co. have been so far successful that a new and improved type of cable will, it is believed, be perfected in the near future. This promises such a gain in handling the traffic that the Board is awaiting the result of further tests before making a decision whether the duplicate Fanning Island to Bamfield cable shall be of the type of those now ordered or the new one.

Thanks to those many friends of the Telegraph Service who have favoured us with New Year's cards of greetings from across the sea, Canada, Belgium, France, New Zealand, Australia, India and China, for example. The kindly thoughts are much appreciated and are heartily reciprocated.

"JANUARY 15, 1923, will stand as an historic date in telephone history," said Mr. Frank Gill, President of the I.E.E., on the above-mentioned date in the opening sentences of his lecture, on "Some Aspects of the Art of Communication" given before the members of the Telephone and Telegraph Society of London. This is undoubtedly true, as is also true the fact that Mr. F. Gill himself was among the favoured few, who at 2 a.m. that morning heard the first real telephone message to reach us across the Atlantic with a distinctness by no means always equally on local lengths, thus witnessing one of the greatest wireless feats of communication yet established. Apart from this announcement the most interesting feature of a most interesting lecture was the earnest persistence with which Mr. Gill returns to the subject of the International Telephone Service of Europe, and provided the existence of a real Central Controlling Authority continues to emphasise the possibilities which remain ready at hand to be realised if only there were more unity amongst the nations, less suspicion and more good faith.

From the London *Times* we learn that several months ago the Danish Government sent an engineer to Greenland to examine the possibilities of establishing radio stations in that Danish colony. He has now returned and advised the establishment of four stations. It is expected that three will be established on the west coast and one on the east coast, near Angmagsalik, the latter in response to a special request from the Government of Iceland, which declares that a station there will be of the greatest importance in transmitting weather information to Iceland.

According to *Indian Engineering*, some progress has been made in the installation of the radio telephone in the Moplah tracts of Malabar and a few sets have been installed and messages transmitted and received.

Big schemes are anticipated to materialise in connexion with broadcasting in Norway. The Norwegian Radio Co., the Norwegian Marconi Co., and the Norsk Telegram Bureau companies intend to form a joint broadcasting telephone company for the purpose of building sending stations in Christiania, and subsequently at Bergen and Trondhjem, each with a radius of one hundred miles, for the regular transmission of concerts. Receiving apparatus, for hire by subscribers at an annual fee, will be placed under the control of the telegraph board. The companies, having applied for a concession, have also requested Government leave to build a large radio-telephone station in Christiania in order to broadcast Press exchange news and weather forecasts over the whole of Southern Norway. Radio-telegraphy is intended to be used for long distances, such as Trondhjem and the North Cape.

The most interesting demonstration in this country up to the present of the possibilities of broadcast telephony was arranged for Jan. 8, when parts of the British National Opera Co.'s performance of Mozart's "Magic Flute" at Covent Garden was radiated from the London station of the British Broadcasting Co. The demonstration was highly successful and selections from operas will be broadcast nightly until the conclusion of the present Covent Garden season.

Some of our C.T.O. enthusiasts who listened in to this display and whose musical ears are of the most fastidious attunement assure the writer that for one-and-a-half hours not a note was missed. The range of the London aerial, it is understood, was somewhat increased during the early part of last month.

Reuter's Agency is responsible for the following item forwarded by their Constantinople correspondent to this country. The Angora Government has decided that Adnan Bey shall henceforth act as delegate at Constantinople of the Commissariat of Foreign Affairs of the Grand National Assembly of Turkey. He will negotiate the handing over to Turkish control of the posts and telegraphs, the cable of the Eastern Telegraph Co., and of the Constanza cable requisitioned by the Frency military authorities.

Such has been the success of the Anglo-Dutch telephone cable that the need of a second has already become sufficiently urgent as to necessitate the laying of a second cable, thus providing three more circuits between this country and Holland.

It is noted with regret, that one of the chief compilers of Bentley's code who was actually employed at the time in the preparation of a section of that complicated work for the special use of bankers, recently committed suicide. Evidence was given that deceased had suffered from depression and insomnia for as one can well imagine, "the work upon which he had been engaged demanded extreme concentration and apparently the brain gave way under the strain."

The following telegraphic arrangements are being made by the local Government for the sending of messages to ships in the harbour of Port of Spain, San Fernando and Brighton, and for the captains of such ships to communicate with their agents in Port of Spain. It has also been decided to establish a receiving station at North Post, which will do all receiving work, the Tobago traffic, and ship work. The Port of Spain station, which will be the controlling or head station and the one with which alone the public will deal, will thus be left free for long-wave work with Venezuela, British Guiana, St. Martin, Curacao, &c. Communication between North

Post and the head station will be maintained by the existing telephone line and also radio. A scheme for linking the telephone systems of Tobago and Trinidad by radio is also likely to be inaugurated.—*Financier.*

We are indebted to *The Times* for the following interesting and succinct account of some of the "freak" results of broadcasting, some of which our wireless friends have already noted, regarding the "blind" (or should it be "deaf?") spots well-known to our wireless amateurs and others:—

"Several freak results have been observed since broadcasting began in this country. One problem is why the London programme should be heard faintly in Yorkshire and strongly in the North of Scotland—more strongly, in fact, than the Newcastle programme; and why Southampton and Portsmouth should hear the Manchester programme with ease and the London programme with difficulty. Furthermore, why should such spots exist, where wireless signal cannot even be heard at all? Several such places have been discovered in England. Didcot is one, Newbury another. The same problem has presented itself elsewhere. America has its 'blind spots,' and the Dutch Army authorities found it impossible to reach a certain area of four square miles by wireless signals. Geological conditions, contour, the presence of water, and atmospheric conditions are all believed to be influencing factors. It is believed that 'fading' and 'blind spots' are parts of one and the same problem. 'Fading,' is a known phenomenon, which is much more pronounced when a short wave-length is employed. This explains why English amateurs can often pick up Paris and The Hague messages with greater ease than British messages. When the wave-length is over 600 metres there is comparatively little 'fading.' The average wave-length of the British broadcasting stations is 400 metres. It has been found that 'blind spots' vary and move with the alteration of the wave-length. Among other 'freak' results recently registered was the receipt of the Newcastle programme at Gibraltar, and of the London programme on a crystal receiving set at Bridlington."

Brighton is another spot where audition is at times "dead" and by some is attributed to the chalky soil of the neighbourhood. This is apparently quite unconfirmed up to the present.

The Cableites have been pleased to note the visits of certain representative parties from our friends of the F.T.B. to the Foreign Section of the C.T.O., where they have been able to realise some of the difficulties with which the staff and supervision have to cope. One of the comments of a party of these was, "How cramped you are for space!"

One could well soliloquise upon the uncertainties of life, its defeated anticipations, plans and hopes on the occasion of the sad and what, from a human point of view, was the *premature* death of the much respected Assistant Controller of the C.T.O., Mr. W. H. Offord. Never robust but possessing a strong, quiet, patient will, he had struggled through years of adverse conditions in his private life due to the ill-health of those near and dear to him. Never dismayed but courageously picking up the threads of life when "outrageous fortune" appeared to have done its worst, he pressed quietly on once more. Official success finally seemed to be making an attempt to balance the inequalities by advancing our late colleague no less than four steps within twelve months, *i.e.*, between Aug. 1, 1921, when he was made Superintendent, B class, passing to C class the succeeding month, to the Higher Grade in March, 1922, and was promoted to Assistant Controller on July 20 last. Those who noted the change which came over our much-regretted colleague soon after this date were justifiably alarmed, but were scarcely prepared to believe that before the end of the year he would be with us no more. To his wife and daughter the sincerest heartfelt sympathy is respectfully tendered.

A Modern Prophet's View of Life:—

"Life is still only a promise, still waits to be born, out of such poor stirrings in the dust as we. . . .

"Some day here and everywhere, Life of which you and I are but anticipatory atoms and eddies, life will awaken indeed, one and whole and marvellous, like a child awaking to conscious life. It will open its drowsy eyes and stretch itself and smile, looking the mystery of God in the face as one meets the morning sun. We shall be there then, all that matters of us, you and I. . . . ."—*H. G. Wells.*

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

Extension of the London Engineering District.

By the time that these notes appear in print the absorption of portions of the surrounding provincial districts by the London Engineering District will have been accomplished, and the staff will be settling down to the new conditions.

Although the Engineering Department has reason to be proud of its organisation and methods of standardisation, which, indeed, can be rivalled by few concerns of equal size, yet, owing to the latitude wisely allowed for dealing with local peculiarities, there are inevitably differences in administration between districts. The reasons for these differences may not at first be apparent to those who may be slightly inconvenienced thereby, but after a few weeks the machine will be found to have overcome the temporary check and to be running perfectly smoothly again.

The total addition to the staff of the London district is 536, and a cordial welcome is given to them. It is hoped that they will identify themselves quickly with the various organisations, technical, social, and benevolent, which already exist and will give their London colleagues the benefit of their experience in provincial organisations of similar character.

Benevolent Society.

The special attention of the newcomers is drawn to the work of the London Engineering District Benevolent Society. The members of this Society subscribe one penny per week, and with the money thus contributed the Committee make grants to necessitous cases. This avoids the constant necessity of "sending the hat round," and also enables a subscriber to accept assistance when the necessity arises without feeling that there is a stigma about it. Few can be absolutely certain that they will never need such relief. If a subscriber does not need to receive anything from the fund, he has something to be thankful for, and the knowledge that he is able to help men who are down on their luck is also a cause for thankfulness.

Applications for Telephone Lines.

The boom in trade which followed the Armistice resulted in a large number of applications for telephones which could not be met owing to the shortage of telephone plant. At one time there were over 14,000 applications in London that had to be refused. It was difficult for subscribers to understand why they could not be joined up immediately, and some very hard things were said about the Post Office. Business men who held commissions in the army and saw the expeditious work carried out by Post Office staff attached to "Signals," expected to be connected up with equal expedition. They knew nothing of the difference between the work of slinging a few wires to trees and hop poles and that of providing a properly designed underground system that would allow for expansion, and they thought that the delay was accounted for by the difference in administration. Those who know and appreciate the difference in the nature of the work will be glad to learn that by Dec. 31, 1922, all the arrears had been wiped off. This means that not only have wires been provided for actual applicants, but prospective applicants have also been provided for at the same time. This has only been possible by the active and cordial co-operation of all ranks and we may now congratulate each other.

We cannot spend much time, however, in admiring ourselves. There is still much to be done before London has a telephone service such as the greatest and most important city in the world ought to have. An appetite for telephones must be created, and the means to satisfy that appetite placed within easy reach of every potential subscriber. It must also be possible to provide the meal without undue expense, and that can only be done if the utmost work of hand and brain is applied to increasing the output.

The larger the service becomes the greater will be the opportunity for the competent man to prove his worth.

Retirement of Mr. J. E. Gibbons.

A large and representative gathering of the staff of the London Engineering District assembled at North Side, Wandsworth Common, on the evening of Dec. 28 last, to bid farewell to Mr. J. E. Gibbons, the Executive Engineer of the South-West External Section, on his retirement from the service under the age limit. As a mark of their esteem the staff spontaneously decided to present Mr. Gibbons with a handsome half-hunter gold watch and chain, and an aneroid barometer, accompanied by a gold brooch for Mrs. Gibbons. Mr. F. F. McMillan, Assistant Engineer, presided, and Messrs. Shackleton, Holmes, Judd, Mizen and H. Sperry, representing the various grades, bore testimony to the genuine personal regard in which Mr. Gibbons is held.

The Superintending Engineer (Mr. R. McIlroy), in making the presentation, expressed regret that the time had arrived when the Department was to lose the services of so excellent an official, and feelingly referred to the difficulty which he and others felt in saying goodbye officially after so many years of association. Mr. McIlroy made it clear that Mr. Gibbons, although he had reached the age limit, was leaving the service solely at his own request, and he commented in flattering terms on the tactful and capable manner in which Mr. Gibbons had performed the various grades of his duties, thereby gaining the esteem of all his colleagues from the head of the District downwards. He trusted that both Mr. and Mrs. Gibbons would be spared many years to enjoy well-earned rest with the accompaniment of good health and happiness.

Mr. Gibbons hails from the North, and joined the Service in 1878. He was transferred to the Engineering Department of the Post Office in 1887. He had a thorough knowledge of the intricacies of telegraphy, and his technical attainments marked him out for early advancement. He served as Engineer in charge of the Fenny Stratford Section of the South Midland District for six years, and in 1900, when the Department undertook the telephoning of the Metropolis, came to London, where he had no small share in laying underground cables in the City, the streets of which, it may truthfully be stated, are the most congested of any in the world. His wide experience and his thorough knowledge of men assured the successful termination of the work, and on its completion he took up his headquarters at Wandsworth Common. Here he has been responsible for the carrying out of many important works, and the present satisfactory condition of the plant in the South-West Section bears eloquent testimony to the energy and ability displayed by Mr. Gibbons in the performance of his duties.

Mr. Gibbons has given no definite indication of his future line of action, but if the difficulty of obtaining a house to which he had been heard to make reference can be successfully negotiated, it will not be surprising to hear of his taking up his abode at Southsea, a place with which he has had pleasurable associations in the past at holiday times. That he will succeed in obtaining his desires, and that he has a long period of rest and contentment in store for him, is the wish of all who have come into contact with him during his official career.

WE TELEPHONISTS.

"TALK OF MANY THINGS."

WE have pleasure in announcing the results of the "Amusing Incident" Competition :

First Prize (half-a-guinea, &c.)—"Anonymous," Liverpool.
Second Prize (the JOURNAL free for a year.)—Miss Z. F. Rich, Llandudno ; Miss I. James, Weybridge.
Third Prize (mirror).—Miss M. L. Roxburgh, Llandudno.

It is hoped to publish next month (with her permission) the name of the first prize winner.

The Misses Rich and James have tied for the second prize ; and by the courtesy of the Editor of this JOURNAL, a year's JOURNALS will be sent to both winners.

The winning stories will be published in later issues, with the exception of the one gaining the third prize, "Courtesy in the Provinces," as this appeared (inadvertently) in the November issue of the JOURNAL.

In next month's London Telephone Service Notes will, in all probability, be given a report of the meeting of the Telephone Staff Hospital Collections (in connexion with the Hospital Saturday Fund) to be held on Jan. 25—after these notes go to press.

The exact amount subscribed by the Telephone staff is not yet known ; but we are assured that we have attained to—and passed—the ambitious amount which Mr. Preston had hoped to reach before his retirement, viz., £2,000. We congratulate Mr. Preston, the Honorary Secretaries, the Fund, and ourselves !

The Gentle Sub.

If it were not for fear of shocking the London Telephone Service until the very plugs trembled in their sockets, we would boldly assert that the natural enemies of telephonists are subscribers. We know this is directly contrary to all the teachings and tests and rulings which have been instilled in telephonists since their first awe-inspiring day at the Schools ; but it is true, and the subscribers have only themselves to blame. If a subscriber gets a wrong number, or is rung in error, he has the whole of the Press in which to make his complaints to the world, and legions rise to support him. It has just occurred to us that *we* have got, at least, a *Column* of publicity, and it will do us good to voice those thoughts which we have to suppress underneath a suave rising inflection, a cooing invitation to "call again," when we are simply bursting to consign the callers to nether regions.

We may have bones which are long since dead to the weight of a transmitter—and they *do* become heavy by the end of a day—and ears whose cartilages resemble the tracks of a scenic railway—but we still have feelings.

We are told to enunciate clearly and distinctly ; if we do not, there is an irregularity up against us. We are impelled always to employ a tone of voice which shall be gentle, tasteful, sympathetic, inviting trust and confidence. We must always forbear and make things generally easy for subscribers. We are taught this, until it becomes second nature to us. But what of the subs ? Who is to teach them ? Who is to bring them to book and make them have just a little regard for the telephonist attending their lines !

We maintain that we are entitled to as much consideration as they.

Heads of firms—the real owners of the telephones—are invariably polite and considerate. They speak in cultured tones and restore the receiver with a gentle movement which does not leave us with splitting headaches for the rest of the day. We are mutely grateful to those of this kind and would slavishly wait upon their signals and call them for numbers in a frenzied effort to show our appreciation. A telephonist *loves* a kindly subscriber with that impersonal love which is permitted by a genial department. It is the minions we are up against and would wage war upon. The "cheeky" office boy who says, truculently, "Er you goin' ter gimme my number, Miss ? Sorry to disturb your nap." The pert office girl who yells out a number in a shrill voice miles away from the telephone, or with her mouth full of hairpins—if some inconvenient person wants a number whilst she is engaged upon her toilet—and rudely tells us to "wake up" if we repeat the wrong number.

The haughty typist who declares she is the Duchess of Goodness-knows-where, and threatens to report us every five minutes, and assumes a tone which no Duchess of our English aristocracy would ever dream of using.

The hateful "New Rich" who tells us if it "wasn't for the likes o' me, you young wimmen wouldn't be wanted for your jobs."

The shrewish women who grumble and complain the minute they lift the receiver.

The foreigners of every nationality upon earth, who speak their own particular idea of our language and then demand to know if we do not understand English.

The old gentleman who barks at us ; the men in a hurry who gabble, the men with a nasty wormy slur in their voices who always seem to imply something far more than the number they ask for—Ugh !

The P.B.X. telephonist who has a little learning and never omits to expound it. . . .

Through it all, we have to sit almost like divinities—never giving way, never relaxing our attitude of meek and smiling efficiency. Always straining, straining to listen, to catch the barely muttered phrases, to repeat them correctly, to guide these peevish clients of ours through the mazes of their own pitfalls.

Oh, to the Outer Limbo with the lot of them !

Psychologists would say this is a very unsuitable atmosphere in which to work ; but—"ours not to reason why." If this *should* happen to catch the eye of a subscriber, please, *dear* man or woman, *do* try to speak clearly and distinctly to us, and *always* adopt a kindly tone. It makes *such* a difference. Besides, *we* have to do it or——

It is good to let off steam and we feel much better now, thank you.

DOROTHY TURNER.

"The Open Window."

DEAR EDITRESS,—I am very glad that you have opened the windows of your column for the ventilation of this very controversial subject.

I am greatly obliged to your correspondent, "Stiff Neck," for her valiant defence of the sterner (?) sex, though it is black shame to us that she should have to stand up for us, in either sense ! ! I am carefully keeping her breezy contribution in the hope that it may prove sufficiently reviving to one of our fresh-air enthusiasts some cold, foggy morning, and so save the rest of us from pneumonia, bronchitis, and all the other cheery concomitants of the ever-open window.

Civilisation, with all its boasted progress, does not seem to have advanced very far in this direction for thousands of years. Probably, Noah had just the same difficulty in gaining unanimous approval as we have. I wonder how he fixed up matters between the Polar Bear and the Salamander ? Poor old Noah !—and he had only *one* window to do it all with !

But, seriously—and this really is a very serious matter—what is to be done about it ? Are we *all* to die of phthisis, pneumonia, asphyxia, and all the rest of the Medical Dictionary, before we qualify for our pensions ? We might, indeed, say then that the case is summed up in the familiar words :

"Those glories come too late
That on our ashes wait,"

and since it seems that 50 per cent. of us will die if a window is opened, whilst the remaining 50 per cent. (I hope my arithmetic is correct) will die if one is closed, perhaps the problem resolves itself into the determination as to which of us is the fittest, and, so, entitled to survive ; and the settlement of this point might, perhaps, be entrusted to a super-sub-committee of the (un) Departmental Whitley Council for their wait-y deliberation.

Before taking such extreme measures, however, it may clear the air a little (and it seems to be somewhat foggy) if I briefly recapitulate the rules which appear to be at present in force regarding ventilation, and it may be that some of your correspondents will be able to suggest some improvements which would save us all from an early demise.

From years of observation, the rules seem to be as follows :—

(1) With cold, biting, north-east winds, open all north-easterly windows, and all doors.
(2) When the temperature is 90° in the shade, close *everything* tightly, and turn on all radiators, &c., to the full.
(3) In a London Particular, open windows until the room is lost in impenetrable darkness ; then close, in case it clears outside.

There are, of course, others—but they are all variations of the above, and I have already trespassed too long on your time, and on your space—so I will hastily bow myself out, and subscribe myself.—Yours sincerely,

"A. TISHOO."

Will the author of "If"—a Parody, published in the October JOURNAL, please communicate with the Editress at the address given below.

Contributions to this column should be addressed : THE EDITRESS, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

WIRELESS TELEPHONE BROADCAST RECEPTION: THE FACTS.

BY B. S. T. WALLACE (*Central Telegraph Office*).

THE promise of broadcasting was honoured with more attention by the daily press than is usually accorded an innovation. Before any scheme was formulated, columns of descriptive matter and long technical articles were published daily. Broadcast programmes have been transmitted nightly from London, Birmingham and Manchester for some weeks past, and barely more than mention of it has been made by the newspapers. It must not be inferred from this that the subject is merely a seven days' wonder soon to be forgotten. Fleet Street had seen the American papers with their columns of radio copy and formed the erroneous conclusion that history would repeat itself in England. We are slow and sure, and learn from other people's mistakes. Instead of the hopeless chaos prevailing in America, it has been the endeavour of the British authorities to provide for high-class transmissions free from interference. This has necessitated the

imposition of restrictions not, *so far*, enforced in the United States, and consequently development over here will be more gradual.

The appeal of wireless telephony is widespread. Thousands of old and lonely people have already, by its aid, been given a new lease of life, and as a cure for fractious children it has no equal. It will prove to be a medium for education even more than for entertainment. Every programme from Marconi House contains a lesson in perfect speech and faultless song. Ideas are more easily absorbed from the spoken word than the printed letter, and the long-familiar phrase, "I saw it in so-and-so," will gradually be replaced by "I heard it over Radio."

A large number engaged in the Telegraph and Telephone Services will, no doubt, feel morally compelled, owing to the competitive interest of less technically-minded neighbours and the urgent entreaties of the younger generation, to take some practical interest in the reception of the broadcasted programmes. To say that valve apparatus can be operated without any technical knowledge is only half the truth; the knowledge and experience are required as soon as a fault develops, which in valve sets is quite certain to happen sooner or later. Perhaps the most useful service will be rendered by indicating a few of the causes of failure, and other pitfalls.

The most likely trouble to appear will be a continuous scraping and crackling sound accompanied by weakening or total loss of signals, due either to a fault in the high-tension battery, or in the transformer or headgear.

The high-tension battery of from 40 to 80 volts is composed of tiny dry cells, usually made up into blocks of eleven or more and sealed with pitch. The little cells are liable to break down unexpectedly owing to irregular chemical action, and the failure or partial failure of one cell, will put the whole receiver out of action. The difficulty, of course, is that the unsophisticated operator has no means of testing his dry battery. It can only be done with satisfaction by means of an accurate voltmeter (an expensive instrument) and a knowledge of what voltage each individual cell or complete section should read when in good condition. A bad fault may be indicated by a drop in voltage of only one in twenty. Another way of testing the battery would be to substitute one known to be perfect. Certain transformers and and the telephone headgear are wound with many turns of wire, finer than a hair. This wire is mechanically weak, and when used in high-tension circuits, is liable to perish from a variety of causes that are still under investigation by the manufacturers. The result is either a complete, or an intermittent disconnexion; a most baffling fault to meet.

If one earpiece of a double headgear becomes disconnected, signals are still received though weaker and accompanied by scraping noises, and a fault in the telephones is about the last thing suspected. Continuity can be tested for by a battery and sensitive galvanometer. This is not entirely satisfactory and might fail to reveal a high resistance fault, where the wire is on the point of breaking or is broken intermittently. Resort must be had to a Wheatstone bridge or a low reading milliamp meter and known voltage, all beyond the scope of the man in the street.

There are other causes of breakdown in valve circuits, many of them an almost hopeless task to find and rectify without considerable experience. Accumulators for heating the valve filaments are spoken of quite casually, whereas they are really the greatest bugbear in connexion with this type of receiver. They soon give trouble if not kept in condition. This necessitates charging every two or three weeks, and the use of an accurate voltmeter for checking the condition of each individual cell. Cheap low resistance voltmeters are unsuitable. A moving coil instrument with a resistance of at least 100 ohms per volt should be used, and the voltage measured with the valves alight. It is not at all an easy matter to get accumulators reliably charged. It is not a paying proposition unless done on a large scale. Many garages do it in a haphazard sort of way by holding the accumulator till a dozen or more of all shapes, sizes and conditions, are ready for charging, with the result that the receiver is out of action for a week or more and the cells probably only half charged when returned. More often than not there are no facilities for charging within a reasonable distance, especially in localities where direct current is not available. Unless money is no object, charging from the house supply is equally hopeless. The valve itself, skilfully used, may last for many years; carelessly handled, not many minutes.

The advent of broadcasting has revived the utility of the crystal detector, and much apparatus employing this device is being marketed. At its *best* it will enable good enjoyable music to be received within 40 or 50 miles of the proposed broadcasting stations. Some difficulty is likely to be experienced with the detector, owing to the great bulk of them being very badly designed, necessitating too much "fiddling about" in the adjustment. The tuning in the cheaper sets is usually done with "sliders," a device moving along a metal rod and making contact with a coil of insulated wire which has been scraped bare in the path of the contact. This system should be avoided, as it is liable to give trouble in a variety of ways. It has the sole merit of being cheap and easy to make.

For the reception principally or solely of the broadcasted music, crystal receivers are recommended, with these reservations :—

Do not purchase an instrument until an opportunity has been given to hear the actual broadcasted music on it, preferably at one's own distance from the broadcasting station.

Avoid all forms of sliding contacts and choose stud tappings or variometers for tuning.

Put the detector out of adjustment to ascertain the ease or difficulty with which it can be readjusted.

The illustration shows a crystal receiver designed by the writer especially for the broadcasted music. The circuits are arranged to compensate for any variation in aerial length between 20 ft. and 150 ft. or more, in view of a possible increase in size of aerial that may be permitted in the future. The correct adjustment of the detector is obtained automatically with facility and certainty by the simple turning of an ebonite thumbscrew, working in conjunction with a special spring device. In practice, readjustment is very rarely needed. On this set, the experimental broadcast transmissions from Marconi House are received clearly on headgear at a distance of 40 miles, and with the Brown microphone amplifier shown in the illustration operating on 6 volts with dry cells, the music is pleasantly reproduced on a loud speaker within a radius of 10 miles. These distances apply with an average good aerial, such as can be arranged with a 20-foot bamboo on the house, and a 50 ft. to 100 ft. length of wire down the garden.

Near the transmitting station crystals can do very well on an inside aerial. A recent test was made on an aerial built in the attic of a small undetached suburban house situated 12½ miles from the above-mentioned station, and made up of twelve short lengths of wire disposed like the ribs of an umbrella. All speech and music was sufficiently loud and clear to be quite enjoyable in three pairs of headgear. Other stations that can be taken on this receiver using a P.O. 100 ft. aerial, are the leading amateurs—some of whom transmit very creditable music, the 600-metre ship and coast stations within a very wide area, and the aircraft telephony ground stations. A very simple modification would intercept Paris time signals. Very little interest is likely to be taken in Morse when the full broadcast programme is working.

It may here be pointed out that providing the apparatus is in order, transmission and reception by wireless telephony is better in every way than ordinary line telephony can ever hope to be, and the reproduction of the human voice and tones of musical instruments, far more perfect than by any other means.

The two methods of reception with either *at its very best* can be summarised as follows :—

Valve apparatus is capable of receiving broadcast telephony at distances up to 1,000 miles, and if required, of amplifying it sufficiently to be audible throughout a large building. Such performances require expert knowledge and wide experience. In its simplest form technical assistance is sure to be required at some time or other. There are appreciable running costs.

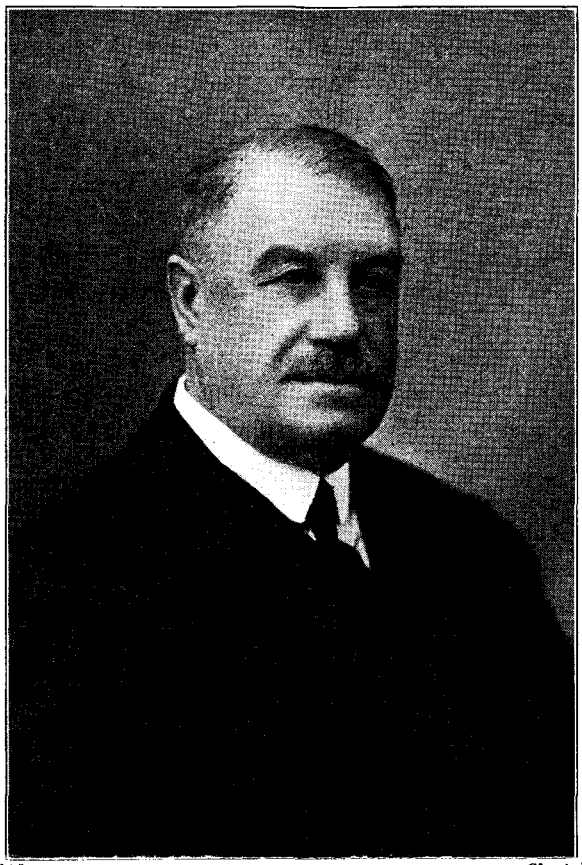
Crystal reception of this telephony is limited to about 50 miles. It is exceptionally clear and pure in tone, requires no technical skill to manipulate, and there are no upkeep expenses. Valve amplifiers can be added subsequently if desired. There is no better way of making a practical study of wireless than commencing with a crystal receiver, afterwards adding a low-frequency note magnifier. It is the simplest form of valve circuit to experiment with. Other circuits can be followed up much in the same way as given in the excellent series of articles appearing elsewhere in these columns.

GEORGE FREDERICK PRESTON.

IF the question were asked what is the most harassing and thankless post in London, a fair reply would be "The Controllership of the London Telephone Service," involving as it does such heavy and wide responsibilities. It is not necessary to enumerate them all, but much imagination is not required to realise what they are when it is remembered that the position includes the control of a staff numbering between eight and nine thousand. In addition, there are the accounts of some 160,000 subscribers to be kept and rendered, and the new Directories to be compiled at stated times. Moreover, the Controller has to be continually investigating new methods of improving the Service, while at the same time keeping a close watch on economy. Also it must not be overlooked that he is always at the call of any subscriber who may not be satisfied with the attention received and even at night he may be and is called up. But, onerous as the duties now are, it is doubtful whether they will ever again be as difficult as during the past 22 years, for this period covers the early days of the Post Office Service when competition existed with the National Telephone Company's system.

Then after about ten years of these conditions followed in 1912 by the amalgamation of the Post Office and National Telephone Services, an event fraught with many and complex problems and necessitating the rebuilding of out-of-date exchanges. It involved also the correction of areas and the transfer of subscribers from one exchange to another. After that, the Great War, causing terrible depletion of trained staff, enormous demands on the Service from other Government Departments, and shortage of new material of every description. But now the work in arrears has been made up, new exchanges have been opened, rates have been adjusted, the Toll Service has been initiated, and London has a Telephone Service second to none in the world. During all these years the Service has been under the guidance of G. F. Preston, General Manager, from 1901-1912, Controller from 1912-1923. Mr. Preston had had valuable experience in his earlier life, for in 1880 he joined the Metropolitan Brush Electric Light Company, and subsequently entered the service of the London and Globe Telephone Company,

whose business was taken over by the United Telephone Company. After serving with this Company for some time, he went to the Northern Telephone Company with which he remained till 1891.



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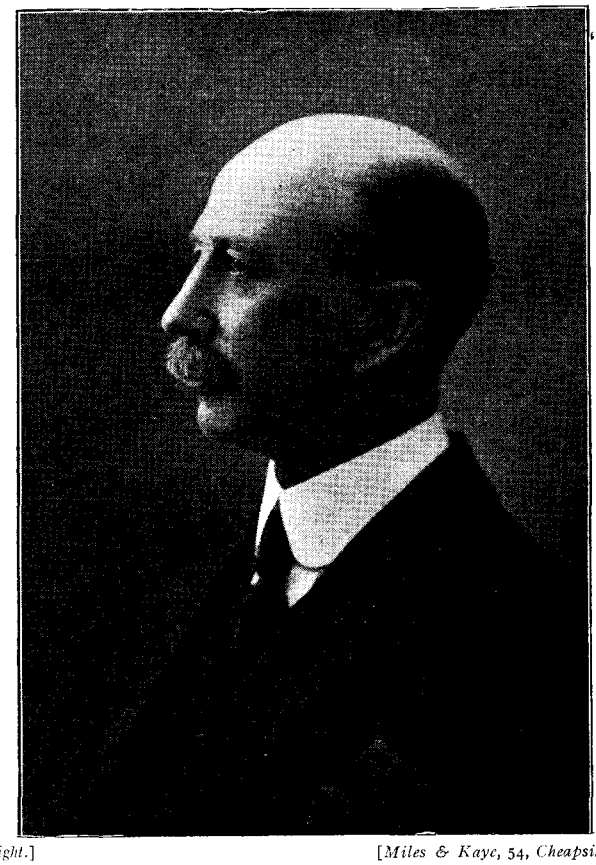
MR. G. F. PRESTON, C.B.E.

When the Northern District Telephone Company was absorbed by the National Telephone Company, Mr. Preston was transferred to the management of the Sheffield District, and was subsequently appointed in 1896 to be the Superintendent of the Southern Province. It was while acting in that capacity in 1901 that he was offered and accepted the position of General Manager of the Post Office London Telephone Service then about to be started. Mr. Preston thus brought with him a wide experience, but more than that, a broad vision and a dogged determination to make the Service a truly public one and one worthy of the Empire's capital. His quickness in detecting weak points, his readiness to adopt new ideas, his geniality, his ability to deliver an appropriate speech on any occasion, his love of sports, in some of which he still takes an active part, are all indicative of the man. But he needs no words of praise, for his record stands and his name will always be associated with the London Telephone Service for which he has worked so hard and to which he has devoted the best years of his life. *Ave et Vale.* L. A. P.

THE NEW CONTROLLER OF THE LONDON TELEPHONE SERVICE.

THE Postmaster-General has appointed Mr. W. A. VALENTINE, Controller, in the place of Mr. G. F. Preston, C.B.E., who retires. Mr. Valentine has had a long experience of telephone work. He has risen through various grades of the National Telephone Company to the rank he has now attained. At the time of the transfer he was District Manager in charge of Glasgow. In a few months he became one of the three officers who held the position at headquarters of Provincial Superintendent. His colleagues were Mr. Dalzell, now Director of Telegraphs and Telephones, and Mr. John Scott, now Postmaster of Birmingham. The functions of the Provincial Superintendents were advisory in order to help over the transition stage and when a more definite organisation was constructed Mr. Valentine became Deputy-Controller of the London Telephone Service. From the point of view of one who had spent his life-time in the Post Office service



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MR. W. A. VALENTINE.

and was thrown into intimate relations with the three Provincial Superintendents, it was a great gratification to find how wide a vision they exercised and how carefully they thought of all the various considerations to be taken into account in adapting the Telephone Service to its new conditions.

Attractive in personality, clear in judgment and sensitive to the influences on character which any large organisation is bound to exercise, he will continue his wide outlook on men and affairs and seek a progression in efficiency which is founded upon those personal relations which are strengthened by mutual confidence and enlightened by wide-reaching discussion. It will probably be his lot to be at the head of the London Telephone Service at the period of its greatest growth, and he will meet that growth with a conception of public service which takes no narrow vision of duty and is never indifferent to opportunities as they may present themselves of developing the dependence of the public on the means of communication for which he is responsible. In the present days of readiness on the part of the public (and of that portion of the articulation of the public which falls to the newspapers) to criticise all efforts which are made by public departments, Mr. Valentine will be found as ready to learn as he is to defend. Such criticism is often mixed of diverse elements. There is in it at times a substratum of truth from which lessons in administration can be learned, and it is not always wise to take up an attitude of resentment. At the same time there are misconceptions to be cleared away and misunderstandings to be corrected. The staff may rely upon Mr. Valentine not to be lacking in his duty in these particulars. He has been associated with the direction of this JOURNAL for a number of years. In that aspect of the responsibilities which he has accepted he has been both helpful and enlightening and a sound and trusty counsellor, and those associated with the conduct of the JOURNAL hope that he will long continue to give them the benefit of an experience which is as wide as the sympathy with which that experience is invariably interpreted.

J. L.

The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

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A TELEPHONE CALL FROM AMERICA.

JANUARY 15, 1923, as Mr. Gill, the President of the Institution of Electrical Engineers, announced to the members of the Post Office Telephone and Telegraph Society of London, will be a notable day in telephone history, for in the early hours of that day, to quote Mr. Gill's words, "the first, definite, good-quality, pre-arranged telephone message from the United States" was received in London. Wireless telegraphic transmission across the Atlantic is no new thing, and we hear of possessors of wireless receiving sets in the suburbs of London listening to concerts at Schenectady, New York, but the clearly-transmitted telephone message of Jan. 15 marks a development of which no one can foretell the outcome. It clearly establishes the practicability of exchanging speech between Gt. Britain and the United States. There are many difficulties, financial as well as electrical, to surmount before a telephone service across the Atlantic can become what is termed a "commercial proposition," and indeed it may never develop to that extent; but the interchange of speech, once established, even under conditions of restriction as to its use, will make a powerful addition to the growing number of chains which bind together the people of this country and the people of the United States.

TELEPHONE DEVELOPMENT AGAIN.

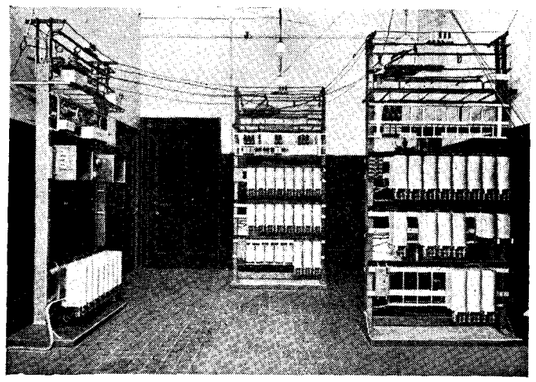
THE annual summary of the telephonic development of the world which we publish in this issue presents no novel features. It shows that at the end of 1921 there were in existence about 21,800,000 telephones in all, of which North America claimed 14,880,000 and Europe 5,560,000. It is perhaps hardly to be expected that Europe which suffered and still suffers so heavily from the war should have made any perceptible progress in the task of diminishing the commanding lead of America in telephone development. It will be seen that Great Britain just failed to reach the million in 1921, that figure being passed in the January of 1922. The year under review was, owing to trade conditions, an unfavourable one for this country, and only 11,000 stations were added, but 1922 showed a net increase of 65,000 stations, and 1923 is expected to show a gain of at least 75,000. Denmark alone of the countries of Europe has a development at all comparable with that of the United States, showing a ratio of one to every twelve inhabitants. Sweden shows no apparent progress for a well-understood reason. Duplicate connections in Stockholm have been gradually diminishing since the amalgamation of the Company's system with that of the State, and although there is probably an increase in the number of telephone users, there is an actual decrease in the number of stations.

It is worthy of consideration whether the number of telephone stations expresses the development of a country as accurately as the number of telephone lines. The former unit is that most commonly adopted in the telephone world, but the ratio of stations to lines varies considerably in different countries. In some few European states the extension stations form a third of the whole, in some a quarter, in others sixth, even less; in this country they are two-fifths, but in America the position is far different. In a New York exchange which was recently converted to automatic working, we learn that there were 7,765 extension stations to 1,088 lines, and whilst not assuming that this extraordinary ratio is typical of the whole of North America, it is certain that hotels, department stores and offices in which extension stations are counted by the hundred are common in all large American cities. It is obvious from this that to say there are 9 or 10 inhabitants per telephone in North America does not connote quite the same thing as to say there are 38 inhabitants per telephone in Western and Central Europe. There must be hundreds of thousands of telephones in America which are not installed for the use of any particular "inhabitant" but for the use of transient guests and customers, and the average of 8 persons per telephone in the United States does not therefore mean (as it suggests at first blush) that practically every head of a household is connected with the exchange system. It may, of course, be protested that an average is only an average, that in Europe also there are large hotel and office installations, that one man has a dozen or more telephones which go to improve the general average; all that we contend is that the difference between the average and the actual figure is much greater in America. We do not seek, however, to extenuate the poor development of Europe. We are well aware of the advantage both to business and to social life of liberal and adequate telephone installations in stores and hotels, and realise that their multiplication is all to the good. We know there is a great field for development in the private house telephones, and in all these directions our keenest efforts will be addressed in the coming years.

ANNOUNCING

The Invention and Development, Jointly by the Development, Research and Engineering Staffs of Automatic Telephone Manufacturing Co., Liverpool and Automatic Electric Company, Chicago of the

AUTOMATIC "DIRECTOR"



Automatic Telephone Manufacturing Co. Multi-Office Demonstration Laboratory.

For Use with Standard Strowger Automatic Telephone Equipment in Large Metropolitan Areas

The Director provides with highest efficiency and greatest economy in investment and operation, and with great flexibility all telephone traffic and service requirements of large-city systems up to millions of lines in any one exchange area.

Realizing the growing favor of Strowger Automatic for use in towns and cities of all sizes throughout the world, and foreseeing the necessity for the coming conversion of the very largest cities to Automatic, the development and engineering organizations of these pioneer automatic manufacturing companies have developed a new unit of equipment. It is built from Strowger equipment now standard for single or multi-office units in cities of moderate size, and will provide all additional functions called for in the inter-connection of a very large number of local offices. It will provide such service functions for Metropolitan Multi-office areas far larger than any known at present. This supplementary unit is called the "Director."

AUTOMATIC TELEPHONE MANUFACTURING CO. LTD.

Head Office and Works.
MILTON ROAD, EDGE LANE, LIVERPOOL.

INTERNATIONAL AUTOMATIC TELEPHONE CO., LTD., LONDON.
AUTOMATIC ELECTRIC CO., CHICAGO.

ASSOCIATED COMPANIES:
INTERNATIONAL TELEPHONE SALES AND ENGINEERING CORPORATION, NEW YORK.
AUTOMATIC TELEPHONES, AUSTRALASIA, LTD., SYDNEY.
Foreign Sales Representatives.
WESTERN ELECTRIC CO., LTD.

London Office.
60, LINCOLN'S INN FIELDS, W.C.2.

Brief Description of the
Director as applied to the Strowger System in Metropolitan Areas

Dial impulses are received, momentarily stored up and then sent out by the Director in such number and combination as are required to direct the call, link by link, over the proper trunk routes to the terminating office; and there to operate the selectors and connectors as required to establish connection with the number dialed.

With the use of the Director, the following important features are provided:—

1—It permits a numbering scheme arranged in conformity with the best trunking practice.

2—It permits of existing exchange names being retained in practically all cases.

3—It permits of large groups of inter-office trunks without additional trunk hunting time.

4—It permits of calls to particular groups of offices being routed over a common group of trunks *via* one or more manual or tandem offices without subsequent resetting of the number, traffic being routed as desired without change in the trunking scheme.

5—It provides for any number of offices as and when required.

6—It can be added to any existing two-wire Strowger System as and when required and at a reasonable cost.

7—It provides great flexibility in automatic-to-manual or manual-to-automatic service and embodies means for obtaining the usual supervision and high quality transmission for long distance calls.

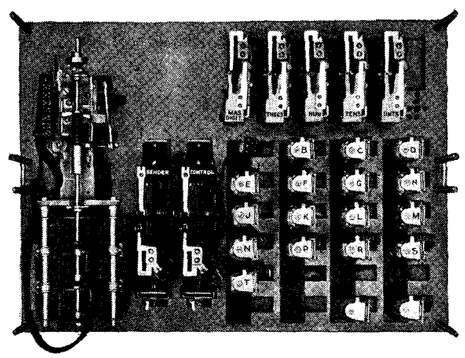
8—Its operation will meet any service charge requirements, flat-rate or measured.

9—It provides for coin collector service both prepayment and post-payment with facilities for automatically bringing in an intercepting operator on calls outside the unit charge area.

10—It provides for the monitoring of delayed calls.

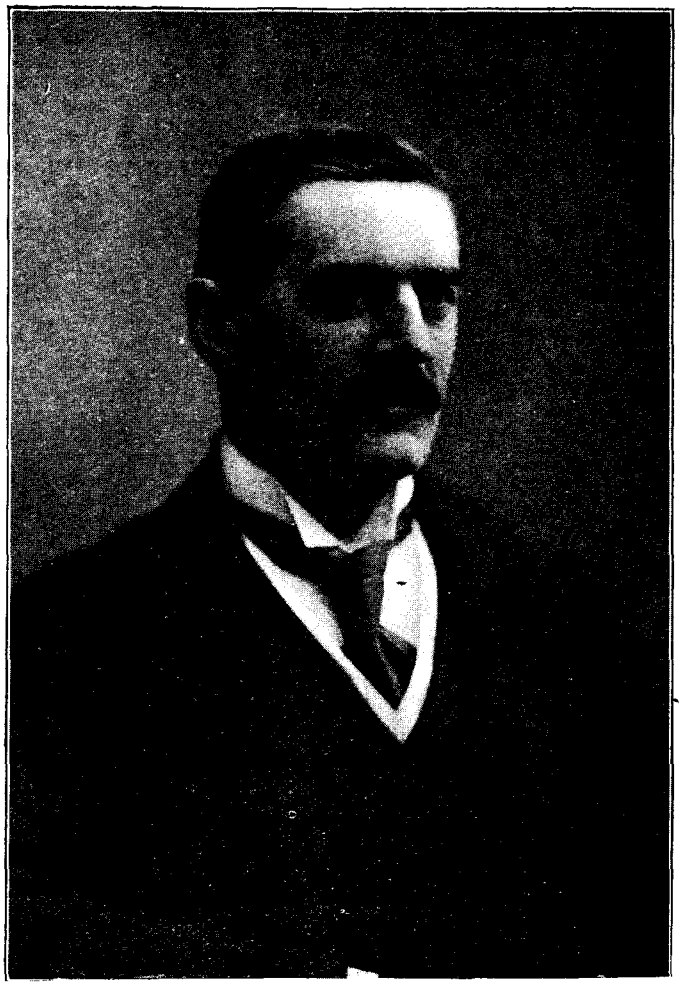
11—It permits by an economical method, the use of large groups of trunks for P.A.X. or P.B.X. users.

12—The cost of the Director is reasonable and the Director plan is entirely commercial both from the standpoint of operating costs and operating revenues.



Director Unit Ready for Mounting.

The invention and development of the Automatic Director is the greatest step yet made in the application of Automatic Telephony to the largest metropolitan areas. Its use of Standard Strowger Automatic equipment proved by years of experience and successful operation in the field, is a guarantee of its commercial practicability. Demonstrations can be made by appointment at Liverpool or Chicago.



Photograph by] [*Percy Wynn, Birmingham.*

THE RIGHT HON. NEVILLE CHAMBERLAIN, M.P.
H.M. POSTMASTER-GENERAL.

I send my hearty greetings to the Telephone and Telegraph Staff and trust that the year will bring happiness to them and increased progress in the great undertaking with which we are connected.

NEVILLE CHAMBERLAIN.

HIC ET UBIQUE.

MR. W. A. VALENTINE, lately Deputy-Controller, has been appointed to the Controllership of the London Telephone Service, filling the vacancy caused by Mr. PRESTON'S retirement at the end of last month. We refer more fully to both gentlemen elsewhere in our columns. Mr. W. H. U. NAPIER (Inspector of Telegraph and Telephone Traffic, Headquarters) becomes Deputy-Controller, and Mr. J. F. EDMONDS (Assistant Controller) is transferred to Headquarters as Chief Inspector of Telegraph and Telephone Traffic. Mr. M. C. PINK becomes Assistant Controller, L.T.S., and Mr. W. D. STEWART, Inspector of Telegraph and Telephone Traffic (Headquarters).

WE learn from the Press that the French Chamber of Deputies has negatived by a vote of 397 to 70 the proposal to hand over the State telephone system either wholly or in part to private enterprise.

AUTHORITY has been given for the opening of telephone exchanges in Kirkwall and Stromness in the Orkneys, the first to be opened in those islands. They will obtain trunk communication with the mainland, limited at present to Thurso and Wick.

WE understand that the Indian Government Telegraphs Department projects the establishment of trunk lines between Bombay and Calcutta, and Bombay and Delhi. Three or four repeater stations will be required on the former line. They are expected to be completed in about 12 months.

With regard to experiments to find out the longest distance which can be spanned by a continuous trunk line without an intermediate repeater installation, says the *Westminster Gazette*, conversations have been carried on between Bombay and Nagpur (520 miles), and Bombay and Ratlam (410 miles). Conversations over these distances was not heard distinctly enough for commercial purposes, although conversation was found possible.

The next longest distance trunk is that between Bombay and Ahmadabad, about 315 miles, and this has proved a complete success as regards distinct hearing.

A WEEKLY journal gives the following valuable "Telephone tip":—

A society friend of mine, anxious to soften the sound of her telephone bell which tinkles all day with appointments, applied to the London Telephone Service. A representative called, solemnly examined the instrument, and regretted that nothing could be done. After he had left, my friend inserted a piece of blotting paper between the bell and the connexion, and her bell now makes a delightful, soft, whirring sound

If the delightful, soft, whirring sound cannot be heard from an adjoining room the society's person's line will be reported: "No reply." Later she will protest indignantly that she was within call all the time, and an altogether abandoned Telephone Service will be blamed.

MR. J. M. KEYNES' complaint in the *New Statesman* of the abuse of the private house telephone attracted a good deal of attention in the Press. He says:—

"At no time during the day can I rely on a quarter of an hour's uninterrupted work. Any unconcentrated person who finds it easier to ring up than to write a postcard, any hostess making up her party, any American tourist to these shores who thinks he would like a few words with me, is entitled by the existing conventions, *and is able*, suddenly and at any hour, to interrupt my business and make me attend to theirs."

Much as for general reasons we desire to see an increase in residential traffic, we admit that Mr. Keynes has just cause for complaint. Indeed, it is the action of people such as he mentions which militates decidedly against the extension of the telephone amongst private people. Mr. Keynes considers that a code of manners for telephone users is required, that a stranger should have no more right to use the telephone of a private house than to open the front door, and that it should be bad manners, except amongst intimate friends, to issue an invitation on the telephone, which gives the guest no time, without apparent rudeness on his part, to consider whether he is really free, and whether he wants to accept.

The *Daily News* cynically suggests that a simple remedy is to hang up the receiver and let the telephone operators bear the blame for the interruption of speech.

A COLLABORATOR has been moved, not so much from a desire to burst into song, as with the aim of rendering mnemonic assistance in a good cause, to indite the following:—

CODE OF TELEPHONE MANNERS.

Use not thy telephone to thrust
Thy personality
Impertinently through the crust
Of English privacy.

Thou wouldst not suddenly intrude
In inner chambers where
Celebrities sit coy and brood—
Unless first bidden there.

Thou wouldst not force an office door
To interrupt a friend
In private converse, like a boor,
To gain some instant end.

Why then thy telephone employ
With underbred insistence,
And Publicists or Peers annoy
In safety from a distance?

No; in the interests of the famed
(And not for them alone)
A Code of Manners should be framed
For those who telephone.

Thou shall not wantonly ring up
A stranger to divine
His views upon the Football Cup,
The Ruhr or Palestine.

No Scribes or Statemen shall be vexed
In their exiguous ease
To make a fourth at Bridge, perplexed
By sudden messages.

Bishops thou shalt not take to task
For dicta on Divorce,
Nor noble race horse-owners ask
The odds upon a horse.

Nor beg a Dean, a gloomy one,
Decide: "Should Cousins Kiss?"
For who can solve by telephone
Conundrums such as this?

Thou shalt not urge that Bonar Law
"Tranquillity" define,
Nor seek to know of Bernard Shaw:
"Is Drama in Decline?"

The telephone to men of sense
Has proved a constant aid.
'Tis not a crude impertinence
'Tis not a weapon of offence
And should not so be made.

W. H. G.

GENERAL FEATURES OF THE ANGLO-CONTINENTAL TELEGRAPH SERVICE SINCE THE WAR.*

By J. J. Tyrrell.

I have met with two difficulties in writing this paper. They are:—(1) the superabundance of material, and (2) the difficulty of writing of post-war matters without touching the war period. In the case of the latter there is no clear cut line of demarcation between the war and peace periods, and one is forced to touch upon the war and even pre-war events to obtain the correct perspective. This paper, then, practically amounts to a continuation of that which I had the honour of giving before this Society in March, 1914.

To open my subject intelligently one must perforce first give a rapid review of the actual war conditions, as those conditions affected Anglo-Continental communications. Had anyone conceived a contempt for the importance of Anglo-Continental telegraphs *prior* to the war, that contempt should surely be replaced by respect in 1922. The enemy at any rate did not so under-estimate its potentialities, as his fairly frequent night visits to the neighbourhood of St. Martins-le-Grand very clearly indicated. On separate occasions bombs were dropped to the north, the south, the west and the east of us, and finally struck us, though not fatally, one beautiful Saturday morning, July, 1917.

In order to epitomise the history of the war period, the following C.T.O. War Calendar will give a condensed history of the fateful four years.

War Calendar of Events directly affecting British Telegraphic Communications with Europe.

July 28, 1914.—Austria declares war against Servia.

„ 31, 1914.—Germany cuts Indo-European Company's telegraph lines with Karachi. Provisional censorship instituted in London.

Aug. 1, 1914.—Germany declares war on Russia and on France.

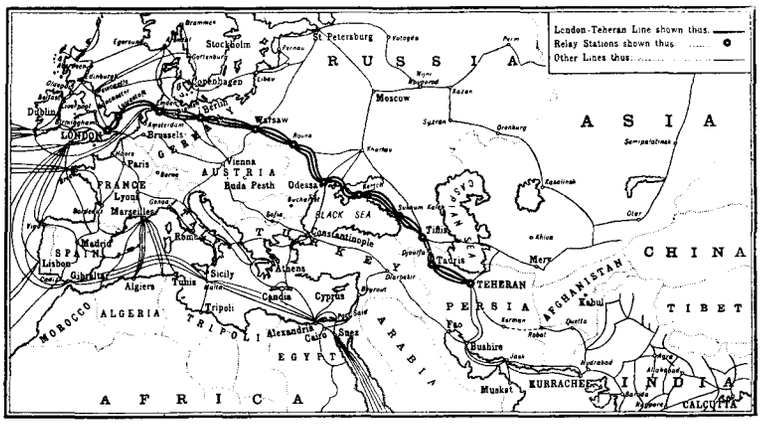
„ 3, 1914.—Telegraph and telephone communication between Germany and Belgium cut. Censors installed in Cable room.

„ 4, 1914.—8.46 p.m.—Following telegram received from Berlin:—"German Embassy, London. English Ambassador just demanded his passports shortly after 7 o'clock, declaring war.—Jagow."

„ 4, 1914.—9.40 p.m.—Working of all wires to Germany ceased. 10.30 p.m.—Berlin requested London to reserve a wire for diplomatic correspondence. This done, but 11 p.m. (London time) no further communication from German side. War commenced.

* Paper read before the London Telegraph and Telephone Society, Dec. 18, 1922.

The censorship mentioned under date Aug. 3, 1914, was extended to all the telegraph companies whether working cables to Europe or elsewhere, so that the Great Northern Telegraph Company, with its ramifications in Norway, Sweden, Denmark, Russia and beyond; the Eastern Telegraph Company with its European and world-wide network, as also the American Cable Companies, were all placed under military control.



Map Showing Indo-European Telegraph Co.'s Line.

The Indo-Telegraph Company's circuits, as you will have noted, were cut by the German Authorities some few days before war was actually declared, thus severing important communications with Russia, Persia, and India. These wires passed through Emden and Berlin, and had always been carefully watched at the latter two points, as anyone interested would have easily noted when visiting these German offices. I think the circuits are the longest Wheatstone circuits in the world and, when on occasions, one of them has been extended to Calcutta, it has successfully worked through nine repeaters. The section between Warsaw and Teheran has recently been restored and we are now waiting for the restoration of the remaining section between Warsaw and London. The route of these lines is a very interesting one and passes through Lowestoft, Berlin, Warsaw, Odessa, the Crimea to Kertsch, thus by cable to Jaman in the Caucasus, to Tiflis, Tabriz and to Teheran. Here the Indo Companies and the British Indian Government staffs are in the same office and here, too, the Indian Government takes over

View of Cable Room, C.T.O. London, Looking South.
(Dutch, Belgian and German circuits.)

control. This diary of the foreign section of the Central Telegraph Office, known as the Cable room, is the diary of the ebb and flow of the Allies' fortunes. This view gives a rough idea of a portion of the room in question. The severance of telegraphic communication between Germany and America, the abandonment of Brussels, the removal of the French Government to Bordeaux, the laying of a new cable giving communication between London and Nantes to meet this new situation and its possibilities, the interruption of the London-Antwerp circuits, the laying of another new cable giving communication, this time between London and Dunkirk, the return of the French Government to Paris because of the improved military situation and with this return the re-allocation of emergency circuits, all were bound up with the magnificent work of the engineers of the British Post Office and their struggles to maintain communication between this country and the continent.

It is probable that the Press of this country were vaguely aware of something in the nature of cable laying, about this time, but whatever it may have been it resulted in a ludicrous report that the enemy had been

GERMAN CABLE STEAMER "STEPHAN" LAYING THE SHORE END OF THE MUNDESLEY-NORDENEY CABLE 1913.

laying secret cables on the East Coast. I have not the cutting at hand but one imaginative journalist pictured a Teutonic boat laying a "secret" cable on Mundesley Pier. Those who know Mundesley will appreciate the exactitude of the information and the wonderfully imaginative details of the landing place! The picture which follows will enable the reader to appreciate how much secrecy there was in the whole of the proceeding, which took place of course before the war, the German Government manufacturing and laying the cable by agreement with the British Government and the latter paying their quota of the cable cost. In the offing is seen the German cable ship *Stephan*, date 1913. From this photograph we can readily estimate the chances of enemy craft landing a deep sea cable in war time on an *enemy* coast without being detected.

WAR CALENDAR 2.

Aug. 5, 1914.—*Before dawn*: German cables to America cut in English Channel.

„ 20, 1914.—Brussels abandons chief telegraph office as enemy approaching, communication cut to Paris.

„ 30, 1914.—All London wires to Paris *via* Boulogne and Calais interrupted.

Sept. 3, 1914.—French Government removed to Bordeaux.

„ 16, 1914.—New cable laid from Beachy Head to Nantes.

„ 27, 1914.—Communication with Paris, *via* Boulogne and Calais, partially restored.

Oct. 8, 1914.—Communication with Antwerp ceased.

„ 10, 1914.—Dover - Dunkirk cable laid.

Jan. 19, 1915.—Cable ship *Colonia* completed laying of Anglo-Russian cable.

„ 28, 1915.—Anglo-Russian cable opened for traffic.

Jan. 17, 1916.—New six-core cable laid to France *via* Dungeness and Gris Nez.

July 18, 1917.—New Anglo-Canadian (London to Halifax) cable opened for traffic.

July 7, 1917.—C.T.O. bombed.

Sept. 6, 1917.—New Cuckmere-Havre cable laid.

Nov. 11, 1918.—Armistice.

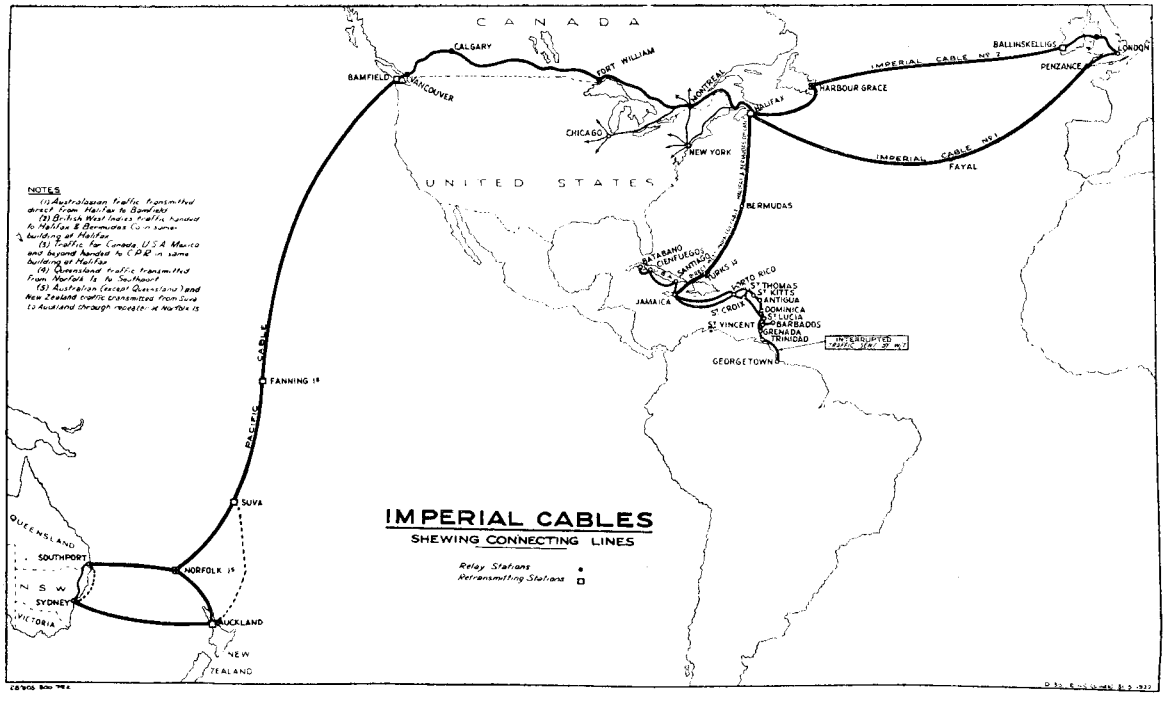
1915 opened with one of the finest of the many fine feats performed by the engineers, the laying of the Anglo-Russian cable, ably aided by experts loaned by the Eastern Telegraph Company. The cable was worked for the remainder of the war period by the Eastern and P.O. staffs, the British staff controlling both the Russian and the London ends and initiating the Russian telegraphists into the technicalities.

In 1916, owing to the need for more communications with France, the P.O. engineers laid yet another new cable, this time a six-core length between Dungeness and Gris Nez. It is obvious that these feats could not have been performed without the aid of our Navy, and if anyone needs excitement let him try cable-laying and repairing in war time.

Here in England the same year you will recall that we were visited by one of the most severe snow storms which have ever struck our communications, uprooting literally thousands of poles all over the country. These were not very easily replaced, but despite a depleted staff the more important circuits were again working in a few hours, or special arrangements were made, as in the case of the Anglo-Dutch circuits, to work the cables themselves from the nearest coastal point.

1917 saw the laying and installation of the first Government-owned Trans-Atlantic cable, London to Halifax. This cable, as is known, was actually a war-prize. It is marked on the map as Imperial Cable No. 2. Imperial Cable No. 1 is the ex-Direct United States cable which was purchased from the company after the war. The eastern end of the latter has now been brought round from Ballinskelligs to Penzance as a more convenient and economical cable station. During the war, therefore, and under super-difficulties, an all-red route across North America to New Zealand and Australia was thus actually realised. Contracts are at the moment out for the manufacture and laying of two additional cables between Suva and Auckland, and Southport and Sydney, as shown on the following map by the dotted lines. The use of a submarine cable to cover the *land* distance between Sydney and Southport is due to the instability of the land route owing to physical difficulties. The respective lengths of these two cables are 1,313 and 539 nauts.

The same year saw a third new cable laid to France owing to the needs of the American Military and Naval Forces, viz., one from Cuckmere (Sussex)



to the Port of Havre. The event of July 7, 1917, has doubtless not escaped the attention of my audience, and as a memento of that occasion, photographs were taken by one of the C.T.O. staff not very long after the bomb fell through the roof and were reproduced in the pages of the T. AND T. JOURNAL. The time between the departure of the last member of the female staff from the damaged section of the building and the falling of the bomb was only measured by a few minutes.

The following tables will give some idea of the variety of circuits which were maintained for military, naval, transport and diplomatic purposes :—

LIST OF CROSS-CHANNEL WAR EMERGENCY LINES UNDER CONTROL OF THE CABLE ROOM, C.T.O., 1914-1922.

Description of Line.	Date of Opening.	Date of Closing.
Admiralty—Paris Marine	Aug. 8, 1914.	Sept. 18, 1914.
„ Bordeaux Marine	Sept. 19, 1914.	Dec. 7, 1914.
„ Paris Marine	Dec. 7, 1914.	Sept. 1, 1919.
„ Dunkirk	Oct. 5, 1914.	June 1919.
War Office—Paris Guerre	Aug. 9, 1914.	Sept. 2, 1914.
„ „ Havre	„ 10, 1914.	„ 14, 1914.
„ „ Le Mans	Sept. 9, 1914.	Dec. 5, 1914.
„ „ Dunkirk	Oct. 1, 1914.	Oct. 14, 1914.
French Embassy, London—Paris Affaires Etrangères	Aug. 12, 1914.	Sept. 4, 1914.
„ „ „ Bordeaux „	Sept. 4, 1914.	Dec. 9, 1914.
„ „ „ Paris „	Dec. 9, 1914.	Sept. 2, 1919.

Direct wires from the British Admiralty, War Office and French Embassy in London, were respectively connected with the French Admiralty, the French War Office, and the Quai D'Orsai in Paris, in the very early days of August, 1914. Owing to military pressure upon the French capital, the French terminals of these circuits had to be extended to Bordeaux less than a month later.

The tide of battle swinging for a while in favour of the Allies these communications were again restored to Paris in December of the same year.

WAR EMERGENCY, No. 2.

Paris—Antwerp *via* London	Aug. 25, 1914.	Sept. 2, 1914.
War Office—Boulogne	Oct. 7, 1914.	June 1914.
„ „ Abbeville	„ 7, 1914.	Oct. 1, 1918.
„ „ Ostend	„ 8, 1914.	„ 13, 1914.
„ „ G.H.Q., France	„ 9, 1914.	June 1919.
„ „ Havre	„ 11, 1914.	Oct. 15, 1919.
„ „ G.H.Q., Folkestone	Nov. 30, 1914.	Dec. 15, 1917.
„ „ Rouen	Dec. 5, 1914.	June 13, 1919.
„ „ Dieppe	Jan. 2, 1915.	Feb. 11, 1917.
„ „ Etaples	July 16, 1916.	Dec. 15, 1916.
„ „ *Calais*	Feb. 4, 1917.	„ 4, 1919.
„ „ G.H.Q.A., 2nd wire	April 1, 1917.	Nov. 1, 1919.

On Aug. 25, 1914, the lines between Belgium and France were cut, but a circuitous line was made up from Paris, *via* Calais, Dover, London and Ostend to Antwerp. This was interrupted by the capture of the Belgian Port on Sept. 2, 1914. It is a curious piece of war history, but despite the devastation of Belgium and its over-running by the enemy, and although only by one very slender thread, practically, telegraphic communication by cable between London and Belgian territory existed right through the war. To be exact there was one small office, the Furnes cable hut on the Belgian coast, with which we were always in telegraphic touch night and day. This little spot was repeatedly bombed from above and bombarded from the sea but the Belgian telegraphists never budged.

In addition to the War Office connexions just shown we were frequently switched through to our own various armies in France, and at times in Italy. Not infrequently the French H.Q. needed us, and occasionally the Italian. Here are a few more circuits :—

WAR EMERGENCY, No. 3.

War Office—Wimereux	Oct. 1, 1918.	Mar. 10, 1919.
Newhaven—Boulogne	Aug. 9, 1914.	Sept. 29, 1914.
Southampton—Havre	„ 9, 1914.	„ 5, 1914.
C.T.O. (Cable Room)—Nantes	Sept. 16, 1914.	Jan. 13, 1920.
„ „ „ Dunkirk	„ 25, 1914.	Aug. 20, 1920.
„ „ „ Furnes	Oct. 15, 1914.	April 1919.
„ „ „ Alexandrovsk ...	Jan. 28, 1915.	Still in service.
„ „ „ Grand Quartier Générale Française	Sept. 24, 1916.	July 1919.
American H.Q.—Havre—Paris—London 5 lines	Dec. 16, 1917.	July 1919.

It was through these various circuits that, day and night, the details of the departure and arrival of transports and hospital ships were announced, and over these lines for hours together high-speed Wheatstone mercilessly chattered out its long lists of torn and shattered humanity, to the monotonous tune of human agony.

It was through these same media that, despite all the stress and imperative needs of the war itself, officers and privates alike were brought home for a few brief days on special leave on account of matters of urgency at home, sometimes in as tragic circumstances as those obtaining in the fields of France. By the middle of 1917 there was an immense increase of traffic largely due to the activities of the United States, so that by mid-December there were five direct lines from the American Headquarters in London with Havre and Paris.

The hurried recitation of these facts brings me to the main theme. The mere naming of these circuits may not convey much to the man in the street. He is not in a position to realise that, during the whole period of stress and strain, private and civil needs were by no means neglected. It is true that anything in the nature of a privately worked telegraph circuit abroad was taboo, but the Press, those gentlemen of short memories and ungrateful hearts, were still able to publish their simultaneous editions in two countries and on two Continents, thanks to the labour, the devotion, the skill and the doggedness of those "terrible people" the Government officials, for the most part, humble men and women telegraphists.

As a supplement to the war—emergency lists—the following is a record of ten more interesting circuits which again show how closely European and our national history were still bound up with G.P.O. West, at what may be termed the armistice stage of relationship with the Continent.

C.T.O. (Cable Room)—Paris Hotel Astoria	Dec. 14, 1918.	Dec. 6, 1919.
Ministry of Commerce, London—Paris ...	Feb. 19, 1918.	Sept. 20, 1921.
London—Cologne Civil Office ... ... *Via* Military line through France opened for telegrams to civilians in German territory occupied by British.	April 16, 1919.	
London C.T.O.—San Remo Peace Conference	April 12, 1920.	April 28, 1920.
„ „ Spa (Belgium) Peace Conference	July 3, 1920.	July 17, 1920.
London Savoy Hotel, C.T.O., to Berlin Foreign Office	Feb. 27, 1921.	Mar. 8, 1921.
London C.T.O.—Cannes Supreme Council Conference	Jan. 4, 1921.	Jan. 11, 1921.
„ „ Genoa Peace Conference... Also	April 10, 1922.	May 19, 1922.
London Foreign Office—Genoa	April 10, 1922.	May 19, 1922.
London C.T.O.—Lausanne	Now sitting.	

In addition to the above there were two emergency circuits of particular interest which became necessary during the war and for some considerable period after the Armistice. Two important submarine cable communications, the first from Fano (Denmark) to Calais, which gave direct connexion between Fredericia and Paris, became interrupted somewhere in the North Sea, cutting France off from the whole of Scandinavia. The British telegraphs came to the rescue, however, and a direct wire was made up *via* Newcastle, London, Dover and Calais, and thus to Paris for the French Government and the Great Northern Telegraph Company. In the second case the shortage of cables between this country and the Near East was at one time specially serious, but the situation was again very considerably ameliorated by an emergency line arranged by the C.T.O., in co-operation with the French and Italian Governments. The route taken by this circuit was London, Boulogne, Paris, Lyons, Turin, Rome, thence to the south of Italy, where a short submarine cable near Scylla and Charybdis took the line into the island of Sicily. Here a further length of cable connected with the Eastern Company's system in Malta. That circuit, made up of a number of various odd gauges, lengths and qualities, was worked by the Company at about 25 words per minute.

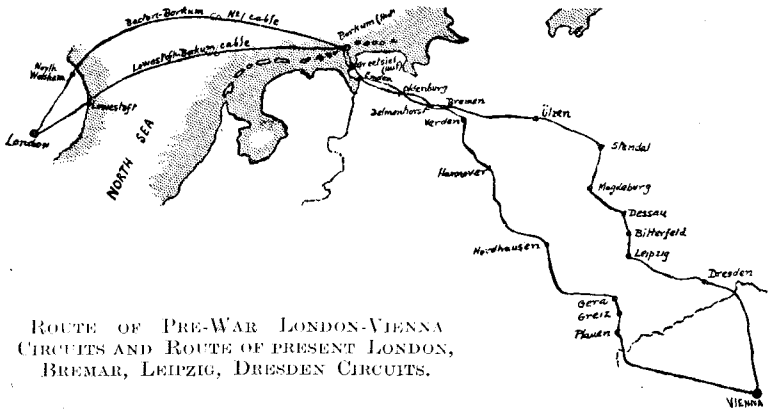
An audience of experts will quickly realise that the make-up and the constant changes necessitated by the varied military needs, and more especially the constant bombing and destruction of sections of these communications on the Continent, demanded an equally constant re-allocation of conductors, the break-down of civil circuits to make up military ones, and again the selection of the best that remained for war purposes, leaving the faulty and poorer conductors for civil traffic. Now this constantly recurring process naturally resulted, at the end of the war, in deteriorated line conditions in all belligerent Continental countries. To these must be added the financial situation and the very subtle factor of the general acceptance of lowered electrical and manipulative standards of efficiency, from which not one of the Continental belligerents has yet recovered.

We stand alone here in England as the only European Power other than neutrals whose telegraph system has recovered from the war effects, at least measured by electrical standards. This is no attempt to boast, for we have to thank our insular position in no very small measure for our safety. Manipulatively we are not yet back to pre-war standards, a fact which is due to the heavy flow of young telegraphists since the Armistice and an appreciable amount of nerve trouble due to shell-shock and other war effects which have affected many of those who have returned from the various war areas.

The absolute re-orientation of European political geography has been a factor with which any dealings with Anglo-Foreign telegraphs must necessarily be most closely associated.

That re-orientation has not finished apparently, judging by the questions which have latterly demanded settlement. Even the "Victory" Atlase are already obsolete. The most concise map of altered Europe I have seen is one that has been drawn for the use of the Cable room by a late member of our staff, Mr. Binder. This was out of date a month or two after it was published in the T. AND T. JOURNAL of January, 1922. The cartographer himself has gone to his reward—by being transferred to the A.G.D. The uninitiated may ask: "What difference does all this re-arrangement of States and countries make to the telegraphs?" I have no doubt but that members of the A.G.D. could expand themselves on this point, and that extensively. With ourselves it has altered the location of centres of traffic; some like Magdeburg, before the war a busy centre of the sugar industry—do not now send us a twentieth of their former traffic. Vienna, with which capital we formerly had two busy wires now has not enough to supply one

line. On the other hand Praha has an increasing quota and needs additional channels as the capital of the new State of Czecho-Slovakia and is actually an extension of one of the old London-Vienna circuits.



ROUTE OF PRE-WAR LONDON-VIENNA CIRCUITS AND ROUTE OF PRESENT LONDON, BREMAR, LEIPZIG, DRESDEN CIRCUITS.

We are now waiting for a direct wire to Warsaw, which I hope Germany will be pressed to give very soon.

The changing over of territory and the self-determination of emerging new nations and the revival of old nationalities has given us a host of alterations of names certainly unrecognisable. The few shown on the screen will give a good idea of the nature though not the extent of such alterations :—

ALTERNATIVE NAMES.

Old Name and Country.	*New Name and Country.*
Apenrade (Germany)	Aabenraa (Denmark).
Antivari (Montenegro)	Bar (Kingdom of Serbs, Croats and Slovenes).
Bozen (Tyrol, Austria)	Bolzano (Italy).
Bromberg (Germany)	Bydgoszcz (Poland).
Brünn (Moravia, Austria)	Brno (Czecho-Slovakia).
Cattaro (Dalmatia, Austria) ...	Kotor (Kingdom of Serbs, Croats and Slovenes).
Gravoso (Dalmatia, Austria) ...	Gruz (Kingdom of Serbs, Croats and Slovenes).
Helsingfors (Russian Finland) ...	Helsinki (Finland).
Ivangorod (Russian Poland) ...	Deblin (Poland).
Jassy (Roumania)	Iasi (Roumania).
Karlsbad (Bohemia, Austria) ...	Karlovy Vary (Czecho-Slovakia).
Kichiner (Bessarabia, Russia) ...	Chisinau (Bessarabia, Roumania).
Kolozsvar (Klausenberg, Hungary)	Cluj (Roumania).
Kovno (Russia)	Kaunas (Lithuania).
Libau (Russia)	Liepaja (Latvia).
Lemberg (Galicia, Austria). ...	Lwow (Poland).
Posen (Germany)	Poznan (Poland).
Pozsony (or Pressburg) (Hungary)...	Bratislava (Czecho-Slovakia).
Prague (Bohemia, Austria) ...	Praha (Czecho-Slovakia).
Ragusa (Dalmatia, Austria) ...	Dubrovnik (Kingdom of Serbs, Croats and Slovenes).
Reval (Russia)	Tallinn (Esthonia)'
Spalato (Dalmatia, Austria) ...	Split (Kingdom of Serbs, Croats and Slovenes).
St. Petersburg (Russia)	Petrograd (Russia).
Teschen (Austrian Silesia)	Cieszyn (Poland).
Wilkomir (Russia)	Ukmerce (Lithuania).
Salonica (Greece)	Thessaloniki (Greece).

Even Ireland spells Queenstown Cobh nowadays, and Kingstown as Dunlaoghaire !

These changes have meant that our circulation of telegrams has had to be re-constructed and re-learnt, so that even our most experienced officers have been heavily handicapped and have had the task of learning to forget the acquired knowledge of years.

The conditions of the countries, Allies and ex-enemy alike, with which we are in direct telegraphic communication, is another factor. It takes at least two to work a telegraph circuit and the mental outlook of the man at the other end of the circuit can make or mar the output of the finest and the most expensive apparatus. For example :—In order to increase the output of certain wires, keyboard perforators with automatic transmitters have been tried with certain countries. On more than one occasion, when, owing to the persistent and increasing flow of signals it has been realised by the foreign receiving telegraphist that a machine was automatically pumping telegrams into him, we have received such interruptions as " Stop, stop, take that devil away ! " Naturally endeavours were made to continue with the economical device, but persistence on our part was met by numerous and transparent excuses at the Continental end until slower methods were adopted. In the special direction where we have been met with the maximum opposition of this type, it is only fair to say that there are now evidences of real progress.

Since the war, too, the turbulent condition of States and people has been reflected in the fitful manner in which circuits are worked. A little while ago we lost touch with a foreign city for a few minutes, then received the words : " Wait, sir, the police are fighting in the office." Silence for perhaps half-an-hour, when once more our correspondent gave attention with : " Continue, comrade, we have thrown the gendarmes into the street ! "

During the war itself a number of the more senior of our male telegraphists were employed in assisting military censors. The work done by these general body men, to my mind, has never received due acknowledgment. Most of the censors were generous enough to admit that their own knowledge of business terms and business methods was very meagre, and that without the help of the experienced telegraphist they would have floundered hopelessly. One dear old chap was one day discovered searching among a list of *metal* merchants for the name of a firm said to be dealing in coprah. Another thought he had discovered a secret code in the text of a telegram which read : " South African bastards are in good demand and good welting bellies are rising." It was a telegraphist well versed in International market phrases who convinced him of the harmlessness of this common term amongst wholesale leather merchants.

Most of my audience have heard of the censor who cut out the quotation : " The captains and the Kings depart " because it was thought to refer to the departure of certain officials.

I have never yet seen it recorded, how one officer stopped a telegram addressed to the name of *Barclay* because " it contained so many figures." It appears that he had associated the name of Barclay with the brewery and had never thought of the banking interest of that name.

The assistance rendered to the military in this and other ways did not help the Anglo-foreign telegraphs, but the women of the C.T.O., augmented by a number of refugee Belgian telegraphists, plus certain temporaries, assisted in filling the places of the " above-age " male telegraphists loaned for this purpose, and also filled the places of the many telegraphists who were performing telegraph duties under decidedly less comfortable conditions somewhere in France, Italy, East Africa, &c., in the trenches and in aeroplanes. Naturally these conditions continued long after the Armistice, and with these conditions continued the daily block of Government and private traffic. Owing to the necessary censor restrictions registered addresses had been abolished and telegrams were written *en clair*. This meant that the average length of a telegram was twice that of pre-war times. Right through the war the C.T.O. generally, but the Cable room with its foreign circuits more particularly, never ceased its labours throughout the 8,760 hours of the year. For days, and even weeks on end, the traffic was endless. One day's traffic was seldom disposed of before its successor was pouring in upon us.

Gradually, however, communications became restored. Temporary land-lines were erected abroad, and submarine cables, maimed by exploding mines, and severely damaged by heavy electrical charges of the enemy were once more placed into service.

POST-WAR CALENDAR 1.

April 16, 1919.—Communication with Antwerp re-opened *via* Amsterdam.
" 18, 1919.—Communication with Brussels re-opened *via* Calais and Dunkirk.
May 7, 1919.—Direct communication restored with Brussels.
" 15, 1919.—Telegraphic communication with the Hague.
June 28, to July 16, 1919.—Exchange of British and French staffs between London and Paris offices.
July 23, 1919.—Censorship removed.
" 29, 1919.—U.S. hand over Cuckmere-Antifer cable to British Government.
Aug. 21, 1919.—Direct communication restored with Antwerp and Brussels by means of repaired Dover-Lapanne No. 2 cable.
" 23, 1919.—Direct working with Berlin and Hamburg resumed *via* Bacton Borkum No. 1 cable.
Sept. 3, 1919.—Direct working restored with Zurich.
" 15, 1919.—Liverpool-Havre direct wire restored.
Oct. 17, 1919.—Direct wire with Berne opened.
Nov. 4, 1919.—Direct communication with Geneva.
" 10, 1919.—Newcastle-Paris wire given up, Fano-Calais cable restored.
Dec. 16, 1919.—French telegraph communication re-opened with unoccupied Germany.

On April 16, 1919, communication with Antwerp was obtained *via* Amsterdam. Two days after, a wire to Brussels was put through *via* Dunkirk ; on July 23 the censorship was removed, and a month later direct wires were established *via* North Walsham and Emden with Berlin and Hamburg. The remaining items have obvious interest as indicating further restorations towards the normal.

The re-opening of the German circuits was a delicate matter, but by strictly official courtesy on both sides "incidents" were conspicuous by their absence. One of the first business telegrams sent to a well-known Hamburg firm was : " Do you still deal in sausage skins ? " Strange to say we were still " at war " with Germany.

POST-WAR CALENDAR 2.

Jan. 10, 1920.—Official date of termination of war.
April 9, 1920.—Newspaper special wire services resumed.
„ 12/28, 1920.—Special Peace Conference wire, London-San Remo.
May 8, 1920.—Communication with Bale opened.
„ 23, 1920.—Eastern Company's Belgian cable restored.
June 21/22, 1920.—Special Peace Conference wire to Boulogne.
July 3/17, 1920.—Special Peace Conference wire to Spa.
Jan. 8, 1921.—Marconi Wireless Service, United Kingdom and France, established.
„ 21, 1921.—Through to Hanover (temporarily).
„ 26, 1921.—Direct communication Paris-Liverpool re-established.
„ 27, 1921.—Wireless service, London and Berlin *via* Stonehaven, opened.
Feb. 18, 1921.—Successful wireless trials, London and Cologne *via* Aldershot.
April 21, 1921.—Wireless messages from Berlin, received by Creed printer.

It was not until Jan. 10, 1920, that we were officially advised that the war had terminated.

The communications with France up to this time had left very much to be desired, and, owing to other causes over which the French Government had apparently no control, the working of the Paris wires was exceptionally bad. Visits had been exchanged between the two offices, a London deputation going to Paris and a Parisian delegation visiting London. Certain defects were noted, principally the miserably low and variable insulation of the French land-lines. *C'est-la guerre mon ami!* But matters did not improve, the traffic was still heavy and delays abnormally high. In the meantime there were special additional Peace Conference wires to provide for, to San Remo and to Boulogne with their attendant extra traffic elsewhere, and these circuits occupied some of the best of the Anglo-French lines, communication with Bale became a necessity, and the special newspaper wires to the Continent for the use of the British and American Press became a demand which could not be denied.

While making every allowance for the devastating results of the war in France some of us at least are still of the opinion that it would have been a real economy on the part of the French Government to have made a special effort to establish more reliable land-lines on their side of the Channel. The strength of a chain is its weakest link. However, in order to ease the situation the Marconi Wireless Service was established, as a temporary measure, between the United Kingdom and France on Jan. 8 last year. Meanwhile there were excellent submarine cables between this country and France, excellent land-lines from London to the coast only lacking the necessary electrical co-operation on the other side to give the finest International service going. Without fear of contradiction I would repeat, that, given the necessary conditions of a fair standard of maintenance on French territory, such as was intended by the International Convention, there are enough cable cores available to carry easily all the present traffic plus an additional 50 per cent., and that with a delay below the present average. That so good a service is possible one has only to prove by watching the London Stock Exchange wire working direct to Paris Bourse, with its average delay of something less than five minutes.

POST-WAR CALENDAR 3.

May 17, 1921.—London Stock Exchange and Paris Bourse direct 5-minute service opened.
„ 21, 1921.—Dresden wire opened.
„ 18, 1921.—Amsterdam wireless established *via* Caister.
„ 27, 1921.—Communication with Praha opened.
July 8, 1921.—Turin direct communication opened.
Sept. 5, 1921.—Amsterdam Stock Exchange wire re-opened (direct Bourse to Bourse working, Oct. 31).
Jan. 1, 1922.—Long-distance radio ships telegrams *via* Leafield.
„ 4, 1922.—Special Cannes wire (Supreme Council Conference).
Feb. 13, 1922.—Transmission of Italian traffic to S. Paulo, Rome, by wireless *via* Leafield.
„ 15, 1922.—Leafield-Cairo Wireless Service proved.
April 12, 1922.—Marconi Service opened, United Kingdom and Berne.
„ 24, 1922.—Opening of Oxford-Cairo Wireless Service to public.

(To be continued).

THE LATE SIR JOHN GAVEY, C.B.

ON Jan. 5 the remains of the late Sir John Gavey were laid to rest in the beautiful Teddington Cemetery situated between Bushey Park and the river Thames.

He retired from the Engineer-in-Chiefship in 1907, having held the office for five years. His reign at the G.P.O. is still well remembered, especially by those who came more immediately in contact with him.

His name is intimately associated in Post Office history with the valuation and transfer of the telephone trunk wires to the State in 1896, the introduction of the message rate of charge, the introduction of the multiple duct system for telephoning London, and the valuation and purchase of the National Telephone Company's plant and assets in 1912. In connexion with the last-mentioned work, he was appointed chairman of the Post Office Committee which determined the policy and the instructions to be given to counsel in connexion with the arbitration proceedings, and himself gave valuable evidence before the Railway and Canal Commissioners.

Permission by] [*Elliott & Fry, 65, Baker Street.*

THE LATE SIR JOHN GAVEY, C.B.

His outstanding ability both as an engineer and an administrator, his downright and straightforward honesty of character, were always in evidence. Ability, resource, and industry he was quick to discover and recognise, and in handling the large staff which he controlled fairness and justice were the basis of his actions. For these and other reasons he held the complete confidence and high regard of the whole of the engineering staff.

The late Sir John Gavey was a past President of the Institute of Electrical Engineers. Amongst the past Engineers-in-Chief of the Post Office this distinction was shared only by the late Sir William Preece. He was also a Director of the United River Plate Telephone Company.

Both at the church service at Hampton Wick and at the cemetery there was a fully representative attendance. In addition to Mr. De G. Gavey and Miss Gavey, son and daughter, Mr. Warner, son-in-law, Mr. de Gruchy, Mr. Ereaut and Mr. Schmidt, there were present Major Purves, Engineer-in-Chief; Mr. F. Gill, President of the Institute of Electrical Engineers, Sir John Snell and Mr. W. M. Mordey, past Presidents, and Mr. P. F. Rowell, Secretary of the Institute. Mr. J. E. Kingsbury and Mr. A. Anns, Directors, and Mr. A. J. Davis, Secretary of the United River Plate Telephone Company; Mr. G. F. Preston, Controller, London Telephone Service, Mr. F. Tremain and Mr. A. Moir, retired Superintending Engineers, Dr. Russell, Faraday House Institute, Mr. W. W. Cook, Consulting Engineer, Mr. Dane Sinclair of the Helsby Company, and others.

LONDON TELEPHONE SERVICE NOTES.

Retirement of Mr. L. A. Prossor.

THE retirement of Louis Anthony Prossor from the London Telephone Service on Jan. 5 of this year, marks an epoch in its history and is a milestone in the lives of many of his former colleagues who are now "20 years onward" It is but a few months more than that period of time since Mr. Prossor entered the Post Office London Telephone Service as its first Service Inspector, and in that capacity and subsequently as head of the Service Section, he had much to do with nursing it through the essential stages of early growth to that condition when it became a serious competitor of the National Telephone Company and a producer of an efficient means of speedy communication.

MR. L. A. PROSSOR.

Before joining the Post Office London Telephone Service Mr. Prossor had had experience of telephone work with the New York Company, and the knowledge so gained combined with a fine personality and the advantage of a University education made him a noticeable force. Moreover, at birth he had been endowed with a ready "Mother wit" and he knew in handling subscribers (many distinguished men) when to be suave and when to be indignant, when to yield ground and when to attack, and perhaps, greatest of all gifts in a "Telephone man," when silence is golden.

But this short appreciation to be complete must deal with the colleague as well as the official. Affectionately known as "Pa," he well merited the nick-name. Kindly and unselfish in his nature he had that sense of sympathy which enabled him to appreciate and understand the outlook of those who served with him. Undoubtedly the chief of this staff, he aimed at winning their goodwill rather than commanding their services. A man of marked intuition, he saw that time spent in furthering the social activities of the Telephone staff was time spent in furthering the well-being of the Telephone Service. Hence he took an whole-hearted interest in the relaxations of life. A staunch supporter of the Langham Choral Society and of the various Swimming Clubs associated with the London Telephone Service he did much to foster that spirit of good fellowship which means success. Perhaps, however, his greatest work was amongst the Boy Messengers. Boys ever appealed to him and he, the happy possessor of the "Spirit of Youth," appealed to boys. He interested himself in their education, their sports and their tastes for the Arts. May the music of the Orchestra he organised in the Boy Messengers' Institute be sweet and unceasing!

In taking his farewell, Mr. Prossor said "he was retiring but not going into retirement," and our hope is that the leisure he now enjoys may afford him opportunity for the full expression of his versatility. He will ever be a welcome guest amongst us.

It remains to be added that Mr. Prossor was given a very hearty and sincere farewell by his colleagues. First at an informal supper at which Mr. E. A. Pounds took the chair, and on the following day at a reception in the St. Bride Street Refreshment Club when the Controller, whose ready wit and ease of speech so well fit him for such occasions, presented Mr. Prossor with an antique Welsh dresser and a handsome solid silver salver as a token of his colleagues' esteem. Sandwiched in between these two functions was a little ceremony in the G.P.O. South when the Boy Messengers of the London Telephone Service gave Mr. Prossor an oak biscuit barrel, and on the evening of the same day Mr. Prossor listened to a further eulogy of himself at the Annual Prize Giving of the Boy Messengers' Institute. On this occasion, to the accompaniment of much vocal and instrumental efforts, he was "chaired" round the room. Truly a remarkable "Au Revoir," and one which we all hope will afford Mr. Prossor the joy which should be the lot of a valued friend.

* * * *

Post Office Sanatorium Society.

London Telephone Service Constituency.

At a Committee Meeting held on Dec. 15, some very interesting information was given by Miss Nurse (Trunk Exchange) who is a member of the Board of Management of the Society.

The Board have visited several Sanatoria this year—including Holy Cross Sanatorium, Haslemere, King Edward VII. Sanatorium, Midhurst, and Harefield Sanatorium. At the Holy Cross Sanatorium Miss Nurse had an opportunity of seeing two of our telephonists who were being treated there, and we were glad to know that they were happy and well looked after.

It is interesting also to learn that 5,500 new members have joined the Society since Jan. 1, 1921, of which over 400 were from the London Telephone Service. 96 applications for treatment have been received and dealt with since Jan. 1, 1922, and 43 cases still remain under treatment at 9 different Sanatoria, at which the cost varies from £2 2*s.* 0*d.* to £3 11*s.* 6*d.* per week.

It is hoped that any of our colleagues who do not yet belong to the Society will appreciate these facts and help the work by becoming members and adding their subscription (3*s.* per annum), as early as possible.

* * * *

London Telephonists' Society.

The annual dance of the London Telephonists' Society was held as usual on the last Saturday of the year, Dec. 30, at Bishopsgate Institute. Once more there was an overwhelming demand for tickets and many late applicants were disappointed. The full 250 turned up in spite of a very wet evening and the strains of Mr. Skinner's Orchestra soon obliterated all memories of damp journeys. As usual, everything went with a swing, Mr. Buckeridge, who has acted as M.C. at every dance of the Society within recollection, being once more in charge of the proceedings, and when he and Mr. Skinner collaborate, there is nothing for everybody else to do but enjoy themselves—which everybody duly did. The supper tables looked very inviting when the company sat down in gay parties for a brief period of rest and refreshment, but before long the programme was resumed with fresh zeal, one of the chief events of the second half being the "Telephone Quadrille," the *chef d'oeuvre* of the "Die Hards" of the Society. This year, owing to various causes, we missed a number of the familiar faces that have always been associated with the social events of the London Telephonists' Society, but shall hope to see them in full force next year. Those who were unable to come or were too late to obtain tickets will, perhaps, like to note that the Hall and Mr. Skinner have been booked for Saturday, Dec. 29, 1923!!

* * * *

L.T.S. Successes at Typists' Hobbies Exhibition

The opening ceremony and distribution of prizes was performed by H.R.H. Princess Beatrice at the Fourth Civil Service Typists' Exhibition held at the Central Hall, Westminster, on Saturday, Dec. 9.

The chair was occupied by Sir Warren Fisher, Permanent Secretary to the Treasury, who, in his opening remarks said that the organisation produced a human interest, and in the Civil Service so much had to be performed which was inhuman, that anything which turned Civil Servants into ordinary human beings was for their good. There had been 1,500 entries in the competitions but their handiwork had not exhausted the good the Typists had done. They had collected over £100 for the great hospitals of London, and recently in one month another £30.

The competitions including painting, music (vocal, pianoforte and violin solos); elocution, essay, short story and poem; cookery, including cakes, apple pies, and assorted sweets; needlework, knitted and crocheted articles in silk and wool; embroidery and doll dressing. Special mention is made of a hall mirror, the frame of which was made of beaten brass, with decorations of red enamel. Three brushes hung in the centre adorned with an initial letter. This was the work of Miss Henwood, a shorthand typist of the Controller's Office, London Telephone Service, and the whole article was beaten out and put together by hand. The judges were so impressed by its originality that a special prize was awarded. Miss Henwood also carried off the second prize for apple pie. The second prize for coloured embroidery was secured by Miss A. D. Taylor, and Miss Rumsey (both of whom are shorthand typists in the Controller's Office) was highly commended for a crocheted jumper in wool.

* * * *

Culled from the Exchanges.

Central Exchange.

The appeal put forward to the staff at Central Exchange on behalf of the provision of Christmas toys to the children of Shadwell Hospital met with very gratifying results.

As a consequence a considerable number of dolls (which were dressed by the Supervisors and Telephonists of that exchange) and other toys were sent to the Hospital, where there is no doubt they were greatly appreciated.

Gerrard Exchange.

On Dec. 15, Gerrard Swimming Club held a Christmas party, and everybody thoroughly enjoyed themselves. Great fun was caused by Father Christmas who distributed the present from the Christmas tree, assisted by P.C.999 who kept order.

Dancing and games occupied most of the evening, and altogether the party was a huge success.

On Jan. 5 a dance was held at Finsbury Town Hall which, despite the weather, proved a great success.

Mayfair.

On Wednesday, Nov. 29, the staff at Mayfair held a very enjoyable dance at the Q.V.R. Drill Hall, Davies Street, W.1, in aid of the Hospital Saturday Fund.

Over 250 guests were present, and Mr. Howe, Inspector from the Engineering staff, was a very able M.C.

During the evening, Miss Reekie, the Hon. Secretary of the Staff Hospital Collections, announced that the proceeds of the dance would amount to £20, and she thanked those present for their kindly support.

A whist drive was held by the Mayfair staff on Dec. 4 at the Cabin Restaurant, Strand. Although the numbers were smaller than anticipated, a very pleasant evening was spent. Mr. Howe again kindly acted as M.C., and Miss Reekie presented the prizes.

In connexion with Miss Reekie's special appeal on behalf of the Hospital Saturday Fund collections, the staff at Mayfair held a small bazaar and sale of work on Friday, Dec. 15. The proceeds amounted to £21 and all those who took part are to be congratulated on a very enjoyable and successful evening. The bran tub and guessing competitions caused much amusement and added to the merriment.

Putney.

A tea was given by the staff of the Putney Exchange to 100 very poor children at St. Mary's Mission Hall, Garratt Lane, Wandsworth, on Saturday, Jan. 6. The staff, assisted by a "Charlie Chaplin" from the Engineering side, entertained the children after they had been regaled with sandwiches, "wedding" cake (so called by one of the tiny guests) and other dainties. The entertainment, which included a Japanese costume song, another with a chorus of realistic sweeps, and a show of waxworks conducted by the renowned Mrs. Jarley went well, but the culminating point was reached when—the lights lowered—the curtain went up revealing a large Christmas tree, lighted by tiny coloured electric lights (the work of the Engineers) and loaded with presents. Santa Claus assisted by a wonderful fairy "straight from Fairyland," distributed these presents to the little ones, whose eyes were wide with wonder and delight. Each girl had a doll and the boys had suitable toys, sweets, oranges, apples, and nuts were added, and 7.30 p.m. found the little ones "tired but 'appy" going home laden to their waiting mothers.

Trunks.

Members of the Trunk Exchange staff have this season formed a Net-ball Club to be known as the Stanbury. The first match was played on Saturday, Dec. 9, against a team from Clerkenwell, with a victory for the Stanbury who scored 20. Clerkenwell 11.

Matches with teams from other London exchanges are invited. Communications should be addressed to the Hon. Sec., Miss B. E. Finch, 22, Canonbury Street, N.1.

Victoria.

During the year 1922, the staff at the above exchange collected £62 13*s.* 3*d.* Of this total, £55 was sent to Westminster Hospital, and £7 13*s.* 3*d.* to other deserving charities. This collection is, of course, quite separate from the Saturday Hospital Fund.

REVIEWS.

"*Catalogue of Scientific and Technical Books.*" *Sir Isaac Pitman & Sons, Ltd.*—This is a very useful compilation, containing a list of works on all kinds of scientific and especially engineering subjects. There is a special section on telegraphy and telephony, comprising several books by Post Office authors.

"*The Journal of Public Administration.*" *Sir Isaac Pitman & Sons, Ltd. Quarterly* 2*s.* 6*d.*—We have received the first number of this journal which is designed to serve as a record of the work of the Institute of Public Administration. It extends to 80 pages and contains several authoritative articles by distinguished Civil servants. Viscount Haldane's inaugural address entitled "An Organised Civil Service," which we are glad to see reprinted here, deals with the ideals demanded of that service, and as might be expected insists on the importance of a high standard of education and largeness of outlook. Mr. Stuart Bunning contributes an interesting article on the American Civil Service, Sir W. Clark one on Government and the Promotion of Trade, and Mr. Corner another on the aims of the Institute. Mr. Lee in a characteristic article on "Security," deals with this subject from a fresh angle. In short, the journal is full of matter interesting to the Civil Servant and should form an invaluable medium for the exchange of opinion to all those interested in administration in all parts of the Empire. We wish it every success and concur in the editorial suggestion that even privately-owned industry may have something to learn from its pages.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

AN exceptionally large number of new stations were added to the Post Office system in November, the net increase for the month being 8,709. The total number of stations in use on Nov. 30 was 1,020,300, of which 365,533 were connected with London exchanges, and 654,767 with Provincial exchanges.

The number of call office stations working at the end of November was 16,093, the net addition during the month, viz., 131, exceeding that for October, the previous best on record, by 7. Public call offices in street kiosks numbered 356, an increase of 12 during the month.

The net increase in the number of rural party lines was 357, bringing the total up to 5,936 at the end of the month, as compared with 2,794 at the end of November, 1921.

Since the announcement of the revised conditions under which exchanges in rural areas may be authorised, support has been obtained for 255 new exchanges. At the end of December 27 of these exchanges had been opened and advice notes to open a further 146 exchanges had been issued. In the remaining cases the completion of preliminary arrangements, such as the question of housing the exchange or the necessity for a guarantee, had prevented the issue of the advice notes.

The weekly returns of traffic show that the average calling rate per line during November was the highest for any month since the introduction of the new tariff. Compared with the corresponding month of the previous year the increase in the calling rate, however, was only about 3 per cent.

The improvement in the trunk traffic referred to in the previous issue was maintained during October, the number of calls originated during the month being in fact the third highest on record. Compared with October 1921, the increase in traffic amounted to 14 per cent.

Further progress has been made with development of the local exchange system. Among the more important new exchanges opened are the following :—

London.—Chislehurst.

Provinces.—Edinburgh (Museum), Tonbridge and Ebbw Vale.

The following important exchanges have been extended :—

London.—Park and Epsom.

Provinces.—Birmingham (Victoria), Redditch, Torquay, Brighton (Kemptown), Glasgow (Western), and Dundee.

The main underground system has been extended by completion and bringing into use of new cables as follows :—

Manchester—Ashton—Mossley.
London—Brighton.
Brighton—Worthing.
London—Leatherhead—Dorking—Cobham.
Hertford—Ware.

During the month of December 21 new overhead trunk circuits were completed and brought into use, and 41 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

During the month of January the following circuits have been equipped for Baudot working :—

Bristol—Plymouth, four duplex arms.
Birmingham—Edinburgh, four duplex arms.
Birmingham—Cardiff, two duplex arms.

The last-named circuit will shortly be extended to Milford Haven, the resulting facilities providing two duplex arms between each of the three stations.

THE

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CONTENTS.

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THE ECONOMIC POSITION OF WOMEN.*

BY MISS NORA MILNES, B.Sc.

Director of the School of Social Study, Edinburgh University.

MISS MILNES said when she began to speak about women she was reminded of a play which many of the audience had seen or probably read. She referred to Maeterlinck's "Blue Bird." There, the little boys and girls in the other world before this world were anxious to come into it; always fighting to come into it. It was very charming to see it. She was sure that many would like to get into another world, and to say to one or two of those people that there are certain things to think about before they came. In the other world they ought to be careful of certain things: such as whom they chose for their parents; if they were going to be girls, think about it twice before they come at all.

Someone had said that it was not possible to talk about the economic position of women because it did not exist. She was not quite sure about that. She tried to remember that she was one of those babes anxious to come into this world and, having got here, tried to make the best of it, and to see that so far as her passage allowed, she left the world a little better than it was when she came into it.

Miss Milnes considered that the position of women to-day was very greatly influenced by various factors that arose during the War and even more a result of factors that existed before the War. The obligations with which they were faced to-day were due to the enormous increase that took place during the War among the number of women workers—about 1¼ million. The increase was very large in the Civil Service. She therefore found herself faced with an enormous number of women workers anxious for employment. It was very interesting from the point of view of women that they entered into fields of employment which were formerly regarded as an absolute prerogative of their friends or enemies—she was not quite sure which; any way, the men. It was found, however, that the women performed the work sufficiently well and, in some cases, it must be mentioned, even better than the men. She would like to add that in many cases they did not perform the work better than the men, and the general conclusion arrived at by the War Cabinet Committee on women's work was that it took three women to equal two men's work.

The lecturer considered that if women wanted to move forward they must examine themselves and see what their defects were. But apart from defects they certainly laboured under certain disadvantages in the fields of work, and organisers of business would say the same thing. When women and men were put working side by side certain definite provision had to be made for the women staff, and, unless that was going to be a fairly large staff, it did not pay to make that provision. A result in many occupations after the war was that when many women had to go out of employment the rest of the women also went.

Then again, the lecturer said, the average woman was not equal to the average man, and she said this because she believed it was remediable. She did not believe it remediable by saying, "We are equal." She believed that things could only be remedied by asking what was the matter with them, and having found that out to try and put it right. The first disadvantage was a physical one. There were exceptions, but taking women as a whole, it was proved that they suffered strain more severely than men. Although they did most wonderful work in spurts, this work took toll of them. She thought that was admitted, in that the very women who fought for equality made it a point that night work for women should be forbidden. Unfortunately, the physical test was always coming out, and it was the physical test that told very largely in this world. She would like to say in passing that the old-fashioned headmistress who condemned sports ought to be dismissed from her post on the spot; their one chance of becoming physically better was thus being killed.

There was one important defect in women and that was they were not so well fed as men. The average girl worker really did not feed herself properly, although she had improved tremendously in this respect.

The old question turned upon the miserable question of equality. She laid it down dogmatically that things which are different cannot be equal. A man and a woman were different. It was said that if women did the same work they should receive exactly the same pay. She agreed, but it had not been proved that she was doing the same work. When a woman married she left her work. If a man was getting married he was offered an increase in salary, but she had never heard of a woman deciding that she would not get married because she was offered an increase of salary. That was a fundamental difference. When you are training people, it is going to pay you to train the people who stay with you. In consequence of that every employer was not thinking much of the present value of the individual, but was thinking of the future value as well, and that he did not know in the case of a woman. She might have just completed her training when she left to get married. The employer feels that all this training is thrown away. This had a very serious effect on the mind of men because looking

* Paper read to the Edinburgh Telegraph and Telephone Society on Dec. 5, 1922.

at the thing from a long time point of view and until you had solved the question of who was going to marry, a woman could not be regarded in the same way as a man. This worked as regards women's training. Many parents did not think it paid to train their daughters, and the woman found herself entering the labour market not so well equipped as a man.

Miss Milnes wished to insist that women had got to see to it that they started on their professional lives as well equipped as possible. It was going to be their only chance. She thought that women ought even to be better equipped than men because with the physical disadvantage and the marriage disadvantage they had obstacles to overcome.

TELEPHONIC DEVELOPMENT OF THE WORLD AT DECEMBER 31, 1921.

BY W. H. GUNSTON.

(*Continued from page* 74.)

TABLE II.

ASIA.

Japan (342,931 in 1920) est.	370,000
Chosen (13,700)	15,000
Manchuria (10,681)	13,000
Sakhalin (1,327)	1,400
Formosa (8,700)	9,600
China (1920)	35,910
Hong Kong	6,787
India	37,067
Ceylon	4,158
Straits Settlements (State)	1,264
Singapore (Oriental Telephone Co.)	3,739
Federated Malay States	2,898
Dutch East Indies	35,890
Phillipines (1920)	12,451
Siberia, Russian Turkestan, etc. (1915) ...	18,600
Azarbaijan (1915)	6,500
Georgia (1915)	2,700
Iraq	1,102
Palestine	1,129
French Indo-China	1,759
North Borneo	315
Total with allowance for Syria, Persia, and Siam	585,000

Population 910,000,000, or 1,569 inhabitants per telephone.

The figures for India, Malay, etc., the Dutch Indies, Hong Kong and Western Asia are official. The figures for Siberia, Transcaucasia, etc., relate to 1915 when those countries were part of the Russian Empire. It is probable that their number of telephones has decreased, but as a set-off no increase has been estimated for China in 1921. The telephone is making some progress in Mohamedan Asia, and official informaton has been furnished from Iraq and Palestine. A telephone company is known to exist in Persia. The figures for Japan and its possessions have been estimated on the basis of the normal annual increase in those states.

India.—On March 31 13,316 telephones were connected with the Government system and 23,958 with that of the Oriental and associated companies, of which 8,272 were in Calcutta, 2,102 in Madras and 9,885 in Bombay, Karachi, and Ahmedabad.

Dutch Indies.—Of the total of 35,890 telephones 8,227 were in Batavia and 5,799 in Soerabaia.

Azarbaijan and Georgia.—In 1915 there were 6,137 telephones in Baku, 179 in Elisavetpol, 155 in Erivan, 2,060 in Tiflis, 332 in Batoum and 185 in Kutais. The present state of development is not known.

TABLE III.

AFRICA.

South Africa (51,439 in 1920)	52,999
Egypt (22,665)	24,719
Algeria	15,400
Tunis (4,400) est.	4,800
S. Rhodesia	1,563
Mauritius	1,104
Madagascar (est.)	612
Mozambique (est.)	370
Senegal and Dahomey (French) est. ...	300
Gold Coast (est.)	258
Belgian Congo (est.)	175
	102,000

Population 180,000,000 or 1,765 inhabitants per telephone.

Egypt.—Cairo has now 9,817 telephones and Alexandria 7,134.

Algeria.—There were 4,863 telephones in Algiers and 1,833 in Oran.

South Africa.—The development of the principal towns is as follows: Johannesburg 13,863, Cape Town 9,334, Pretoria, 3,455.

TABLE IV.

NORTH AMERICA.

	1921.	1920.	Population (Thousands.)	
United States	13,875,219	13,411,379	107,000	7.7
Canada	902,090	856,266	8,700	9.6
Mexico (est.)	47,000	44,748	16,000	340
Cuba	38,000	34 376	2,900	77.2
Hayti and Dominican Republic	2,000	1,938	3,400	—
Central America	18,000	15,950	6,000	—
Total	14,882,000	14,365	145,000	9.7

United States.—The total is made up as follows:—

American Telephone & Telegraph Co. (Bell system)	8,914,155
Companies in connexion with the Bell system ...	4,466,064
Independent Companies...	495,000
	13,875,219

The first two items are official, and the third has been obtained from a reliable estimate.

Canada.—The number of telephones in the principal provinces is as follows:

Ontario	380,211
Quebec	146,856
Saskatchewan	96,239
British Columbia	79,069
Manitoba	68,463
Alberta	64,383
Nova Scotia	35,418
New Brunswick	26,322

The figures relating to *Mexico, Central America* and the *West Indies* for 1920 have been kindly furnished by Mr. Berthold, of the American Telephone and Telegraph Co. and have been increased in accordance with nominal development. The same remarks apply to the statistics for South America.

TABLE V.

SOUTH AMERICA.

	1921	1920	Population (Thousands).	Population per telephone.
Argentine	121,000	116,553	8,250	68
Bolivia	2,517	2,517		
Brazil	93,000	85,091	30,650	230
Chile	33,000	29,867	4,200	127
Colombia	7,700	6,843		
Ecuador	4,700	3,946		
Guiana	1,898	1,898		
Paraguay	400	406		
Peru	9,200	8,552		
Venezuela	9,500	8,896		
Uruguay	24,000	22,381	1,400	60
	307,000	286,950	60,000	196

TABLE VI.

AUSTRALASIA.

	Telephones.	Population.	Population per telephone.
Australia (233,406 in 1920) ...	251,029	5,500	21
New Zealand (88,541)	94,849	1,200	12.6
Hawaii (1920)	14,376	255	16
Fiji	742	157	—
Totals (with allowance for other places)	361,500	7,500	21

Australia.—The telephonic development by States is as follows, New South Wales 101,617, Victoria 74,927, Queensland 30,845. South Australia 22,505, Western Australia 13,591, and Tasmania 7,544.

Sydney had 62,301 stations, Melbourne 50,777, Adelaide 17,022 and Brisbane 13,202.

New Zealand.—Wellington possessed 11,684 telephones, Auckland 10,757 and Christchurch 8,327.

TABLE VII.

LIST OF CITIES WITH UPWARDS OF 20,000 TELEPHONES.

New York	979,534	*Cologne*	38,666
Chicago	605,495	New Orleans	38,316
Berlin (Greater)	347,735	*Liverpool*	38,219
London (Telephone area)	345,797	*Frankfurt on Main*	37,705
Boston	313,295	Atlanta, Georgia	36,541
Philadelphia*	233,122	*Dresden*	36,286
Paris	173,300	Des Moines	34,791
San Francisco	162,430	Winnipeg (1920)	33,682
Los Angeles	162,118	Osaka (1920)	33,004
Detroit	154,077	Houston (Texas)	32,954
Cleveland	153,951	*Amsterdam*	32,756
*Pittsburg**	129,436	Spokane	30,831
Stockholm	110,095	New Haven (Conn.)	30,871
St. Louis*	108,136	Rio de Janeiro	30,523
Copenhagen (and suburbs)	106,105	*Kristiania*	30,285
Cincinnati	102,166	Hartford (Conn.)	29,776
Toronto	101,452	Worcester (Mass.)	29,276
Vienna (98,000)	100,000	Springfield (Mass.)	29,213
Minneapolis	96,166	Syracuse (N.Y.)	28,575
Washington	96,111	Richmond (Virginia)	28,495
Hamburg	95,534	*Breslau*	27,736
Baltimore	92,259	Salt Lake City	27,550
Milwaukee	88,746	Dayton, Ohio	27,117
Montreal	83,917	*Birmingham*	26,391
Seattle	76,907	*Düsseldorf*	26,288
Indianapolis	75,325	*Stuttgart*	26,211
Buffalo	72,949	Youngstown, Ohio	25,830
Buenos Aires (1920)	65,383	Memphis	25,687
Oakland (Cal.)	67,729	Akron	25,226
Portland (Oregon)	65,173	*Rotterdam* (1920)	24,848
Tokio (1920)	64,564	Ottawa	24,996
Sydney	62,301	Habana (Cuba) 1920	24,936
Petrograd (62,000 in 1916)	—	San Antonio (Texas)	24,377
Denver (Col.)	58,751	Rochester, N. Y. (1920)*	23,940
Moscow (57,000 in 1916)	—	*Brussels*	23,809
Kansas City (est.)	57,000	*Nürnberg*	23,671
Omaha	56,651	Norfolk (Va.)	23,363
Columbus Ohio	56,423	Mexico City (1920)	23,503
Newark, N.J.	54,015	*The Hague*	23,179
Melbourne	50,777	*Hanover*	23,102
Providence	49,548	*Gothenburg*	22,804
Manchester	47,301	Oklahoma City	22,834
Toledo (Ohio)	46,692	*Warsaw* (1919)	22,400
Munich	46,214	Fort Worth	22,247
Buda Pest	44,398	*Zurich*	20,983
Glasgow	42,514	East Orange, N.J.	20,702
Jersey City	42,506	Birmingham (Alabama)	20,231
Leipzig	41,906	Tacoma	20,194
Vancouver	40,494	Scranton (Pa.)*	19,680
Dallas (Texas)	40,108	Louisville (Kentucky)*	18,787

55 of these cities are in the United States, 9 in the rest of America, 32 in Europe 2 in Asia and 2 Australasia.

* These figures relate to the number of Bell Stations only. Towns so marked have at least 10 per cent. additional stations belonging to independent Companies.

TABLE VIII.

CITIES WITH OVER 10,000 TELEPHONES.

United States (55 of these are enumerated in list VII)	106
Germany (enumerated in the notes on Europe)	23
Great Britain and Ireland (enumerated in the notes on Europe)	13
(In addition Nottingham and Belfast contain over 10,000 stations within the limits of the old telephone area.)	
Canada (Montreal, Quebec, Toronto, Vancouver, Winnipeg, Ottawa. Hamilton, London, Edmonton, Halifax, Victoria, B.C.)	11
Japan (Tokyo, Osaka, Kioto, Nagoya, Kobe)	5
Australia (Sydney, Melbourne, Adelaide, Brisbane)	4
Switzerland (Zurich, Geneva, Basle, Berne)	4
France (Paris, Lyons, Marseilles)	3
Holland (Amsterdam, Rotterdam, The Hague)	3
Sweden (Stockholm, Gothenburg, Malmö)	3
Italy (Rome, Milan)	2
Belgium (Brussels, Antwerp)	2
Russia (Petrograd, Moscow)	2
Spain (Madrid, Barcelona)	2
New Zealand (Wellington, Auckland)	2

One Each.

Denmark (Copenhagen), Norway (Christiania) Austria (Vienna), Poland (Warsaw), Czecho-Slovakia (Prague), Hungary (Buda Pesth) Danzig (Free City), Portugal (Lisbon), China (Pekin), South Africa (Johannesburg), Cuba (Havana), Mexico (Mexico), Brazil (Rio de Janeiro), Argentine (Buenos Aires), Uruguay (Monte Video)	15
	200

Of these 118 are in North America, 65 in Europe, 6 in Asia, 1 in Africa, 3 in South America and 6 in Australasia.

It may be of interest to put on record the number of telephones in the British Empire at the end of 1921 :

Great Britain	997,805
India	39,450
Ceylon	4,158
Rest of Asia	15,000
South Africa	52,999
Rest of Africa	3,000
Canada	902,090
Australia	251,029
New Zealand	94,849
Total, upwards of	2,360,000

BAUDOT DUPLEX RESULTS.

BY A. C. BOOTH.

Now that the use of the Baudot Duplex, which is quite distinct from the Baudot Simplex system as developed in France, has been fitted to most of the main telegraph lines in Great Britain, it may be worth while to bring to general notice a few results which were obtained in the early days of its struggle for existence, when the conservatism of some of the older officials was sufficiently strong to delay, but not to stop, its development for a number of years.

The results obtained in those days were so good that they were considered to have been too good to be true. Indeed, it was actually stated that such results must have been "engineered."

The following results are extracted from *I.P.O.E.E. Journal*, and may be a useful guide to officers now in charge of Baudot Duplex sets as showing what the system is capable of doing when necessary.

Extracted from the "I.P.O.E.E. Journal," Vol. 6, page 324, 1913 :—

"Duplex working of the Baudot system continues to yield the excellent results that were obtained from the sets installed at the Central Telegraph Office in 1910.

"The Quadruple Duplex on the underground loop circuit between London and Birmingham gives a uniform daily output of some 3,600 messages in 12 hours, including the slack hours of the early morning and late evening. Occasionally the daily total has exceeded 4,000, whilst on the day following the fire at the test-box of the C.T.O. in August, 1912, the following results were obtained between 10 a.m. and 5 p.m. :—

10—11 a.m. = 595	Total of 3,851 messages in 7 hours.
11—12 „ = 576	„ 5,025 „ 12 „
12— 1 p.m. = 551	Average of 550 messages per hour.
1— 2 „ = 579	„ 68.75 „ channel.
2— 3 „ = 516	
3— 4 „ = 501	
4— 5 „ = 533	

Extracted from the "I.P.O.E.E. Journal," Vol. 8, *page* 13, 1915.

"In order to ascertain the maximum amount of traffic that can be carried by the different types of Duplex Baudot, the Controller of the Central Telegraph Office, London, was good enough to arrange for two-day tests of the sextuple duplex to Birmingham, the quadruple duplex to Liverpool, and the recently erected quadruple duplex to Glasgow, which works through a duplex repeater at Warrington.

"The idea of the tests was to ascertain the approximate value of such apparatus under emergency conditions, such as occurred at the C.T.O. in 1910. There was no intention to ascertain operator output, because that had been already tested over a considerable period. In 1910 the quadruple duplex to Birmingham carried as many as 600 messages in one hour; the quadruple duplex to Liverpool carried as many as 628 in one hour, thus confirming the figures obtained in 1910. The results on the Glasgow quadruple duplex were not so good, being only 446; but this set has been installed quite recently, and, owing to the war conditions, the messages are noticed to be considerably longer than those at Birmingham and Liverpool.

"The sextuple duplex carried 849 messages in the hour, and was not even then at its best, as Birmingham sent 455 to London's 394. This difference was due to slight faults in the printing apparatus at Birmingham, and to a slight insufficiency of traffic. Under better conditions it is expected that the figure of 900 messages in the hour would have been exceeded.

"The results obtained are most creditable to all concerned, and show the value, not only of the Baudot as such, but also of the duplex method of working, which was so severely criticised before it had been tried, although it has since been adopted in the Murray multiplex. The Western Electric Company have also adopted the duplex method in their multiplex apparatus, which is now being tested in this country.

"For record purposes and for the benefit of those readers desirous of obtaining further details of the tests, the results are set out in the following tabular form :—

LONDON-LIVERPOOL. QUADRUPLE DUPLEX BAUDOT.
February 8, 1915.

Time.	No. 1 Channel.	No. 2 Channel.	No. 3 Channel.	No. 4 Channel.	Total.	
	S. R.	S. R.	S. R.	S. R.	S. R.	Gross.
11 a.m. to noon	66 70	58 76	76 75	75 73	275 294	569
Noon to 1 p.m.	69 70	63 73	72 81	64 62	268 286	554

February 10, 1915.

11 a.m. to noon.	78 72	80 80	71 86	83 78	312 316	628
Noon to 1 p.m.	77 69	73 76	79 83	72 80	301 308	609

LONDON-GLASGOW. QUADRUPLE DUPLEX BAUDOT.
February 2, 1915.

Time.	No. 1 Channel.	No. 2 Channel.	No. 3 Channel.	No. 4 Channel.	Total.	
	S. R.	S. R.	S. R.	S. R.	S. R.	Gross.
11 a.m. to noon.	56 54	55 51	53 52	60 58	224 215	439
Noon to 1 p.m.	56 57	53 60	55 42	58 63	222 222	444

February 3, 1915.

11 a.m. to noon.	60 55	54 48	58 51	65 55	237 209	446
Noon to 1 p.m.	59 47	50 47	53 38	59 54	221 186	407

LONDON-BIRMINGHAM. SEXTUPLE DUPLEX BAUDOT.
February 4, 1915.

Time.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	Total.	
	S. R.	S. R.	S. R.	S. R.	S. R.	S. R.	S. R.	Gross.
11 p.m. to noon.	72 75	70 77	67 66	63 73	74 70	60 60	406 421	827
Noon to 1 p.m.	71 53	60 51	70 45	58 51	63 37	63 60	385 297	682

February 5, 1915.

11 a.m. to noon.	69 85	77 82	64 68	64 80	59 67	61 73	394 455	849
Noon to 1 p.m.	71 72	65 55	66 14	67 63	65 48	69 50	404 302	706

"Excellent as the results are, there are two other important features in favour of the system viz., a very appreciable decrease in the delay on the work passing over this system as compared with other types, the rapid correction of errors, and the fact that the skilled sending is very easily learned and is preferred to Morse or typewriter working. Correct sending at 30 words per minute has been learned in a week; the outside time required is less than two months

"The foregoing tests were made at a working speed of 30 words per minute per channel, which is the generally accepted rate of working. With the introduction of alphabetical keyboard perforators and automatic transmitters, the speed can be readily raised to 40, 45 or even 50 words per minute. Even with the ordinary 5-key Baudot keyboard a speed of 45 words per minute has been maintained without any error for some minutes. We may, therefore, yet be able to see the skilled telegraphist holding his own with the very much more costly keyboard perforator and automatic transmitter.

"As an instance of the reliability of Baudot Duplex working on long lines, the following consecutive daily results obtained on the recently installed London to Glasgow circuit of some 400 miles in length, with a duplex repeater at Warrington are worth recording :—

LONDON TO GLASGOW.

1915.	Sent.	Received.	Total.
Feb. 1	1,784	1,217	3,001
„ 2 ...	1,885	1,539	3,424
„ 3	1,950	1,564	3,514
„ 4	1,645	1,310	2,955
„ 5	1,845	1,409	3,254
„ 6	1,491	1,137	2,628
„ 8	1,690	1,380	3,070
„ 9	1,773	1,362	3,135
„ 10	1,846	1,407	3,253
„ 11	1,895	1,503	3,398
„ 12	1,905	1,514	3,419
„ 13	1,562	1,258	2,820

"The figures are not so good as those on similar quadruple duplex Baudot sets on the shorter circuits to Birmingham and Liverpool. This is not due to the greater length of the circuit but to the facts already mentioned, longer messages and less experienced staff. There is, however, not much room for an increase in the general reliability and uniformly good working, but there is no question that the amount of work dealt with will increase with longer experience.

"It will be interesting to compare these results with similar tests on other systems of large output. At present I think the 849 on the sextuple duplex is easily a world's record, because the messages were finished and disposed of, whereas in a Wheatstone system, where a far greater number of messages can be transmitted, they are very far from being finished with, and generally a second circuit is required for clearing up the corrections, &c."

PRESENTATION TO MR. ARCHER SMITH.

ON his departure to take up the District Managership of Manchester, Mr. Archer Smith, District Manager, Newcastle, was presented with a solid silver rose bowl, a beautiful example of the silversmiths' art, in token of the esteem in which he is held by the Newcastle district staff. In the presence of a large and representative gathering, Mr. Robson, chief clerk, made the presentation, and paid warm tribute to the many qualities which had rendered Mr. Smith so popular with the staff. The contract manager, Mr. J. P. Urwin, and the traffic superintendent, Mr. J. Gwyther, also spoke highly of Mr. Smith, both as a superior officer and friend.

Mr. Smith, in replying, referred feelingly to the happy time he had spent among the North Country folk, and expressed his regret at parting from so many friends, whose good wishes go with him to his new sphere of work.

PRESENTATION TO MR. J. D. W. STEWART.

MR. J. D. W. STEWART, District Manager, was presented with a demi-hunter gold watch and an "Eversharp" pencil by the Manchester telephone Staff on Jan. 15, prior to his departure to Newcastle. A small token of esteem in the shape of a gold pendant set with pearls and amethysts was also presented to Mrs. Stewart. The presentation was made by Mr. Elliott, Contract Manager, who, in a happy speech, conveyed to Mr. Stewart the feelings of the Staff in losing him after nearly 11 years' service in Manchester. Mr. Godfrey (Chief Clerk), Mr. Staite (Traffic Supt.), Misses Dutton and Lees (Fees Division) and Mr. Humphreys (Clerical Staff), also spoke as to Mr. Stewart's thorough and conscientious manner in dealing with business or staff matters. Mr. Stewart responded in suitable terms.

HOW THE TELEPHONE WORKS.

BY A. CROTCH.

VI.

FIG. 17 illustrates the switch, complete with its electro-magnet and bank of contacts. Associated with it is the line and cut-off relay shown in Fig. 18. The upper bobbin of this combination belongs to the cut-off relay and its armature is at the left hand side and cannot therefore be seen. The line relay is the lower

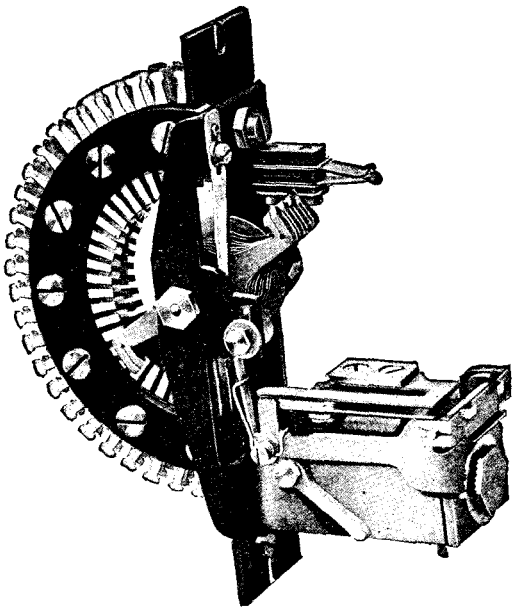


FIG. 17.

one and its armature is on the right hand side, hinged on the common base. At its free end it carries an extension which, when actuated, will cause the two outer springs on that side to make contact with two others. Pivoted on the back plate is an arm which normally lies horizontally (as shown). In this position it prevents the cut-off relay armature from making its full journey ; the latter then moves the four left hand springs sufficiently to break their contacts, but not sufficiently to make contact with others. When the line relay is actuated, its armature causes the left hand end of this arm to rise clear of the cut-off armature. Hence when the two are energised, all the springs move sufficiently to break existing and to make new contacts. Fig. 19 gives the connexions of the switch.

Selector.—The principle is shown in Figs. 15 and 16. The actual instrument is given in Fig. 20 and a connector in Fig. 22 : the working parts, however, are practically the same in both. The

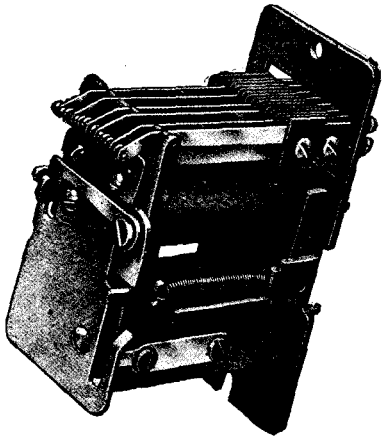


FIG. 18.

principal difference is in the number of relays fitted, five in the selector and nine in the connector (one missing in figure). The two figures are on different scales. It will be remembered that the office of the selector is to be stepped up to the hundreds level by the impulses of the first digit and then to automatically rotate until a connector is found.

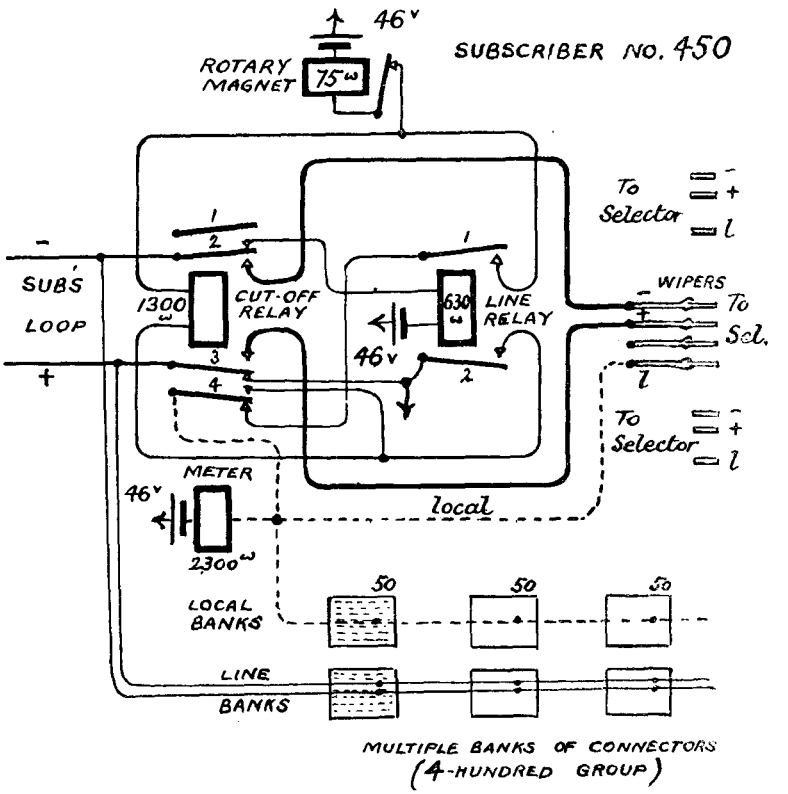


FIG. 19.—CONNEXIONS OF LINE SWITCH.

The diagram of connexions is given in Fig. 21. On the metal back, above the moving parts, are mounted the five relays SA, SB, SC, SD, and SE (the S being prefixed to the letters to indicate that they belong to the selector.) SA is the " impulsing " relay. SB has a solid copper block or " slug " at the base of the core which

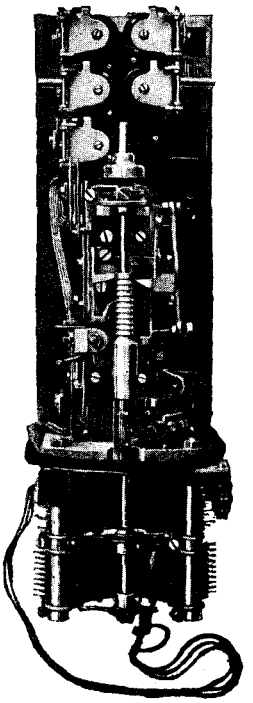


FIG. 20.

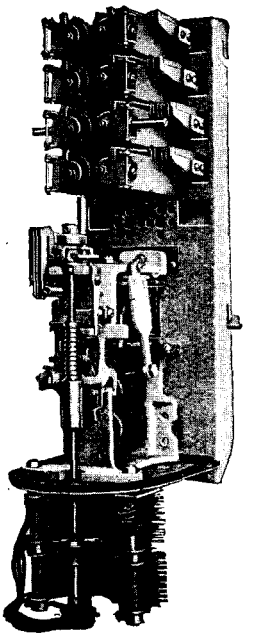


FIG. 22.

has the effect of delaying the release of the armature on the cessation of the current. That is, if a series of impulses pass through the coils, the armature will remain attracted throughout the series.

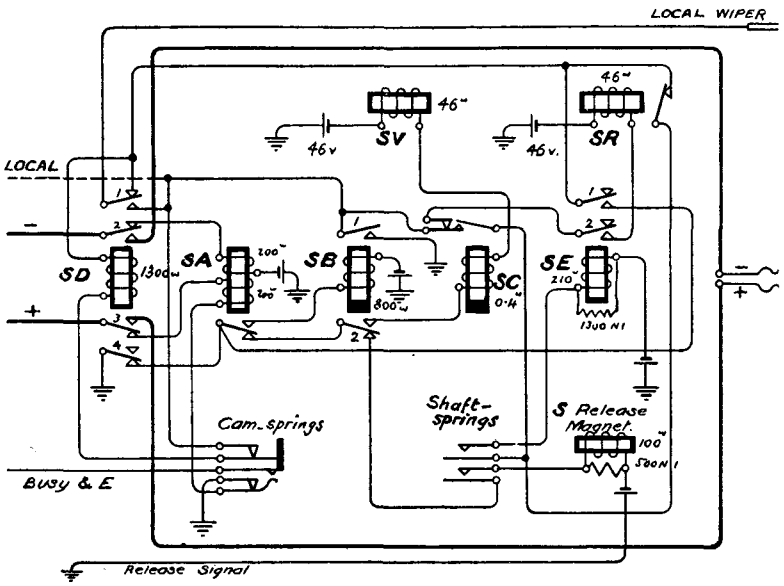


FIG. 21.—CONNEXIONS OF SELECTOR.

SC is similarly provided and is in series with the vertical magnet. SD is the "back bridge relay"—until this operates, the selector wipers are disconnected; so that, in seeking a connector, they shall cause no disturbance in passing over the contacts of those engaged. The function of relay SE is to provide a circuit for the automatic energising of the rotary magnet until it finds a disengaged connector.

On the lower part of the spindle a cam is fixed. When the shaft has rotated the wipers over the whole ten contacts without finding a disengaged connector, it moves another step into an extra (11th) position. No contacts are fitted here but on reaching this position the cam actuates a set of springs which give the "busy" tone to the calling subscriber. At the upper end of the shaft are two pairs of springs (the shaft-springs or the "off normals") which, when the selector is at rest (disengaged) are disconnected from each other. The first current received raises the shaft one step and this allows two springs to make contact with the other two.

Connector.—This is shown in Fig. 22 and its diagram in Fig. 23. It differs from the selector as follows: No cam or cam-springs are fitted; the springs at the top of the shaft, the shaft-springs or "off normals," are five in number and normally "make one." At the first upward movement of the shaft this connexion is broken and two others are "made": four extra relays are fitted, or nine in all.

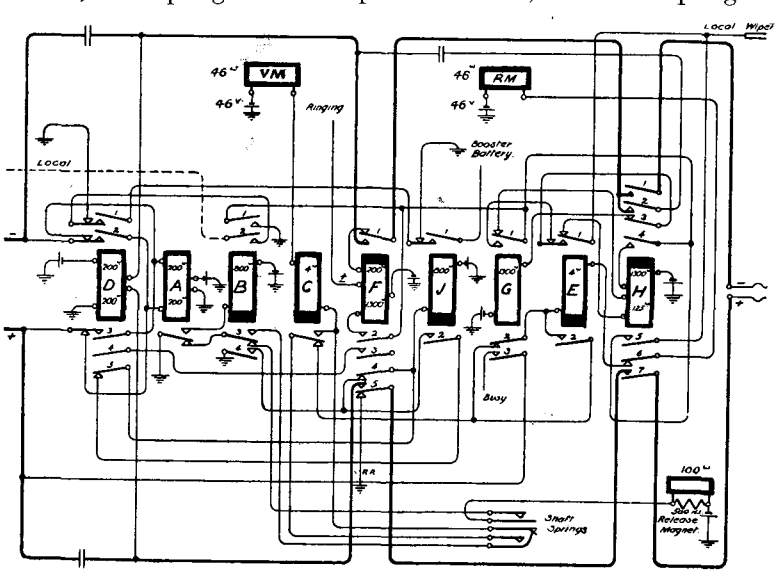


FIG. 23.—DIAGRAM OF CONNECTOR.

A is the impulsing relay: B, C and E are coppered and have similar functions to those on the selector: D's contacts, when actuated, reverse the connexions of the A relay coils (and therefore the battery) to the calling loop: F applies the generator to the wanted subscriber's loop; H throws the lines on to the wipers; G furnishes the "busy" tone to the calling subscriber when the desired number is engaged and J brings in an additional battery for metering purposes. F and H are coppered at the armature end of the core, which delays both their magnetisation and demagnetisation.

Having described the various pieces of apparatus concerned, we will now consider the operations involved in one subscriber getting through to another.

(To be continued).

TELEGRAPHIC MEMORABILIA.

MURRAY Multiplex is now in daily use on one of the special wires working into the *Manchester Evening News*' office in cottonopolis. Our congratulations to D. M. not only for having kept abreast of our American friends in the pleasant rivalry of the multiplex system, but also on account of the excellent "press" which followed the innovation. "MODERN MAGIC AND THE DAILY PRESS. QUICKEST KNOWN METHOD OF TELEGRAPHING NEWS" make splendid headings for cross columns, followed later by "WONDERWORKING MACHINE. HOW FOUR DIFFERENT MESSAGES ALL COME AT ONCE OVER ONE WIRE." Our Manchester press friends have, however, rather overdone it when they quote Hughes and Baudot as "the two great names in telegraphic history," as though there were no others. In all kindliness it might be said that a little closer study of the evolution of telegraphy is suggested, for with due respect to the "*third* great name, the wizard of the new telegraphic system," the gap between the Wheatstone tape system and the Murray Multiplex is by no means empty of other successful printing systems as Mr. Murray has himself most generously acknowledged. However, there must have been special jubilation in the *News* office that evening, and it is heartening indeed to read so enthusiastic a report on telegraphic matters in the lay press.

The C.T.O. was visited in January by a small delegation of Swiss and Italian business men headed by the Secretary of the Swiss Legation, who paid very special attention to the Anglo-foreign circuits and spent more than an hour in watching the working of the long-distance lines which fan out from the Cable Room. Like many other visitors they were surprised at the size of the building and "never guessed that in the midst of the City of London there existed so wonderful an organisation."

The experimental stage of Hughes' wireless trials between London and Berlin has been succeeded by two or three weeks' working with live traffic, several hundreds of public telegrams having been successfully and expeditiously dealt with for the first time by means of this printing system. At the time of writing an accident has happened to the antennæ at Zellendorf. There is no doubt in the writer's opinion, that the Hughes lends itself well to wireless transmission, owing to the practical absence of any lag due to long submarine or other metallic conductors. It cannot be said that the present London-Berlin wireless arrangements provide an ideal wireless circuit, nevertheless, with the watchful co-operation of Stonehaven and that of our expert friends of the C.W.O., added to which one may hope the exploitation of the circuit by the most expert Hughes manipulators at both ends, it could give much better outputs even than those yet produced. The more expeditious treatment of RQs was a distinct feature.

Listeners-in during the evening periods may have recognised an old C.T.O. colleague in the person of Mr. A. E. Thompson now engineer of the Western Electric Company. I rather fancy too—such is the faithfulness of modern high-speed printing—that A. E. T.'s photograph appeared in a recent issue of the *Broadcaster*. In any case, Mr. Thompson is to be congratulated upon his versatility, engineer in charge of broadcasting at Witton, or exponent of the merits of five-unit multiplex duplex in half-a-dozen countries it matters not.

A report from His British Majesty's Minister at Caracas, which has recently come to my knowledge, gives a very interesting record, amongst other things, of telegraphic progress in Venezuela in 1921. This though belated is nevertheless the latest report available. 1921 was a busy year for Venezuela. The telegraph system was extended *via* Nutrias and Bruzual to El Amparo on the Colombian frontier and five new stations were opened: at San Lorenzo,

Lagunillas, Santa Rita, Bruzual, and Palmarito. The total length of telegraph wire is 10,049 kilometres, with 218 stations. Radio stations now exist at Barquisimeto, 400 miles range; La Guaira, 400 miles range; Caracas, 300 miles range; Maracaibo, 300 miles range; Maracay, 300 miles range; Porlamar, 200 miles range; Puerto Cabello, 300 miles range; and San Cristobal, 400 miles range.

During the year a radio service with Trinidad (and thence by cable to Europe) was opened, the charge by the through rate to London being less than that charged by the French Cable Co.

A radio service has also been established between Venezuela and New York *via* San Martin.

The revenue from the telegraphs in 1916-17 was 468,257 bolivars. In 1919-20 it had increased to 1,010,364 and in 1920-21 had risen to 1,131,754, nevertheless, as the expenditure during the year just quoted was 2,330,122, there was a definite loss of £50,000 in round figures.

The following is quoted as an actual definition given by a Toronto daily paper some time ago, and may lighten the strain of the study-hours of this year's technical students. So far as can be gathered, the reporter was describing a Hydro Electric Power installation and he proceeded thus :—

> "There were six holes in a brick wall, through which entered, passing along copper wires encased in pipes, 26,000 units of power. They are called 'volts,' and volts means leaps or bounds. 'Leaps' of power; but the bounds are so speedy that practically the power pressure may be said to be unbroken in the direct current."

The *Electrical Review* states that a severe criticism is made by the *Radio Revue* of the French Government's regulations for the use of wireless aboard French mercantile ships and the selfish ignoring of their obligations by French shipowners and shipping companies. The French arrangements are declared to be ten years behind the progress of radio-telegraphy. The apparatus is said to be obsolete and inefficient. The most luxurious of French mail boats have to dispense with Press messages, even on voyages of two months' duration. These strictures, it is to be observed, do not apply to the French navy, which is said to be abreast in the matter of progress, with the navies of other countries.

According to the *Melbourne Age* the following are some of the conditions upon which Commonwealth wireless licences are issued, extreme care being taken to prevent the possession of secret sets. Installations must be operated by certificated operators, and with regard to land stations the regulations stipulate that unless specially authorised by the Minister, the licensed installation shall not be utilised for the conduct of commercial traffic constituting competition with the Postmaster-General's telegraph and telephone services. The regulations provide for licences for broadcasting stations used for the purpose of disseminating news or entertainments. These installations must also be operated by certificated operators, and a stipulation is made that the stations shall not be employed for broadcasting advertising matter or commercial traffic. Further regulations relating to the control of broadcasting installations will be issued later.

The fees for the various types of licence will be as follows :—Coast station, £1; ship station, £1; land station, £1; broadcasting station £5; experimental licence (transmitting and receiving), £1; experimental licence (receiving only), 10*s.*; portable station, £1; aircraft station, £1.

Reuter's Trade Service is responsible for the following very interesting paragraph on Carrier current Telephony Developments :—The American General Electric Co. has succeeded in transmitting the voice over electric power lines operating at 70,000 volts by means of a carrier current. The tests were made over the high-pressure transmission lines connecting the Highland town sub-station of the Pennsylvania Water and Power Co. at Baltimore, with its hydro-electric plant at Holtwood, on the Susquehanna River, a distance of 40 miles. Conversation was carried on under every possible possible condition that might occur on a power transmission line, such as short circuits, grounding, and broken wires. The voice is received in much the same way as radio broadcast signals. The equipment consists of a detector and two amplifier tubes. Tuning is not necessary, as the wave-length and other characteristics are always the same. Since carrier current travels on a wave-length of 15,000 metres, it is removed from any possibility of interference from radio broadcasting stations. The 50-watt sets, as tested, are capable of carrying on communications for a distance of 85 miles, but 250-watt sets are being made by the General Electric Co. which will make it possible to extend the distance of communication to 260 miles.

The retirement of Mr. Hutchinson (Plant Superintendent) of the C.T.O. removes a kindly and sympathetic personality from the ranks of C.T.O. superintendents, as all those who have had occasion to come into close contact with him will be ready to testify. There will be no more willing acquiescence in this tribute than that of those more specially connected with Cable Room technical matters for whom his ready co-operation did much to lubricate official wheels during the war, and post-war periods. The heartiest good wishes go with our colleague in his retreat by the side of the silver sea. May all the good things which he would wish himself and his household accompany him! It is also a happy chance that has placed Mr. Sanderson as his successor.

Amidst scenes and sounds almost if not quite unique in the annals of the C.T.O., Mr. Spalding, Assistant Superintendent, quitted the Provincial Gallery to pass out to his retirement one day in January last upon reaching the age-limit. Surely no man could leave the scene of forty odd years of activity unmoved with those hearty cheers ringing in his ears, and without feeling the sincerity of the sympathetic if full-throated ovation. Surely, too, the remembrance of this last day at the office will be set against the official *contretemps* and even those official disappointments against which most of us have bumped at one time or other. Thus, also surely, must our friend have soliloquised as he left us and no doubt has already placed these expressions of affection among life's compensations.

A subsequent reception and presentation at "The Ship" gave tangible evidence of the reality of the previous vocal signs in the shape of some beautiful mementos of the occasion. Mr. Edwards (Deputy Controller), at no small personal inconvenience, broke away from another gathering in order to "deliver the goods" to the recipient, which task was performed to the complete satisfaction of all present. The proceedings were accompanied by excellent instrumental and vocal items, and, but for one jarring note, were a complete success.

One of our longest submarine cables recently developed an earth fault at or near the cable hut on the foreign shore. Wishing to inform London that the fault had not been removed, the engineer-in-charge there directed a service message in the following unconventional but expressive terms :—"We inform you the place of corruption is not cleared."

Telegraphic communication between Italy and Albania has been re-opened by means of the Otranto-Vallona cable.

According to the *Ceskoslovenska Posta Telegraf a Telefon*, published by the Czecho-Slovakian Government at Praha, Engineer Steinbach has written an interesting article on Baudot telegraphy. Thus this, one of the youngest of the countries of New Europe, is apparently well in the van of progress.

It is understood by the *Electrical Review* that in well-informed circles in Berlin the directors of the German Atlantic Telegraph Co., of Cologne, are in promising negotiations with an American group in regard to the grant by the latter of a loan for the establishment of a direct cable to the United States. Foreign aid in this respect is necessary, as owing to the depreciation of the mark it would have been impossible to raise sufficient funds in Germany, and the compensation from the Reich for the loss of cables is also inadequate to accomplish the object in view. It is denied that the company has been transformed into a Portuguese company or has come under the influence of an American group or that its shares and debentures have been exchanged for similar holdings in foreign currency. The "German Atlantic," it is emphasised, is and will remain an independent German company.

Reuters' Agency states that further experiments are to be made by the French telegraph and telephone service in connexion with the transmission by wire or radio of photographs, drawings, finger-prints, and handwriting by the system invented by Dr. Belin, known as telestereography. It is hoped that the system may prove of particular use in communicating with Eastern countries, such as Japan and China, where it would be of advantage to transmit the native characters instead of having to translate them into a Western alphabet.

The following two items are also published on the same authority :—Commercial wireless communication between the United States and China has now been established. The Federal Telegraph Co. announced on Jan. 5 that a station at Hillsboro, Oregon, working on 8,400 metres, was being heard regularly at Shanghai, where the company had erected an experimental station.

An American company intends shortly to inaugurate a radio-telephone broadcasting service in Shanghai.

As a result of the installation of a new valve transmitter, the wireless station at Bergen (Norway) has repeatedly been in communication with American stations, whose signals have been distinctly heard. The Bergen station has also been equally successful in transmitting replies, the American stations reporting that the signals were very distinct.

According to the *Electrical Review* a radio-telephonic convention has been arranged between the German and the Swiss Governments whereby all the Swiss networks may now communicate with all the networks of Bavaria and Wurtemberg, also with those of the postal districts of Darmstadt, Frankfort-on-Main, Karlsruhe (Baden), and Constance. It is announced also that, by an agreement between the Governments of France and Switzerland, all the Swiss networks may now exchange messages with all the networks in the Department of the Upper Rhine. The tax for a non-urgent conversation within a distance of 30 kilometres is 1 fr.; above that distance, 2 fr.

The Times informs us that telegraphic communication has been established between the Kilo region of the Belgian Congo and the British telegraph system in Uganda.

Advice to Those in Charge.—If you ask for discipline or complain of the lack of it, ask yourself "Am I worth following"? Your assistants, your disciples, if I may call them so, will interpret you to the public. . . . . You will not make disciples by fair speeches and if you do not make disciples you will not have discipline. . . . Be prepared for things going wrong and when you are inclined to lose your temper over them analyse what temper is. It is mental sickness. Compare it with sea-sickness. Let humour come to your aid and show you how ridiculous temper is when it is of the fretful variety. . . . You claim to be the captain of your ship, act like a captain and not like a cabin-boy.—*Robert J. Norton, Address to the Yeovil Rotary Club.*

J. J. T.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEM.

TELEPHONES.

THE total number of stations in use in the Post Office system on Dec. 31 last was 1,028,258, of which 369,038 were connected with London exchanges and 659,220 with provincial exchanges. The net gain during the month was 7,958, making the total net increase for the December quarter 22,485, the best result yet recorded. There are indications that the introduction of a lower tariff for residence lines has contributed to this result as 40 per cent. of the net growth in exchange installations in the quarter was in respect of private house connexions. At the end of December the total number of residence rate subscribers was 148,892, *i.e.*, 26 per cent. of the total subscribers.

The net addition to the number of Call Offices during December was 103, bringing the total at the end of the month to 16,196, and making the net increase for the year 1,154. The public call offices in street kiosks numbered 374, representing a growth of 50 per cent. during the year.

A substantial increase in Rural Party Line subscribers was reported in December, the total at the end of the month being 6,205. The number of subscribers to this service has more than doubled during the past 12 months.

The weekly returns of traffic shewed the usual seasonal decline in December and January, and there is as yet no indication of a marked improvement in the calling rate.

The trunk traffic continues to show a slight upward tendency, though the increase, as in the case of the local calls, is not as yet substantial. For the month of November, 1922, the increase in number of calls over the corresponding month of 1921 was 16 per cent.

A marked development in the continental traffic has taken place during recent months. For the 8 months ended November the receipts from outgoing calls amounted to £50,162, an increase of £13,195 (35 per cent.) over the corresponding period of 1921.

Some statistics shewing the general development of the service during the 9 months ended December are given in the appended table :—

TOTAL AT END OF :—

	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Exchanges ...	3,112	3,116	3,115	3,113	3,114	3,116	3,121	3,128	3,140
Exchange stations	942,671	947,534	953,931	957,476	962,852	969,126	974,959	983,528	991,049
Private wire stations	36,960	36,934	36,810	36,627	36,578	36,647	36,632	36,772	37,209
Call Offices (stations)	15,405	15,487	15,573	15,667	15,755	15,838	15,962	16,093	16,196
Call Offices in street kiosks	275	289	305	317	327	335	344	356	374
Rural Party line stations ...	3,747	4,101	4,408	4,671	4,894	5,191	5,579	5,936	6,205

Further progress has been made with the development of the local exchange system. Among the more important works recently completed are the provision of a new exchange at Lark Lane, Liverpool, and extensions of the East Ham (London), Nottingham, Macclesfield, and Wolverhampton Exchanges.

The main underground system has been extended by the completion and bringing into use of new cables as follows :—

Hawarden—Rhyl.
London—Guildford.
Waltham Cross—Epping—Bishops Stortford; and
Hull—Grimsby.

During the month of January, 25 new overhead trunk circuits were completed and brought into use, and 28 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

During last month the following Baudot installations were brought into use, displacing Morse working between the offices concerned :—

(1) Liverpool—Leeds—Hull.

(2) Sheffield—Leeds—Grimsby.

The Birmingham—Cardiff Baudot service, which was opened in January, was also extended to Milford Haven.

LONDON ENGINEERING DISTRICT NOTES.

Presentation.

A VERY interesting little function took place at Denman Street on Jan. 31, when a presentation of a silver salver was made to Mr. Preston by Mr. McIlroy on behalf of those engineering officers who came into personal contact with Mr. Preston. Tribute was paid to the unvarying courtesy and kindliness which characterised Mr. Preston in all his dealings with the engineering officers, and the very excellent relations which exist at present between the staff of the London Telephone Service and that of the London Engineering District were attributed largely to the influence of the late Controller. It was stated that Mr. Preston had shown conclusively that in order to be efficient it was not necessary to be brusque and abrupt as was sometimes erroneously supposed, but that on the contrary the existence of courteous and harmonious relations tended to make the official machinery run smoothly. It is as true in human relationships as in lifeless machines that friction involves waste of energy, and an efficient organiser is one who is quick to notice the existence of friction and takes immediate steps to remove the cause.

The hope was expressed that, whether Mr. Preston found fresh work upon which to expend his boundless energy or whether he took a long period of leisure, his future years would be full of health and joy.

"Institution of P.O. Electrical Engineers."

In spite of the fog there was a very good attendance at the Institution of Electrical Engineers, Thames Embankment, on Wednesday, Jan. 17, at 5.30 p.m., to hear Mr. E. S. Ritter's paper on Cable Testing before the London Centre of the Institution of Post Office Electrical Engineers. In the absence of the Chairman of the Centre (Mr. R. McIlroy, Superintending Engineer of the London Engineering District) on official business, the Chair was taken by the Vice-Chairman, Mr. H. Wilson (Staff Engineer). Among the audience we noticed Mr. F. C. Baldwin, Assistant Superintending Engineer, N.E. District, and Chairman of the N.E. Centre of the parent Institution; Mr. Frank Gill, President of the Institution of Electrical Engineers and European Engineer of the Western Electric Company, and Mr. E. S. Byng of the same Company.

The use of telephone repeaters, balanced cables and loading coils in connexion with underground plant necessitates a very accurate knowledge of the constants of the cables which are used, and the requirements as regards insulation, conductants, capacity, are much more exacting than they were at one time. The paper described in detail the methods adopted by the Department for testing cables during construction, and also dealt with the testing and localisation of faults in cables. In addition, a brief account of the principal operations involved in the laying, jointing, loading and terminating of main cables was given. Much of the work described in the paper is original, the methods and tests having been devised by officers of the Engineering Department, and it is gratifying to note that our American friends—generally regarded as being far in advance of engineers in this country in telephone practice—have adopted some of these methods.

Several debatable points were intentionally raised in the paper, for example, the waxing of cables opened for jointing or testing; the terminating of cables and the merits of silk and cotton covered cable. These points, however, did not raise as much discussion as one would have liked. Mr. Ritter is to be congratulated upon his paper which forms a valuable contribution to our knowledge upon the important subject of cable testing. Its value for reference is enhanced by a summary of contents, an index, and a bibliography. It is to be hoped that the paper will be printed, and thus be available for general use.

PRESENTATION TO MR. KIDD.

MR. A. M. KIDD, who was for 17½ years District Manager of the Cork District, has been transferred to Nottingham as Acting District Manager, and was on the occasion of his farewell visit to the District Office presented with a Silver coffee pot by the staff.

"TALK OF MANY THINGS."

THE name of the first prize winner in the recent competition is Miss Blair, of Liverpool.

The London Telephonists' Society.

The meeting of the L.T.S. (held every month with great success) took place last time on Feb. the 2nd, when Competition Papers beckoned. Miss Bott (to hear her, what a boon !) "emerged" a Moth from its Cocoon. With insight and with humour, too, she gave the learners' point of view; and said how careful chiefs should be to show a ready sympathy.

Miss Turner next, her bright head bowed, told of her protestations loud, to save two increments alive, that she might at the least survive. She gave in language clear as dew her own and others' points of view; and that of One Who Matters Most. Told how she strove to lay the ghost of past misdeeds, and her sad plight, at interviews abortive quite. Each listener's eyes with tears were dim (with one or two exceptions grim). Miss Bott replied with kindly tact, and said each word was based on fact; and then, with vivid lightning flash, and rolls of thunder, crash on crash, antagonistic voices pealed, till poor Miss Turner's blood congealed. She saw no quarter—not a speck—then looked—in vain ! for Mr. Beck; and, as she trembled on the brink of tears, for Messrs. Dive and Pink; and then, lest all who heard should scorn her, gazed wildly round for Mr. Corner; and, in her eye a tear of brine, searched next for Mr. Valentine. And then there splashed that large, hot tear; where *were* the men of yesteryear !

Oh, stronger sex, if you should read this simple tale of direful need, we pray that you'll be led to make great sacrifices for our sake. To wit, each meeting you'll attend defenceless damsels to defend; giving that touch of kindly leaven that leads poor mortals nearer Heaven.

On being Fired with Enthusiasm.

"If you have people working for you who are not fired with enthusiasm, and you cannot fire them with enthusiasm, then promptly fire them with enthusiasm."—*Telephony.*

We print a contemporary's idea of an "Optimist."

The Great Optimist.

A cheerful man was Peter Wicks,
Who'd reached the age of four score six;
And people came for many a mile
To drink the sunshine of his smile.

When Peter couldn't get about,
From rheumatism and the gout
Instead of feeling all depressed
He thought how peaceful 'twas to rest.

And when no longer he could read,
He'd tell of wonders that he'd "seed"
And deafness wasn't "nuthin fell"
It simply meant a "quiet spell."

Old Pete had left but just two teeth,
An upper and the one beneath.
But life to him was good and sweet,
He thanked the Lord the teeth *did* meet.

The great idea for you and me
In this old man's philosophy,
Is—if we have a cheerful mind,
Our clouds will all be silver lined.

We have very much pleasure in printing a letter received from Mr. C. V. Long. It may be mentioned that Mr. Long himself has just received a letter of appreciation from a Dutch colleague in Hertogenbosch, Holland, for his very clever parody on "If" which appeared in the October issue of the JOURNAL.

An Appreciation.

DEAR EDITRESS,—May I trespass upon the privacy of your page for a few words of appreciation of a recent article entitled "The Gentle Sub" ! by Miss Dorothy Turner ?

Although readers of the JOURNAL are by no means unacquainted with Miss Turner's talent, they must surely agree that she has excelled herself this time, and outdone her previous efforts. Being an authority on "Load Lines," she will, no doubt, appreciate a somewhat obscure analogy suggested by an engineer that she had this time reached "*peak load.*"

"The Gentle Sub" is, to my mind at least, remarkable, for it shows the authoress has an understanding and power of expression of the point-of-view of the over-criticised telephonist; an excellent control of the language: and lastly—that inestimable quality—a sense of humour. Anyone who has intelligently followed her recent contributions must agree that she has gone from attainment to attainment, and one wonders—what next ? It is hoped that Miss Turner will understand that this letter is—(what it is intended to be)—just "an appreciation."—I am, yours faithfully,

C. VINCENT LONG (Gerrard).

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

HOLIDAYS IN SWITZERLAND.

THE Horsley Party leaving London for the Bernese Oberland, on June 8, will be personally conducted by Mr. J. W. Fewtrell of the P.O. Engineering Dept., G.P.O. (West), E.C.1., to whom intending members should apply.

THE POST OFFICE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

ON Jan. 15 last, Mr. Frank Gill, President of the Institution of Electrical Engineers and European Chief Engineer of the Western Electric Company, gave a most interesting address to the members of this Society on "Some Aspects of the Communication Art."

Mr. Gill, while referring briefly to many aspects of telephone service, devoted considerable attention to two which he considered of outstanding importance at the present time (1) the need for unhampered growth and for an efficient "selling" organisation, and (2) the necessity for a centralised control of the international telephone service of Europe with a view to its efficient development.

Mr. Gill shewed that the phenomenal growth of the telephone service in the United States was largely due to a highly organised system of publicity, and he illustrated his argument by lantern-slides of a number of typical advertisements by American telephone companies.

As regards international telephone service, Mr. Gill pointed out that experience in the United States in regard to corresponding distances shewed that efficient telephonic communication was practicable between any two places in Europe, but that for the development of a comprehensive international service it was as essential in Europe as it was in America, that there should be a central controlling body co-ordinating the various interests and welding all international lines into a homogeneous system.

The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. MARCH, 1923. No. 96.

OVERLAND AND TRANSATLANTIC TELEGRAPHS.

MR. TYRRELL'S exhaustive and yet condensed account of the position of the Anglo-Continental telegraph service during and after the War is not entirely confined to that interesting field. He refers in passing to the Indo-European overland telegraph line which, before the War, afforded communication with Persia and India *via* Berlin, Warsaw, Odessa, Tiflis and Teheran, and to the Imperial cables, which, during the War, opened up an all-British route to Canada, New Zealand and Australia. These suggestive glimpses of extra European and Transatlantic communication, which has existed in some form or other since the sixties of the last century, give as a vivid reminder of the achievements of telegraph pioneers and the perseverance with which they overcame all obstacles in their efforts to girdle the globe with wires. The failure in 1857 and the ultimate success in 1866 of the attempt to lay a cable across the Atlantic, and the failure and success of the cable between Egypt and India a few years later, are matters of history. There is no doubt that the sixties saw great telegraphic developments, for, by the year 1854, the European system extended no further east than Königsberg, Lemberg, and Orsova on the Serbian border, did not reach Rome, stopping short at Viterbo, did not cross the Pyrenees, and stretched no further North than Aberdeen and Elsinore respectively. Yet by 1863, the Russian system was not only extended to Kazan, but even to Irkutsk in Siberia; and this brings us to one of those failures which are almost as interesting as successes.

In an article in the *Telegraph and Telephone Age* entitled "The Russian extension of the Western Union Telegraph Company," we learn that on the successful extension of the telegraph from the Atlantic to the Pacific, an overland route was projected from the United States to Europe *via* Behrings Straits! A report was made to the Senate of the United States in Feb. 1862 revealing the vast progress of telegraphs in Europe and the enlightened action of the Russian Government in the proposed extension of her telegraph system to the Pacific. An appropriation of $100,000 for the survey of a route from California to the Amoor was asked for. Russia offered her aid to a rebate of 40% on American messages when communication was established. She had already assured the construction of 7,000 miles of line from Moscow to the Pacific. A line was in course of construction from San Francisco to Oregon and Vancouver, but the distance thence to Behrings Strait was 1,800 miles. It must be remembered that the first attempt to lay the Atlantic cable had failed, and that many engineers doubted if such a cable would ever succeed. Everything, therefore, pointed to the overland cable as a great route to Europe; it was entirely practicable, and it was claimed that no work costing so little money had ever been accomplished by man that would be so important in results. No difficulty was found in raising money for the scheme, the British Government acted loyally and liberally with regard to British Columbia, the Russian line was extended to Irkutsk, and in 1865 the survey of the territory between Vancouver and the Yukon River began. It was hoped to complete the line at latest in 1867. Preparatory work was in hand at the mouth of the Amoor, when in 1866 came the news of the successful laying by the *Great Eastern* of the Atlantic cable. When the complete success of this cable became evident, the work on the construction of the Russian line was stopped. Its justification ceased to exist and it is added to the list of those glorious failures which are landmarks on every path of progress.

HIC ET UBIQUE.

THE gradual resuscitation of the Telephone and Telegraph Societies in the provinces is a matter for congratulation. Last year witnessed the revival of the Edinburgh Society and this year societies are being formed in Manchester, Birmingham, and Norwich for the reading and discussion of papers, whilst at Leeds the West York Social and Discussion circle already fulfils some of the functions of a Telephone Society.

ACCORDING to an Italian newspaper, the *Corriere Mercantile*, a syndicate of Italian and foreign companies engaged in private telephone industry is about to be formed to take over the exchanges and inter-urban telephone lines of the Italian Government. The heads of the syndicate are reported to be G. B. Pirelli and Comm. Motta.

ON the other hand *Telegrafi e Telefoni* reports that the concessionaire telephone companies in Spain are being taken over by the State. The Barcelona company (the largest) whose concession expired in December, 1921, has already been acquired, and the transfer of the remainder will take place in the course of the next five years. It is proposed to remodel and improve the system.

THE *Automatic Telephone* gives the following interesting statistics of automatic telephone development. They are supposed

to refer to the end of 1922, but as they were published in November, they must necessarily be estimated despite the fact that tens and units are shewn in the figures.

	Total Telephones. (Thousands.)	Automatic Stations.	Percentage.
North America ...	16,018	851,128	.053
Europe	5,712	284,425	.049
Asia	572	13,163	.023
Oceania	451	60,300	.133
South America... ...	364	22,425	.062
Africa	118	116	.008
	23,238	1,231,557	.053

We consider the estimate for the first column far too high; we should put the figure at about 22,900,000; but any estimate made before, say, July next must be pure guess work.

A FRENCH Broadcast scheme whereby Stock Exchange, produce markets, and fish-market prices are to be daily circulated to the ports and other places interested by radio-telegraphy is being elaborated by the Under Secretary of State for the Merchant Marine and the Post Office. It will involve no State outlay, as the cost will be covered by licence fees. Its special object is more particularly the furnishing to the fishing ports of early morning intimation of the ruling quotations in the Paris markets.

It would be interesting to hear what Billingsgate would have to say while "listening-in" to atmospherics at 4 a.m.!

CORRESPONDENCE.

TO THE EDITOR OF THE TELEGRAPH AND TELEPHONE JOURNAL."

I READ with much interest the article, "Suggestions towards the Improvement of the Service," written by Miss Dalley in the January issue of the JOURNAL, and would like to add a word in support, particularly in connexion with the portion dealing with the Information Desk and Monitorial complaint work.

To accomplish the purpose for which it exists, surely the Information Desk should not only be fully equipped, but absolutely *the* most fully equipped position in the switchroom.

It is not "business-like" to expect good results from indifferent material, much less is it "economical" to expect the monitor to work under conditions which very often prove to be a serious handicap in an endeavour to give satisfaction to a complaining subscriber.

My personal experience is, that instead of every possible facility being provided to ensure smooth and quick working, many hindrances are in the way, one very big one (mentioned by Miss Dalley in her paper), being the fact that a very large percentage of the calls to outside exchanges have to be routed *via* an "A" telephonist, and here, an additional difficulty is met with, as in these cases the supervisory signals on the monitor's position do not operate.

This routing of calls *via* the "A" board causes much delay and further annoyance to the subscriber who has experienced difficulty before being connected to the monitor and who now is in no mood to be trifled with.

According to "Traffic Instructions," one of the qualifications which the monitor must possess, is the ability to "convince the subscriber that he is talking to some one in authority who is able and anxious to help him."

Anxious to help, she *may* be, but is she *able to do so speedily*?

Frequently quite a considerable time elapses before the monitor is in a position to give the subscriber the information he seeks, and this delay, in many cases, is due to lack of apparatus, which the "*A*" *telephonist* has at *her* disposal.

There certainly is something very wrong in the construction of an Information Desk which has such restricted facilities. What can have been the object for the present design?

In conclusion, I fully realise that no new points have been brought out in my letter. My object in writing has been merely to emphasise what Miss Dalley has most clearly said in her paper, and I sincerely hope that her "Suggestions towards the improvement of the Service" will not only be "considered" but "*adopted*" by the officers concerned.—Yours faithfully,

(MISS) E. G. O'CONNOR.

City Exchange, Manchester,
Jan. 24, 1923.

"AN ADVERTISEMENT."

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

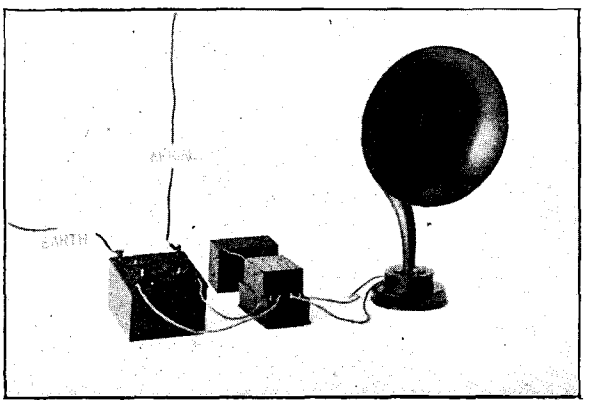
DEAR SIR,—May I respond through your columns to some remarks made by "Civil Gerard" in your January issue.

In her well-timed sarcasms, I am particularly drawn to her reference to the Engineers. We are not martyrs to science nor, of course, anything like the paragon she intentionally invents for us. It is perfectly obvious what she means, however, regarding the relations between operators and the exchange linemen, and I do not doubt that an operator may sometimes think she has run up against something worse than a peevish subscriber. The reason may be traced to reaction, or to real cause for adversity, or to both.

It is almost certain that the engineers cannot operate, and therefore do not understand many difficult positions with which an operator is faced, and which call for coolness and collectedness. Operators cannot clear faults and I think for this reason do not allow for their eccentric behaviour. A repeat fault acts like a libel on the intelligence of the man responsible; the most diligent men are sometimes affected. An elusive "dis" or "short" promotes mental disorder and both operator and engineer are concerned. I am not quite sure if the latter is not more pleased to clear a "bad penny fault" than the operator is with restored conditions.

"Civil" is rather to be admired, however, because, although fully alive to all her trials, she treats the unreasonable part in a lighter vein. Rightly so—and a little fore-thought will, I feel sure put her right with the engineers. No one values her more than the engineer who feels that she is helping him to keep a mastery over faults. Lucidity and persuasiveness are not among his essentials, and seldom his common properties. She may meet with the "real" disgruntled man of science and will tolerate his personal peculiarities because he is great; and she will blame his molecules and atoms. I do not intend to make comparisons, yet it is usually the *fault* that makes the lesser fellow bad tempered.—Yours, &c.,

Victoria, Jan. 15, 1923. "YORKY."



WIRELESS TELEPHONE BROADCAST RECEPTION: THE FACTS.

THE above illustration, which was omitted from the February issue, shows a crystal receiver designed by the writer of the article especially for the broadcasted music. It refers to the following passage (p. 80):—

The circuits are arranged to compensate for any variation in aerial length between 20 ft. and 150 ft. or more, in view of a possible increase in size of aerial that may be permitted in the future. The correct adjustment of the detector is obtained automatically with facility and certainty by the simple turning of an ebonite thumbscrew, working in conjunction with a special spring device. In practice, readjustment is very rarely needed. On this set, the experimental broadcast transmissions from Marconi House are received clearly on headgear at a distance of 40 miles, and with the Brown microphone amplifier shown in the illustration operating on 6 volts with dry cells, the music is pleasantly reproduced on a loud speaker within a radius of 10 miles. These distances apply with an average good aerial, such as can be arranged with a 20-foot bamboo on the house, and a 50 ft. to 100 ft. length of wire down the garden.

GENERAL FEATURES OF THE ANGLO-CONTINENTAL TELEGRAPH SERVICE SINCE THE WAR.

BY J. J. TYRRELL.

(*Continued from page* 88.)

This particular urgent rate service cannot be beaten, so one wonders how much longer the French Government intend to utilise the temporary measure while valuable cables, some brand new, are permitted to lie in the Channel, fretting for more scientific treatment.

If the French wires are bad the Italian circuits, all of which pass through Paris, can be no better, in fact they are actually worse, owing to temperamental and electrical conditions, and social unrest in Italy, all of which have tended to deteriorate the service since the war.

The detrimental electrical conditions on Italian territory are alleged to be largely due to the high tension circuits which run parallel to the route of the telegraph wires on the railway. Be that as it may, we have daily difficulties with the Rome, Milan, Turin and Genoa circuits, which seldom remain uninterrupted for more than an hour or two, while it is not often that all four are working well at the same time.

Communication with Belgium has improved considerably, but there are still almost daily signs of line trouble even on the short lengths that connect Antwerp and Brussels with the coast.

POST-WAR CALENDAR 4.

June 5, 1922.—Remote control of Leafield taken over by Cable room for all services except to Cairo and Rome.

July 1, 1922.—Ex-D.U.S. cable taken over by Government.

„ 17 to July 24, 1922.—Delegations from French and German Telegraph Administrations visit C.T.O. to discuss telegraph matters, exchange views, and obtain information.

„ 24, 1922.—Karachi wireless broadcast for Bombay, Calcutta.

„ 31, 1922.—Telegraph money order service established with Australia.

Sept. 6, 1922.—A Rotterdam wire ceded to Commercial Cable Company.

„ 18, 1922.—Tchecho-Slovakian Mission (MM. Kucera and Strnad) visited C.T.O.

The Dutch circuits which carried very heavy traffic throughout the war, but were not subject to enemy action, were nevertheless detrimentally affected for some time. It may, however, now be safely stated that these have recovered their pre-war stability, and have even added to that stability by a considerable portion of the Dutch land-lines having been placed underground. It is hoped that the British will be able to complete this side before long.

The list of post-war events includes the opening of a direct wire to Turin, a special express and direct telegraph service between the London and Amsterdam Stock Exchanges, and the institution of a wireless service by the Marconi Company between London and Berne, this latter giving additional communication to a country which has already more telegraph facilities with Great Britain for its size than Germany or Italy.

The remaining features of special interest are the various wireless developments initiated by the British Government of which more later.

The opening of a direct wire between London and Praha, the capital of Czecho-Slovakia, is an event of almost historical importance. This new country is strong and vigorous. Before the war its telegraph communications with the outside world were very meagre and were subject to many restrictions. It has now direct telegraph communication with no less than nine European countries. The route of the London circuit is in part the same as that of the old London-Vienna lines which are at present unnecessary owing to the collapse of Austria.

A few of the mileages of some of the London-Continental circuits may prove of interest. Our only *direct communication* with Budapest at the present time is by wireless, the traffic here also owing to political changes having been much reduced.

SOME OF THE PRINCIPAL ANGLO-CONTINENTAL TELEGRAPH CIRCUITS AND THEIR APPROXIMATE MILEAGES FROM LONDON.

Name.	*Length.*	*Name.*	*Length.*
Amsterdam ...	230 miles.	Milan	800 miles.
Paris	280 „	Genoa	880 „
Zurich	426 „	Vienna	1,045 „
Berlin	720 „	Rome	1,170 „
Leipzig	835 „	Budapest ...	1,360 „

We now come to the German circuits. Here again we were met by very heavy deterioration in the electrical value of the foreign land-lines, but, steadily these also have improved in quality and, if not up to the electrical standards of 1914, the more patient working of the circuits compensates considerably and results in very creditable outputs. The installation of the Siemens' High-Speed Printing Telegraph Duplex system on a London-Berlin wire, working at a speed of 500 letters per minute, has done much to assist in dealing with the shoals of belated traffic from Western Europe, while the Baudot Double Duplex worked to Berlin has formed a most stable communication. Baudot Double Duplex to Hamburg on three wires, giving 12 channels in all, has also proved a particularly prompt means of dealing with the increasing traffic of the chief German port. Germany has not been without her social unrest, but, except for a reluctance to work during certain hours of the night, it is freely admitted that the German telegraph officials have co-operated excellently with our endeavours to improve the Anglo-German Telegraph Service.

The opening of an enlarged and better equipped repeater office at North Walsham on the English side has contributed not a little to the more effective working of the cables. If one is not mistaken certain finer re-adjustments of anti-induction values have also added to the effective traffic value of these cables.

WIRELESS DEVELOPMENTS.

It will have been noted that wireless developments have not been overlooked in connexion with Anglo-Continental communications, and in this the C.T.O. has played a not unimportant part. I have frequently been asked what is definitely the nature of the relationship between the Wireless Branch G.P.O. North, and the Foreign Telegraph Section of the C.T.O. in G.P.O. West? Candidly speaking, I do not think that either Department could correctly define that relationship except that the former is more intimately connected with the technical side and its adjustments than the latter. The Wireless Branch, however, also handles a certain amount of traffic which is controlled by the C.T.O. and at the same time acts somewhat in the manner of a repeater station. Whatever may be the ultimate official relationship between us, it is intensely gratifying to place on record the fact that the two Departments are actively co-operating.

The C.T.O. appears to be recognised as the repository for everything in connexion with the rapid despatch for traffic, high-speed automatic, or multiple telegraphic transmission and reception, including keyboard perforation in the first case and Creed printer reception in the second.

It does not matter what particular type of apparatus may be ultimately chosen for use with the wireless systems. The C.T.O. will engage to supply the necessary operators for any description of apparatus that may be selected, including Wheatstone, Baudot, Siemens, Murray, Western Electric, Undulator, Syphon Recorder, Creed, Morse or Hughes. The latter type-printing system has recently been tried over a distance of 500 miles with excellent receptoin in the C.T.O.* The Wireless Branch has introduced a new medium for the transmission of telegrams and with its highly-trained technicians has tamed that medium to our use. We, on our side, have given of the best of our long experience to the competent handling of Anglo-Foreign and Colonial traffic at high or low speed. I would submit that our united efforts have so far produced results not unworthy of the British Post Office.

So much for the general position. We are now simply waiting for any new turn that invention, or agreement, may take as regards the type of apparatus to be used. Meantime we have been utilising hand-speed Morse, hand and high-speed Wheatstone, keyboard or hand-perforated slip with Creed printer reception, and sounder or aural reception.

Now to particularise! Taking the Government wireless circuits in their chronological order of installation we come to London-Berlin duplex with Stonehaven on the British, and Konigswüsterhausen on the German side as the respective controlled stations. This circuit was opened on Jan. 27, 1921, which date, by the by, is the Kaiser's birthday! 30 to 45 words per minute is generally attained by means of automatic transmission, but undoubtedly twice that speed should be possible. The Wheatstone slip is prepared on the second floor of the C.T.O. and conveyed by hand to the wireless room on the roof where it is run through the transmitter. This is a somewhat cumbersome and uneconomical arrangement, but quite unavoidable in the present stage of development and with the very restricted structural conditions at present obtaining. At times Creed printer reception is easily possible. This circuit was specially helpful during a recent breakdown of the land-lines abroad. A second Anglo-German wireless circuit was proved in February of the same year between London and Cologne with Aldershot and Riehl as the respective controlled stations. This is an ex-military station and actually works at a speed of 100 words per minute with automatic Wheatstone transmission and Creed printer reception. There is at present insufficient traffic for this circuit, and it is a pity that circumstances do not permit of a change over being made between the London-Cologne and London-Berlin installations.

By means of the Stonehaven installation a simplex wireless communication with Poland is also obtained each day from 4 p.m. on one day until 11 a.m. of the next, the Berlin circuit using the arc from 11 to 4 p.m. In this case the traffic is transmitted from London by hand to Stonehaven, the latter similarly re-transmitting to Posen. A similar service, but worked through the Northolt station, is open each evening with Budapest for Hungarian traffic, from 10 p.m. to midnight, but is at times somewhat erratic as regards its output. This is not always due to technical causes.

* Subsequent and successful trials with the Hughes' printing telegraph duplex apparatus have been carried out between London and Berlin since this paper was read.

Wireless communication by Wheatstone transmission is also carried out on the London-Caister-Amsterdam circuit from 11 a.m. to 6 p.m., remote control also being adopted in this connexion. This like the Berlin circuit is worked duplex.

On Feb. 13 last a wireless service was opened between London and S. Paulo, Rome, and has recently proved of considerable assistance. This circuit was at first worked through the Leafield aerial but Northolt is now the station remotely controlled by the roof G.P.O. West. This is also a slow Wheatstone circuit working from 1 p.m. to 6 p.m.

Perhaps the most interesting wireless circuit is the Oxford-Banbury-Leafield combination which is a 24-hours' circuit with the following programme.

OXFORD RADIO DAILY PROGRAMME.

Control.	*Hours.*	*Service.*
C.T.O.	Midnight— 1 a.m.	Foreign Office Press.
C.T.O.	1 a.m. — 1.50 a.m.	Long-distance radio. Telegrams for ships.
C.T.O.	1.50 a.m. — 2.35 a.m.	Radio communication Company's message for Captain *Berengaria, Balmoral Castle, Samaria,* and *Scythia.*
	2.35 a.m. — 2.45 a.m.	Change wave length.
C.T.O.	2.45 a.m. — 4 a.m.	Halifax Press.
Banbury	4 a.m. — Noon.	Cairo.
C.T.O.	Noon — 1 p.m.	Foreign Office Press.
Banbury	1 p.m. — 4.10 p.m.	Cairo.
C.T.O.	4.10 p.m. — 5 p.m.	Press telegrams for Cairo.
C.T.O.	5 p.m. — 7.45 p.m.	Halifax Press.
	7.45 p.m. — 8 p.m.	Change wave length.
C.T.O.	8 p.m. — 9 p.m.	Foreign Office Press.
Banbury	9 p.m. — 9.45 p.m.	Cairo.
C.T.O.	9.45 p.m. — 11.45 p.m.	Halifax Press.
	11.45 p.m. — midnight	Change wave length.

Gell perforated slip in conjunction with specially low-geared Wheatstone transmitters is the method of transmission, with remote control by London of the Banbury aerial, for all services except that of Cairo. The latter is supplied by hand transmission to Banbury with, for the present, re-transmission at the latter point.

The preparation of the Wheatstone slip for this circuit is very carefully made. All erasures and errors are avoided, or if made are carefully cut out and the perforated slip joined up with a special exactitude. The slip is also checked during transmission, so that perfect transmission is doubly assured.

The Foreign Office Broadcast Press is also a specially useful and successful item of the programme, and the London-Halifax Press Service—we have it upon the authority of the American Press—"has never yet had its equal in a trans-ocean radio service."

This is in no small measure due to the really magnificent co-operation of the Canadian operators at Halifax, Nova Scotia. The average rate of transmission is about 30 words per minute. This is received aurally at the Halifax end, and I believe typed. When time has been short and press heavy, the speed has been raised to just over 40 words per minute at the request of Halifax. More than 10,000 words have been disposed of in one night by this means, and that with only two or three corrections.

A small amount of press has also been successfully transmitted direct from London *via* Banbury to India, while telegrams to ships at long distances are transmitted each night and broadcast news is also picked up by the special steamers mentioned.

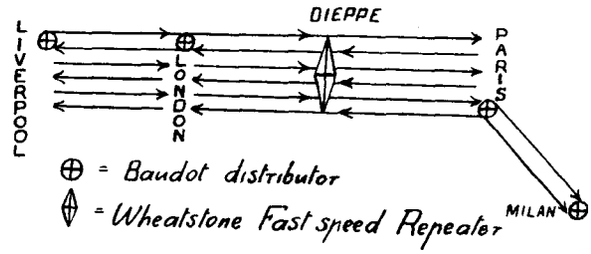
The programme before us has to be carried out to the minute. On one occasion we were charged with being 60 seconds late, but were able to prove that our delinquency only amounted to something less than five seconds.

As a point of interest it may be mentioned that, during the recent crisis in the Near East when land and cable communication was interrupted, certain important Government telegrams were despatched by the London, Banbury, Cairo, Jerusalem Wireless Service to Constantinople.

The best of the wireless results have been attained on circuits staffed at both ends by men of our own nationality, although the London-Amsterdam circuit should be productive of much better results if higher speeds and Creed reception could be adopted. The Berlin circuit, too, is capable of better things, but at present it is governed by certain conditions which may improve before long.

DUPLEX BAUDOT DEVELOPMENTS.

The war was largely responsible for the adoption of the duplex principle of working Baudot multiplex with France. The restricted number of wires available for the increased trans-Channel traffic was an overwhelming argument in favour of the system. The British Government loaned engineers, repeater staff, and apparatus for the Dieppe and Havre routes whereby the traffic-carrying capacity of each wire was increased by at least 100 per cent. So successful was the system that, with the arrival of peace, there was no question of a return to simplex conditions and the system has been continued. Triple duplex Baudots betwen London and Paris are now a standard type of communication on the longer Anglo-French cables, giving six traffic channels, three in each direction on one wire. This has made possible the forking of these duplexes at Paris to certain Swiss stations, thus giving connexion between London and Geneva, Berne, Bale, Zurich, &c. An adaptation of this was installed after the war between Liverpool, London and Paris. A



duplexed metallic loop is utilised between Liverpool and London and a duplexed single wire between London and Paris, the latter fitted with a fast speed Wheatstone repeater at Dieppe. The apparatus used is triple Baudot duplex so that six traffic channels are available throughout. This provides four channels, London and Liverpool, and by means of ancillary apparatus at London gives two channels between Liverpool and Paris. There now remain four channels between London and Paris which can be utilised for traffic between the two capitals, or can again be further extended according to the needs of the moment.

Other Baudot duplex developments have been proceeding in addition to simplex forked Baudot to additional Swiss centres, so that we now have direct telegraphic communication with Bale, Berne, Geneva and Zurich and during the recent Conference with Lausanne.

By means of Baudot duplex increased traffic channels have been obtained between London and Amsterdam, and London and Rotterdam. Thus Amsterdam now carries 12 channels on 2 wires, Rotterdam 8 on 2 wires. By this economical use of the Anglo-Dutch cables certain cable cores have thus been set free. These have been leased to private companies, to the financial advantage of the administrations concerned.

The outstanding features of the Anglo-German circuits has been the re-establishment of Baudot duplex with Berlin and Hamburg by a *reduction* of the number of channels per cable conductor, in some cases from six to four. By this means greater stability has been obtained. Also the introduction of the Siemens' high-speed automatic printing telegraph, which is at present working well duplex at 500 letters per minute in each direction, as already stated, between London and Berlin, or as quite recently between London and Dusseldorf.

FOREIGN TELEGRAPH MONEY ORDERS.

Another interesting phase of Anglo-Foreign and Colonial telegraphy, both before and during the war, and post-war periods, has been that of the telegraph money order system. If the archives of the Post Office could be searched I do not think a more steadily persistent Department could be found than that which provides the initiative and motive power for the development of this sytem. Silent in their labours they are among the true Imperialists. The spread of the telegraph money order system abroad, especially to the Colonies and the U.S.A., is in no small measure due to the steady, courteous pushfulness of this, our own administration.

NEW FOREIGN AND COLONIAL TELEGRAPH MONEY ORDER SERVICES SINCE 1914.

June 30, 1916.
- Bahamas.
- Bermuda.
- Egypt (extensions)
- Hong Kong.
- Rhodesia (North and South).
- Sarawak.
- Seychelles.
- Somaliland Protectorate.
- Zanzibar.
- West Indies (as follows) :—
  - Antigua.
  - Barbados.
  - Dominica.
  - Jamaica.
  - St. Kitts.
  - St. Vincent.
  - Trinidad.

Sept. 1, 1916.
- Federated Malay States.
- Fiji.
- South Africa, Union of
- Strait Settlements.
- Sudan.

Sept. 30, 1916.
- Ceylon.
- Gibraltar.
- St. Lucia.
- British Guiana.
- New Zealand.

Nov. 1, 1916.
- Mauritius.

April 1, 1917.—Grenada (West Indies).
May 10, 1917.—British North Borneo, Malay States of Johore, Kedah and Perlis.
Nov. 1, 1917.—Aden, India (including Burma and certain places in French India).
July 1, 1919.—Malta.
Aug. 1, 1919.—Greece (including Crete).
Nov. 20, 1919.—Alsace Lorraine.
May 4, 1921.—South-West Africa.
July 1, 1921.—Gambia, British Honduras.
Sept. 1, 1921.—Cyprus.
„ 29, 1921.—District of Memel and Danzig.
Jan. 2, 1922.—Kenya and Uganda.
May 1922.—Morocco.
July 31, 1922.—Australia.
Oct. 1, 1922.—Palestine.
„ 24, 1922.—Norfolk Island.

The quiet development of this method of telegraphically transmitting money to and fro across the world did not slacken even during the war. About the middle of June, 1916, extensions of the system were made to the Bahamas Bermuda, the whole of Egypt, Rhodesia (Northern and Southern), Sarawak, Seychelles, Somaliland Protectorate, Zanzibar, and to the West Indies as tabulated. Reading down the lists of places opened up to this form of communication, and not forgetting that the commencement of this particular phase of British progress dates from more than two years prior to the signing of the Armistice, one cannot but admire this splendid piece of optimism of Post Office officialdom.

An immense amount of cash was transferred between Northern America and the British Isles during the war, and the two years which followed the Armistice, and I will simply recite two examples of rough but sincere tributes to the efficiency and simplicity of the system as well as to the efficiency of the Post Office executive staff.

An American soldier on leave in London presented a telegraph money order from somewhere in the backwoods and, much to his suprise, was paid within two or three minutes of presentation. "I guess you lick us here, stranger," he said. "Way back in Downtown I should have had to dig out the Sheriff to witness this yere bit of paper afore they put down the dollars, an' p'raps then they wouldn't done it, shake!" and he insisted on shaking hands with the counter clerk.

In the second case a Canadian "Tommy," upon returning to Canada, found that a telegraph money order which he had sent home had not been paid owing to some mistake in the address, and accordingly demanded return of the cash. The usual particulars were requested, but he could not remember the name of the Post Office in London. Asked to specify, he wrote as follows: "I can't say the number or name of the Post Office, but if you go to the club and look out of window down the street to the square about 100 yards ahead you'll see it." The L.P.S. identified the building and the money was duly refunded.

ANNUAL RETURN OF TELEGRAPH MONEY ORDERS.

Year. April 1—March 31.	Continental.	U.S.A. and Canada.	Other Colonials.	Total.
1914/1915	35,578	4,665	—	40,243
1915/1916	14,862	6,379	—	21,241
1916/1917	11,902	14,797	3,101	29,800
1917/1918	15,832	46,958	12,548	75,338
1918/1919	17,486	48,636	15,097	81,236
1919/1920	15,211	18,010	8,021	41,242
1920/1921	15,203	12,095	*22,220	49,518
1921/1922	13,833	11,289	9,204	34,326

* Large influx of Indian Telegraph Money Orders, October and December, 1920.

Of course there are people who would exploit the system for particularly selfish ends.

A couple of years ago the number of telegraph money orders from India to this country during the month of October was abnormal, running easily into a value of six figures measured in pounds cash. According to a regulation laid down by the Indian Government only a very limited number of these telegrams is permitted during a specified period. This was apparently designed to render the transmission of abnormal sums by the telegraphic medium inconvenient and finally impossible. The object of the restriction during the present sensitive condition of International exchange is obvious. However, where there's a will there's a way, and as there is no regulation controlling the number of T.M.O.'s *to* a person although, as already stated, there is a strict limit to the number and total amount that may be transmitted *by* any *one* sender, a very easy loophole appears to have been found, by means of which the regulation was rendered nugatory. The simple method adopted was that of a multitude of *senders* to a comparatively few *receivers*, with the result that a veritable procession of Hindu names with varying prefixes and suffixes and permutations of the same streamed across the cables, even the names of some of the Hindu gods and goddesses being utilised for the purpose!

This move was subsequently counter-moved by the Indian Government but not before considerable sums of money had been gained by the simple method of telegraphing the transfer of large sums for payment in sterling in London, the Government, of course, being the loser. On single occasions as much as £50,000 was handled in Anglo-Indian telegraph money orders in one day, and something well over £100,000 in a single week. Of course schemes for individual betterment of this type are not confined to the East. Quite recently payment of a certain telegraph money order in the West was stopped for the simple reason that three people of the same name claimed it, but as the official advice from the United States put it, "none of them have good credentials," it was returned. For some time past the conversion of telegraph money orders into the various currencies of the world—which is one of the many odd duties performed in the C.T.O. (Foreign Branch)—has been one needing extreme care and alertness. Thanks to the telephone we are in easy touch with the Money Order Department who advises us daily, sometimes even more frequently, as to the present worth of the German mark, &c.

TELEGRAPH RATES, URGENT SERVICE, &C.

One product of the post-war period, as we have seen, has been the institution of the urgent rate for Anglo-Continental telegrams on the suggestion of the British Government. The step was taken at a time when the flow of traffic was particularly heavy and complaints by financial and business interests were inclined to be acrid. The British Administration at that moment committed an act which was a complete reversion of policy to that which had been followed from 1875 onwards. Until that moment in theory and practice, in the eyes of the British Administration, every telegram was an urgent message. The change of outlook has not passed unnoticed by other nations, and the logical outcome of the "urgent" European telegram at triple rate may eventually be a deferred telegram at quarter rate for Europe. In any case it is well within the bounds of probability that this suggestion will be supported by certain Powers at the next International Telegraph Conference.

In addition to the introduction of the urgent rate for European telegrams there has been a general, though not exorbitant, *increase* in the European *regime* of an average of about three farthings per word between this country and Algeria, Belgium, France, Italy, Germany, &c.

The Faroe Islands and Iceland have, however, reduced their rates by an average of five farthings per word.

The most remarkable fact is that of reductions such as those in connexion with British possessions which range from threepence for British East Africa to 3*s.* per word for British Guiana. Owing to an arrangement with the West India and Panama Telegraph Company, a flat rate of 2*s.* 6*d.* per word is now accepted for all British Islands in the West Indies, which means in some cases a reduction of more than 50 per cent. For example, in the case of the Island of Trinidad, it means a reduction from 5*s.* 1*d.* to 2*s.* 6*d.** There has also been an all-round reduction of 6*d.* per word to the majority of the British possessions in East, West and South Africa. This reduction also is the result of negotiations made with the British Government. The South American States, though served by more than one telegraph company, are still the same as in 1914, so that we have this curious condition of affairs that Africa, served practically by a monopoly company, has reduced its rates, while in South America, though served by competing organisations, the rates remain unchanged.

There are also certain telegraph rates concerning which no comparison can be made for the simple reason that the countries concerned had no separate entity before the war, for example, Poland, Esthonia, Latvia, Czecho-Slovakia, &c.

The matter of rates is one that appears to be receiving considerable attention in certain high official quarters abroad, but in somewhat indirect fashion. There is evidently a movement on foot to cheapen the deferred rates for the reason that the high price of urgent telegrams justifies it, apparently on the grounds that the more there is of urgent service the more deferred become the deferred telegrams. This movement also appears to maintain the attitude that the reason for cheapening deferred telegrams is, that, being in plain language, there is less labour involved in their transmission and also that being a delayed telegram the service rendered is correspondingly less. Another attitude taken is that the cost of telegrams in plain language, whether urgent or otherwise, should be less than for those in code or cypher because of the comparative ease with which they may be handled. These movements are all along the line of recognising how very cheaply the business man obtains his telegrams by means of difficult cypher which, while hiding the real contents from the telegraphist, makes the latter's work much more difficult and enables the sender to convey a long telegram in small compass.

It is a matter of common knowledge that the use of letter cypher has grown considerably of late. The code book of the British Electrical and Allied Manufacturers' Association is an excellent example of how much science can be put into a work of this kind.

That cypher telegrams should be a little more expensive is the logical sequence of the principle that plain language telegrams should be a little less so, and with this, unless there are really serious objections, one does not feel disposed to quarrel. It is, therefore, likely to remain with the representatives of the high-contracting parties of the next International Telegraph Conference to decide whether plain language telegrams shall be cheapened or cypher telegrams increased in price, or whether steps in both directions shall be taken simultaneously, or again whether matters shall be left in their present relative positions.

That the letter cypher telegram is an expensive telegram to transmit cannot be denied. It demands an exactitude from man and machine which is well worth increased tariff. These telegrams have frequently to be repeated in order to avoid public complaints, and thus the senders of such telegrams, while making a huge economy in the number of necessary chargeable words, have frequently a free repetition, or to speak telegraphically, a free T.C.

I have lately given some little thought to the matter of cable codes, and have made some examination into the question of what the merchants and manufacturers are able to save by telegraphing their needs in the letter cable codes of to-day.

There is the Beama code, for example. Its compilation was undertaken by a member of the I.E.E., and is a model of how to get the most out of telegraphy. What financial bearing, however, have this and similar productions upon the revenue of Government and company-owned cables—Yes, and upon wireless corporations also? The relationship is not far removed.

* These rates have since been raised slightly as a tentative measure.

Telegrams I have examined, on a rough average, show that it is possible so to condense a telegram by means of letter cypher as to be able to save nine-tenths of its cost in plain language. That is to say, such a telegram of 200 words would, if telegraphed to Australia in *plain* language cost the sender £30, reduced to cypher the charge would be £3.

There may be other considerations, but on the surface there would appear to be ground for at least some serious study of the pros and cons of increased charges. Cables, as I have already shown, have dealt very tenderly with the consumer despite higher prices all round. I may be charged with hampering British industry, but the paramount question is whether the telegraph system of a country is to be a philanthropic or a business concern. If the State is prepared to run at a loss well and good, but let there be a clear understanding that such loss when reached is due to deliberate policy and not to the "mismanagement and incompetence of Government officials."

There is another suggestion with which there is likely to be somewhat less sympathy. It is the proposition that all telegrams in plain language should be confined to three languages, *i.e.*, the language of origin, the language of the destination of the telegram, and French. Thus, if an American or a Britisher were in Spain and wished to wire to, say, a friend or relation in Italy, he would not be able to use his mother tongue, but would be restricted to Spanish, Italian or French.

I am afraid this suggestion is not likely to be received with immense enthusiasm, neither is it likely to add to the concord of nations, and I trust it will never see the Conference Agenda.

ANGLO-CANADIAN AND ANGLO-RUSSIAN CABLES.

The Imperial cable now so well known, as we have seen was a war product, and has proved one of the most profitable telegraph enterprises of the British Post Office. There has been plenty of criticism of Government institutions and of the supposed lack of business acumen by Government officials, but I do not remember seeing any Press notice of the £90,000 net profit made by this cable under P.O. management in the year 1920-21 for example. Neither has there been any particular *furore* over the bargain purchase of the ex-D.U.'s cable as an additional cable link between this country and our Canada. One had imagined a bold Press head-line: "Britain more solidly linked to her Colonies," but it could not be found. However, we will be thankful for small mercies. There has been no severe criticism or murmurs of unfair competition of the State. If I make but a passing reference to the Imperial cable it is simply because my friend, Mr. Avery, has already dealt with the subject in a most exhaustive fashion and I have no desire to paint the lily.

The Anglo-Russian cable is the longest Anglo-European telegraph communication and was also a war-time circuit and a war prize. During the war over 40,000 words per day were frequently dealt with by this cable between London and Alexandrovsk, and an additional 10,000 words has actually been obtained during an exceptionally good run of 24 hours. Owing to the present economic conditions, added to the strained relationship between this country and Russia, the present traffic is particularly light. It is, however, hoped that the position will improve.

It is worthy of note that the Great Northern Telegraph Company of Denmark has been able to restore its communication with the Far East *via* Petrograd and Irkutsk, and an excellent service is at the present moment actually functioning between England and China, telegrams reaching London from Pekin by this route with considerably less than two hours' delay and a somewhat heavier transit time from Japan. The Indo-European Telegraph Company's pre-war lines *via* Russia have not yet been restored nearer than Warsaw, and it is symptomatic of the present political atmosphere that the latter, a British Company, and the Alexandrovsk cable, a British interest, should both be held up while the Danish organisation is practically in a flourishing position.

SERVICE CORRESPONDENCE.

The general all-round deterioration of the International telegraphs due to the inexperience of many of the telegraphists, especially on the Continent, continued well up to the end of last year. This caused an abnormal number of enquiries and a huge unremunerative but necessary correspondence which at times engaged the attention of a very large staff. The numerous calls for back dates of foreign forms led to the necessity for loaning certain experienced telegraphists to the Accountant-General's Department for something like a couple of years. This became a further drag upon an already heavily-pressed and somewhat war-weary staff. As many as one thousand cases have been known to be awaiting attention on a single day.

Certain risks were, however, taken in dealing with a portion of these enquiries, added to which the human conditions abroad began to improve on the one hand and the on-coming slump materially aided in reducing the pressure on the other, so that in this direction we are now somewhere near the normal.

I do not think that the powers that be fully appreciate the serious nature of this correspondence, especially the paid requests for repetitions and the absolute necessity for immediate attention. It would not be difficult to prove that we have even lost business over this section of this particular duty, which at one time was all bundled together as dead traffic!

COMPARATIVE TRAFFIC FIGURES.

Year April 1—Mar. 31.	Telegrams exchanged with Continent and over Imperial and Russian Cables. (Imperial from Feb., 1920.)	United Kingdom Telegrams exchanged with Cable Companies.	Total.	Liverpool-Continent.	Grand Total.
1913/14	7,730,992	982,407	8,713,399	633,539	9,346,938
1914/15	*5,672,354	1,144,891	6,817,245	209,512	7,026,757
1915/16	4,052,746	1,954,364	6,007,110	—	6,007,110
1916/17	3,882,581	1,954,203	5,836,784	—	5,836,784
1917/18	†3,332,857	1,698,948	5,031,805	—	5,031,805
1918/19	3,591,069	1,668,072	5,259,141	—	5,259,141
1919/20	6,585,548	1,675,569	8,261,117	98,892	8,360,009
1920/21	8,138,925	1,269,372	9,408,297	[271,338	9,679,635
1921/22	8,257,533	1,067,292	9,324,825	[258,353	9,583,178

* Russian cable opened Jan. 28, 1915.

† Imperial cable opened July 18, 1917; interrupted Dec. 15, 1917, to Feb. 5, 1919.

Liverpool-Continent communications suspended August, 1914.

Liverpool-Havre wire restored Sept. 15, 1919.

Liverpool-Paris wire restored Jan. 26, 1920.

NOTE.—Average length of G.C. telegrams (U.K. and transit) in June, 1922, 15.5 words. During war period nearly double this figure.

In the financial year of 1913/14, *i.e.*, April 1 to March 31, the total traffic (including 633,529 telegrams dealt with by Liverpool on their direct Continental communications to Antwerp, Hamburg, Havre and Paris) was roughly 9½ millions. The figures for the financial year ended March 31, 1922, are over 9½ millions. This looks very well on paper. Let us not be deceived! The 1921/22 figures include those of the Anglo-Russian cable opened on Jan. 28, 1915, and the Anglo-Canadian cable opened on July 18, 1917, factors which could not therefore affect the 1913/14 returns. If we compare the last financial year with any one of the war years, we are not much better, for while the average length of an Anglo-Continental telegram was 15.5 words in June, 1922, during the war periods, it was nearly twice that figure.

I am not optimist enough to prophesy a higher figure for the current year. It is true, as you have seen, that we have increased our outlets both by cable and wireless, but the public alone are the gainers as we are practically giving a more expeditious service at much greater cost. One can only hope that the British public in some measure will appreciate this point, but of this "I hae m' doots!" However, if the Civil Servant did not possess something in the nature of a keen interest in his or her duties to which, I may add, something also in the nature of a real love for and interest in the craft itself, it would go hard with *most* of the public services. The telegraphs is one of those services, and therefore we do not *expect* appreciation, but are agreeably surprised upon those rare occasions when we happen to receive it.

ADMINISTRATIVE DEVELOPMENTS.

Notwithstanding the slight pessimism of my last note, it is safe to say that administrative developments since the war have made it possible to come into closer touch with the public than was ever the case before the war. The Controller of the C.T.O. has been one of the ardent pioneers in this direction and, personally, I am of the opinion that this has been nearly all to the good of a more complete understanding of mutual difficulties.

It is not so very long ago that the C.T.O. was almost *sacrosanct* to the visits of the public, and at one time communication by telephone was discouraged. Speaking from experiences of chargeship of the Cable Room, especially *evening* chargeship, I am confident that many of the calls, to which personal attention has proved compulsory, have saved considerable unnecessary annoyance of the Secretary's Department, and what is more important, I say it with all deference, sir, it has frequently reduced public irritation to a minimum. These personal interventions are particularly useful in cases where practical knowledge of the special matter at issue permits an immediate explanation of a difficulty or of an error.

The queries raised are of course varied; a business gentleman has received a telegram in code at his private address, "Could we decipher his telegram?" He does not know in which of the many codes it is written and his code books are locked up in the safe at his office. We regret inability to assist, but suggest a taxi to the city and back. He thanks us and thinks our suggestion a good one! Or there is a call from an irate pressman who fears that we have not delivered the first five hundred words of a most important telegram. He has been "waiting all day for it." We make enquiries and suggest that he should look at his batch of the previous day's date. He grumbles, calls again after about ten minutes, apologises and wants to know how we guessed that it had been placed on yesterday's file by the office boy! The bulk of these matters is, however, of a serious nature and mean a prompter service. Thus, for example, we are able to keep in

touch with the evening editors of the press agencies and newspapers so that when telegraphic conditions abroad are precarious, they may be able to regulate the quantity of words, words, words which flow so easily down Fleet Street way, and during the day time we have long been in constant touch with the big banks and financial interests of the City.

Quite a post-war innovation has been the introduction of the Government canvasser—I hardly like the name and think it should be altered to "representative." These officials are something more than mere pedallers of Government wares. They are rather ambassadors who smooth over difficulties, explain the Government position in relationship to Anglo-Foreign and Colonial telegraphy, and not infrequently make clear to the possible users of the Government system the exact facilities which are at the disposition of the public. They are particularly useful in dealing with that form of public complainant who states he "knows all about telegraphy!"

It may be said that most of these points are splendidly laid out in the Post Office Guide. I would maintain that the business man whose chief need is a thorough acquaintance with world telegraphy would not go to that excellent, but most conservatively produced, volume for rapid reference. He would go, as the business man *does* go, to the private companies. The field of a real live publicity might well be explored on behalf of the Government cables system. The time would appear to have passed for the "take it or leave it" policy of the old-fashioned shopkeeper.

What do the public say of our representatives? One section of the public at least complains of the unfair competition of the Government because we adopt certain of the methods of the business man, namely, we canvass and we advertise. I fancy I remember something about the lack of business methods and the ineptitude extant in Government Departments. If, however, we are so inept, why worry about an inept competitor? In connexion with the work of these representatives, I would direct attention to the scores of large firms on the outer belt of London who should be encouraged to use the Government and Imperial routes. To do this, some re-organisation will be necessary in order to get this class of traffic into the C.T.O. with all speed.

We are on the slump of the traffic graph at the moment. Now, surely, is the time to study the question and to formulate plans. We should certainly not wait until the peak of our traffic begins to rise. It might pay the Department in the long run to introduce some form of Teletype apparatus to firms who required a rapid service. I see no practical difficulty in such a development with a commutator switchboard situate in the C.T.O. so that any firm possessing a typist could hand their own printed telegram direct into the Central Office by means of typewriter keyboard apparatus. And/or it might be possible to equip certain small offices in the vicinity of large suburban businesses with apparatus of this description. Here is a problem for the Engineering Department whose genius is sure to find an easy solution. It does not appear to be in accord with the secrecy of a telegram that the general public should be able to read the contents of a private message by the click of the sounder while purchasing stamps, or, what is perhaps worse, hear one's business dictated by 'phone from the other side of a Post Office counter.

STAFF MATTERS.

There is another and perhaps somewhat more delicate administrative development upon which there is decidedly more than one opinion. One has noticed a gentle tendency towards short-circuiting a good deal of formal handling of officials' papers. That it is a cautious tendency is all to the good. That there is room for a closer touch of a judicious type cannot be denied. I wonder if I may say that we in the Cable Room much appreciate this closer touch with the C.T.O. Engineer, and with certain essential Departments of the Engineer-in-Chief which have been possible during and since the war. Certain of the Secretarial Departments have also materially helped us by informal consultations, thus enabling public business to be carried out more expeditiously. In any case, I am certain that there are many large private companies with considerably more red-tape than is used in G.P.O. North and West. There also has never been a period when difficulties have been so freely discussed between one grade of officials and another as since the war. The advantages, here again, have resulted in a growing interest in the work and a gradual return to the efficiency of the pre-war period. The Cable Room staff was disproportionately drawn upon during the war, and it is rather a wonder that the new entrants have progressed so well than that they have not progressed farther. That the pace has been slow may be admitted. I am, however, rather concerned with the sureness of the steps than their speed, and am thankful to the powers that be for the measure of local autonomy which we possess in connexion with the special needs of Anglo-Continental and Anglo-Colonial telegraphy.

Recognising that there *are* fundamental differences in the training of telegraphists for this type of traffic, we are permitted to educate our new entrants along lines which experience has proved to be most valuable to general efficiency. It was suggested in this hall, when Sir Henry Bunbury read his paper on "Technique," that every new entrant into a department should be shown what relation his own particular job bore to the whole organisation. This method has been adopted for the last year or two. An officer of supervising rank conducts every new entrant round the various points of interest, so that after two or three days the youngster does not feel that he is a lost soul in the middle of noise and wheels, but an individual who has a definite part, gradually growing in importance in a useful organism.

I do not mind touching thorny subjects, so I will just mention that we have a women's question in connexion with the Foreign Telegraph Section in the C.T.O., brought about by the war which compelled the opening of the door to women being utilised for the Anglo-Continental Telegraph Service. That question, we hope, will not be long before it is settled and, as no question is settled until it is settled right, there is every hope that while making room for the ladies, obligations due to the other sex will not be forgotten. I am afraid some at least of my audience must by now be bored by the emphasis my statements must of necessity make upon the differences between our own system of telegraphy in these Islands and the complications which follow immediately another nation governs the other end of the wire or wireless system. We may be sorry that the foreign telegraphs cannot be run on the same lines as the Inland Service. We must not forget, however, that the British signature stands at the foot of the International Telegraph Convention, and as all the rest of the world are unanimous in refusing to toe the line of British organisation and usage, our simple duty is to fulfil those obligations at the foot of which the National seal has been placed. I make this statement simply because we are always being told "You and your foreign telegraphs are so different from everything else in the Kingdom."

While there is a Convention we should stick to it, and I very much fear that, on those occasions where we have attempted to set aside certain of its provisions, neither efficiency or economy or good feeling have been furthered.

We are, of course, not the only offenders. I wish, for example, that certain of the signatories to the Convention would fulfil their obligations in the direction of wires of sufficient stability to stand up to an ordinary day's telegraph traffic, an obligation very clearly laid down in the same Convention, Art. IV., 1908.

ARE SUBMARINE CABLES OBSOLESCENT?

Whatever medium may be utilised for telegraphing, the telegraph transmitter and receiver of some type or other will always be needed. I do not think, therefore, that the very youngest telegraphist need have any qualms as regards the stability of his vocation so long as the only question of the *medium* of transmission, and not the *mode*, remains as the vital issue. At present it is wire *versus* another medium. We can, therefore, examine the matter without conscious or unconscious bias. I am fully aware that there is scarcely a country which has not its own particular scheme of wireless, either formulated or in the making, and for the most part these schemes are State-aided in some form or another. Side by side with these projects there are others equally important for the development of submarine telegraph cable communications. France, Germany and Italy have some huge wireless projects, but each one is looking well after sub-ocean communications in the Atlantic, while the British and the U.S.A. appear to be well alive to this older type of communication, both for trans-Atlantic and trans-Pacific communications. The Japanese, too, while developing wireless, have no intention of neglecting cables. Germany was cut off from the world during the war so far as cables were concerned, and had every incentive to develop wireless to its utmost. Before very long she will again have cable connexion with America despite her wireless services, and has bound herself more closely than ever to Sweden not by wireless, but by a combined telegraph and telephone submarine cable. This, despite the fact that both Sweden and Norway are themselves competing for the trans-Atlantic Wireless Service.

South Africa and South America have also their wireless projects, but in the case of the former the Eastern Telegraph Company shows no sign of giving up the exploitation of cable working, while in the latter country the wireless installations are, generally speaking, not on the huge scale. It is probably recognised, too, that although the recent earthquake has interrupted certain cables, the restoration of cable communication is likely to be far more rapid than would be possible in the case of a wireless station if overthrown in the same conditions. A long-distance wireless installation is a huge affair. A cable transmitter is comparatively light and easily portable.

It has been calculated that the comparative earning power of the same pair of wires used as a telephone trunk circuit and as a telegraph circuit, the latter equipped with the latest form of multiplex duplex fitted with keyboard perforators and automatic transmitters, is as 1 : 7. I am open to correction. I am prepared, however, to expect that the relative financial values of wire and wireless telegraphy, both at their best on any Anglo-Continental circuit, would suffer even in a wider disparity at the present stage of development.

It is not by any means a popular standpoint to take up, but it seems necessary that we should not lose our heads over wireless developments. There is a danger that during the present broadcasting boom, land and cable telegraphy may be looked upon as a back number. The cable companies throughout the world do not think so, and literally millions have been spent since the Armistice in repairing and developing the older system.

I shall be met with the reminder that in hesitating to accept wireless at the full value given to it by its sponsors, I am simply repeating telegraphic history of the early periods of Wheatstone and Bright. To such critics my reply is that telegraphy of the early part of the nineteenth century was the history of a struggle against an adverse public opinion until the Slough murderer was caught by its agency, and public imagination was fired.

To-day, public opinion, fanned for the most part by a very unscientific daily press, has swung the pendulum well over to the other side. One thing is certain, if the money spent in Europe on wireless experiments had been spent on the development of submarine plus underground cables, Europe would have been able to vie with the U.S.A. in the quality of its trans-Continental telegraphy. I do not wish to pose as a Mrs. Partington sweeping back the sea of wireless progress. Far from it. I am probably prepared

to go farther than most of my wireless friends. It is an easy prophesy to make that type printed wireless telegrams will pass to and fro over the Atlantic. Germany has already made preliminary experiments in this direction with satisfactory results. It should be possible with the five-unit code to do this, and even with other types of direct printing apparatus, telegrams should presently pulsate through the ether to appear on a tape hundreds of miles away in clear bold Roman characters.* No one who has studied even the outlines of latter-day research in electrical phenomena can doubt but that we are only just beginning to learn.

Therefore, I am prepared to see photographs transmitted across the oceans and continents by wireless during the next year or two. Whether such a proposition will become a paying one is another question, as is also whether a network of submarine cables and underground cables is to be superseded by a network of radio stations.

In its present stage wire telegraphy is more pliable than wireless. Submarine cables up to about 300 nauts can be constructed of four copper cores, these four when duplexed can easily and simultaneously carry 16 telegrams, 8 in each direction. Each of these cable cores can be carried away in different directions, either overhead or underground, and then could each be bifurcated at points so that two channels could be led north and two south, and each of these separate channels by means of inexpensive automatic re-transmitters could be carried on again and again by this means right across Europe if need be. Your wireless installations are very expensive, and the wear and tear is exceedingly heavy. As a means of serving some specially selected area in a more or less intensive manner, wireless has proved itself a very practical proposition, but except for broadcasting purposes wireless cannot at its present stage hope to compete with the world's net-work of cables and lines which transmits and accepts messages to and from the tiniest hamlet on the globe. Wireless systems will, of course, accept telegrams for any recognised telegraph office, but in hundreds and hundreds of cases the final delivery of such telegrams must depend on that thin thread of iron, copper, or bronze.

Yet we have found wireless to have a use which was probably never anticipated. It has happened that some of our staff in the evening have been listening in to the various Continental centres, transmitting and re-transmitting their traffic, and have been surprised to recognise that some of the telegrams which had been sent by cable in the morning were still wandering round Europe seven or eight hours after they had been transmitted by London ! This is an actual experience quite recently, and may explain the delay of 36 to 48 hours which certain traffic sometimes suffers after it has left British hands.

There is another advantage in connexion with wireless telegraphy for International telegraphy, and that is the absence of any charges on traffic transiting intermediate countries. In one word there is no charge—at least at present—for the use of the ether in, around, or about any intervening country. We can, therefore, for example, radio to Germany, though our wireless waves oscillate through every building in every city, town and hamlet of Belgium, France and Holland, without the payment of a centime for the privilege.

The development of wireless may eventually pass along the lines of smaller power stations and the invention of even more sensitive receivers. At the present moment the apparent waste of energy is terrific, there is no other word. It is possible to have 3 to 400 amperes in the aerial and yet the current received is only measurable in decimal points of a milliampere. That wireless will develop is to state the obvious, and together with wire telegraphy will probably be in use until that period is reached in the progress of the human race when both wire and wireless may become obsolete and the prophesy of Wells be fulfilled that the transference of thought from individual to individual shall take the place of human speech.

But is the exploitation of wire and cable likely to stand where it is any more than that of its younger sister ? Has the last word in submarine cable manufacture been spoken ?

† Judging from the combined telegraph and telephone cable only recently laid between Sweden and Germany one is entitled to give a decided negative. Commander Rolls Appleyard pointed out quite recently the possibility that out of the present chaos of coinage the price of silver might itself fall so low as to make the manufacture of silver-cored cables a good commercial proposition, with an increase in cable speed of 5 per cent. without spending one halfpenny on improved apparatus, and he points to other possibilities which might further increase cable speeds by another 20 or 30 per cent. Has Heurtley said his last word on cable speeds ? Has the mechanic abandoned further effort in the delicacy and sensitiveness of responsive apparatus ? Has that great friend of wireless itself—the valve—nothing to say for wire telegraphy ? From all one gathers of the tendency of modern research a very definite negative may be vocalised.

* In January of this year some hundreds of public telegrams were exchanged over the Anglo-German Government-owned wireless systems between Berlin and London by means of the Hughes' direct printing telegraph apparatus, an invention of the late professor of that name. Curiously enough, one of the oldest forms of printing telegraphs (it was invented over 50 years ago) has thus become associated with and proved itself adaptable to the most modern system of telegraphic communication.

† The developments in cable-speeds on some of the new far-East cables should be watched with more than usual interest.

Then there is that further and most economical development of land telegraphy, the carrier current, as in America for trans-Continental use, where, by means of four wire conductors, 27 telegraph and telephone circuits may be and actually are obtained as shown by this year's president of the I.E.E., Mr. Gill. May not this latter system one day be adapted to cables ?

Nevertheless, this expressed opinion of, and my confidence, in a continuance of wire telegraphy is quite consistent with a thorough belief in a big future for wireless. It has already taken a place in International communications and even if there were no further developments, it has proved an extremely useful adjunct to wire systems, and has more than justified itself ever since the war during International crises and difficulties. True, it is no safe friend of secret diplomacy, but this in itself might be a real blessing to the peace of the world ! As a news-spreader and a propagandist, it has the widest circulation possible, for the world is its parish, and as a life-saver it has already received the benedictions of all those who go down to the sea in ships. Its place in International communications is likely to be confined to the big political and commercial centres with an ample network of telegraph and telephone wire circuits radiating from each. The possibilities of trans-Continental telegraphy were foreshadowed by Mr. Gill while I was writing this paper. The respected President of the I.E.E. has visions of a unified Europe with a central bureau co-ordinating its telegraph and telephone systems, and he suggests the carrier-current system which I have already mentioned. He is a noble optimist !

So far as European telegraph systems are concerned, the Baudot and the Siemens system appear to be competing for first place. Given a somewhat higher standard of line efficiency and maintenance for use with International circuits either would prove excellent for the purpose. Both are five-unit systems, both have a system of re-transmission, but the fact that the Baudot, like the Western Electric and the Murray, is a multiplex system, and practically solves the "RQ" delay question, would appear to give the French system points as against the German. The ease with which any one of these multiplex systems can be forked and extended makes quite practicable a single wire quadruple channelled circuit between London and Constantinople. These features, together with the central control of International circuits and traffic circuits, may some day be realised, and could not doubt be associated with the carrier-current principle. With this question of a central control for European traffic is bound up yet another matter :—

THE EQUALISATION OF DELAY.

I am afraid that this matter of the equalisation of delay has not received quite the careful study due to it. To equalise delay to all English towns telegraphically connected to London is unquestionably the correct policy, and one which can conveniently be carried out with good prospect of a successful issue, but to equalise delay to half-a-dozen *countries* telegraphically connected with London is quite another proposition.

Let us take a concrete example. We have, say, half-an-hour's delay to Switzerland, one hour to France, and two to Italy. Now, both France and Switzerland have, generally speaking, good facilities for disposing of Italian traffic, and nothing would seem simpler than to divert Italian traffic to both France and Switzerland until the delay is about one hour all round. To do this obviously the French and Swiss traffic must be held up until sufficient Italian traffic is disposed of to reduce delay to the latter to unity.

The Swiss are good workers and are willing to take any amount of Italian traffic, but by accepting traffic for Rome, Milan, Genoa, &c., they realise that they are delaying the commerce of their own country. What about the French ? Well, their particular psychology apparently takes another view. In effect, they say if the British wish to dump their Italian traffic upon us, let them do so, with the result that you cannot guarantee the prompt re-transmission of diverted Italian traffic by that route, so that great risk is run that in trying to reduce your delay to the over-all figure of one hour you may eventually increase it to three or even more. Germany is willing to accept Italian traffic, but this generally means that she cannot get it further along the road than Switzerland, where it often arrives with an hour or two's extra delay, and then probably has to wait its turn for re-transmission hence. If we take any of these steps we have, of course, equalised *our* delay, but we have not equalised THE delay. We have simply worked the trouble off our own beat, and I confess to very frequently accepting more of that responsibility for which I am paid by adopting the policy of making the *Italian circuits work out their own salvation, certainly in the case of traffic* for towns with which we have direct communication. I have never seen a public complaint due to that policy, and I am certain that the actual delay suffered is much less than when endeavouring to follow a shibboleth. There are other restrictions of course. With our inland telegraphs, if by any freak of circumstance we were telegraphically cut off from Wales and the West of England, and Glasgow and Edinburgh had good communication with that section of the Kingdom, there would be no hesitation in diverting such traffic northward, but if we are cut off from Belgium and have good communication with the isolated country, say *via* France or Holland, it is a matter of how much someone is going to lose on each word by the diversion over an abnormal route. Before you can divert traffic from the normal route over Anglo-foreign lines, therefore, one has to bear in mind a table such as that before you. If by diverting, the traffic so diverted passes through an additional country to the normal, then a proportion of the money received per word has to be lost by someone. That, too, will depend upon which country is the cause of the stoppage and how many hours the interruption has lasted. If it is the submarine cable which is the cause, then the difference of the loss is split. That settled, and we attempt to transmit *via* Holland, the Dutch then may prove averse to accepting such traffic until a point is reached where risk of delay to their own commerce is remote.

SAMPLE SCHEDULE SHOWING THE POST OFFICE PROPORTION ON TELEGRAMS FOR THE UNDERMENTIONED COUNTRIES.

(*Corrected to February* 1923.)

Route.	Post Office proportion per word.			
	Via Normal Route.	*Via* Abnormal route, if diversion is caused by interruption of		
		British land-lines.	Foreign land-lines.	Cables.
	Centimes.	Centimes.	Centimes.	Centimes.
FRANCE	12.5	—	—	—
Via Belgium ...	—	8.5	14.5	11.5
Via Holland ...	—	3	16.5	9.75
Via Germany ...	—	0.75	17.25	9
BELGIUM	14	—	—	—
Via France ...	—	9.25	16	12.625
Via Holland ...	—	10	16	13
Via Germany ...	—	2.25	18.75	10.5
HOLLAND	14	—	—	—
Via France ...	—	2	17	9.5
Via Belgium ...	—	10	16	13
Via Germany ...	—	4.6	17.8	11.2
GERMANY	—	—	—	—
Via German cables	15.5	—	—	—
Via Belgium or Dutch cables	13.75	—	—	—
Via France ...	12	—	—	—

Route.	Post Office proportion	
	Centimes.	
AUSTRIA—		
Via Germany ...	13.75	
Via Belgium ...	12	
Via Holland ...	12.25	
Via France ...	12	
HUNGARY—		
Via France ...	12	
Via Germany ...	13.75	
Via Belgium ...	12	
Via Holland ...	12.25	
SWITZERLAND—		
Via France ...	11.25	
Via Germany ...	11.5	
	ordered.	devié.
Via Belgium ...	12	10.1
Via Holland ...	13	10.28

ITALY.	
Route.	English proportion
	Centimes.
NORMAL—	
Via French cables ...	11
Via German cables ...	10.75
Via Direct Prague Wire	10.75
Via Zurich	11

Even in the diversion of, let us say, French traffic from one French centre to another, there is a reluctance to accept any traffic not proper to the recognised circulation. There is one particular industrial centre which, though willing to accept such traffic, will not do so to the detriment of telegrams addressed to their own particular commercial centre. If you desire to divert you must sometimes be prepared to wait until all the normal traffic has been cleared. There is much of this narrowness of thought and outlook on the Continent and one realises that insularity is not always confined to people living on an island.

I cannot refrain from referring to the apparent tendency in certain quarters to divert the exploitation of International communications from the State to that of private interests. We see it in Italy and in Austria; it has been mooted in France, and the advent of wireless has brought it to the front as a possibility in this country. We, however, of the Government service, while recognising that State control has its drawbacks from certain points of view, have been able to realise through the war that there is more need than ever to-day for the State to hold a firm hand over International communications.

Some of our early war difficulties would have been much more readily overcome if complete ownership of every telegraph station in these Islands had been in the hands of the British Government prior to August, 1914. So far as our Inland telegraph system is concerned, it has proved the model for our Colonies, and is so to-day, and no private concern could have developed the system with equal disinterestedness. It is, indeed, this respect and care for the needs of its customers *in all walks of life* which mark it out as a really National Institution. No private company gives such unbiased attention to complaints from its humblest patron as does the British Post Office, whether that complaint refers to an Inland telegram for which it is wholly responsible, or to a foreign one for which it often has to stand both the unjust criticism of the public and the loss of revenue on account of errors beyond its control. It is hoped that a future International Telegraph Conference will be able to settle one or two of the points I have mentioned, and that :—

(1) Improved line maintenance;

(2) Attention to the prompt treatment of traffic in transit;

(3) Close co-operation between telegraph administrations during times of pressure and a keener sense of the meaning of delay;

may become something real and lasting in the working of International telegraphy in general and Anglo-Continental telegraphy in particular, be the the medium what it may, wires or wireless!

There are one or two things the British State could do better than it does. It could supply better telegraph forms for all its International telegrams. I am not very proud of our Continental telegraph form, when I compare it with those of the private companies or, let us say, with the Dutch or German. It is the scorn of those business men to whom a foreign telegram is a record of a business transaction and has to be handled and filed and referred to with considerable frequency.*

We should also be able to deliver more promptly at all times of the day, and I hope that some real enquiry will be made into the degree of efficacy of our tube systems, plus the new system of batching telegrams for delivery. Averages are excellent things, but it is no solace to an editor waiting to go to press, or a business man eager for a reply to a business enquiry, to know that the *average* delivery time is 7 minutes, when his own belated telegram stares him in the face with 20 minutes, perhaps more.

The association of the telephone with the telegraph may in many cases assist, but not in all, and my personal bias is still along the lines of an exploitation of some description of typewriter transmitting system for the special cases where 'phone and tube deliveries may prove unsuitable.

All these suggestions and many others that might be put forward will mean expenditure of money, and we should expect to be met with cries of "Economy" with a big E. There are, however, those of our administrators, both in the Post Office and at the Treasury, who are not without a sense of true perspective, who realise that if we are to meet the future someone will have to tackle these problems, and that without cash nothing effective further can be done. It means in the long run more business and increased revenue, for, to parody an old proverb, "One quick telegram ensures another."

I should like to tender my sincere thanks to the Editorial Committee of the *P.O. Engineers' Journal* for permitting the reproduction of the "Stephan" and other photos, and to several members of the Cable Room staff for their assistance in compiling certain material for some of the slides.

* Since the writing of this paper I have had very conclusive and additional evidence of the irritation caused to business men on account of the poor quality of paper used in connexion with the delivery of foreign telegrams in this country, especially code and cypher telegrams, which, be it remembered, remain for months in many cases as a business record and reference.

FINIS.

LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

AT the fourth meeting of the London Telephonists' Society, prize competition papers were read by Miss D. M. H. Bott, Supervisor, Paddington Exchange, and Miss D. Turner, Regent Exchange. The subject of Miss Bott's paper was "The Emerging of the Moth from the Cocoon." Miss Bott showed by her paper that she had studied psychology to some purpose. She invariably gives an impression of sympathetic insight. One of her axioms was "Never do anything that you would not allow your staff to do." It was an interesting paper, and we hope to see it in the JOURNAL shortly, when wider publicity will be given to the many useful suggestions made by Miss Bott.

Miss Turner's paper, "An Interview at Head Office," was written as a pathetically humorous account of the feelings of a delinquent before, during, and after an interview. Her rendering of it was so realistic that some of those present mistook it for an attack on disciplinary measures and in consequence it evoked a storm of criticism. It was unfortunate that Miss Turner's sympathisers spoke so soon after the close of the paper, as they were unable to come to her rescue during the somewhat tempestuous discussion that followed.

There was only one man in the audience, and he did his best to lull the storm, but as his idea of doing this was to ignore the subject of the paper altogether, the storm passed him by unheeded. Miss Turner mentioned in her paper that The One who Matters Most had told her to "forget all about" her office troubles. The Chairman said the same thing in effect; but, as Miss Turner had read only a few moments before:—

"Forget it! when you have lived it, breathed it, imbibed it, for a whole day, and the end is not yet!" Certainly "*tout lasse, tout casse, tout passe*," but that does not affect the poignant present.

There were no other male members present which was unfortunate, but Miss Turner knew that she had many sympathisers in the audience, although they had perforce to be silent. Perhaps, too, our knights errant will turn up in large numbers at the next meeting.

The final meeting of the Session will be held on Friday, March 2, when the remaining Prize Papers will be read, "The Personal Faculty," by Miss E. M. McAllister, and "Relief Supervising," by Miss H. M. L. Wilson. Competition letters will also be read and the Election of Officers for next Session will take place.

Hospital Saturday Fund.

The Annual General Meeting of the Telephone Staff Hospital Collections (associated with the Hospital Saturday Fund) took place on Jan. 25 last, when Miss Reekie, one of the Honorary Secretaries, announced the gratifying result of the year's collections to be £2,091 8*s.* 8*d.* The net amount handed to the Fund was £2,087 15*s.* 2*d.*, the total amount of expenses for the whole year having reached the astounding height of £3 13*s.* 6*d*! Mr. Preston presided, and in moving the adoption of the report, said that such a magnificent result, with such small expenditure, was phenomenal; and he paid a very high tribute to the Honorary Secretaries. He said that many firms would like to surrender their businesses to such people, who get such wonderful results with so small an amount for expenses. Mr. Preston also called attention to the parlous condition of Hospitals at the present time. He said that although a great fund has been raised publicly, in order to get hospitals out of their immediate difficulties, this is only for the moment; and organisations of this kind, with regular contributors, are needed, in order to relieve hospitals from the terrible strain imposed upon them of having to undertake their work without sufficient funds. He strongly urged everyone to make the slogan "2*d.* per week for the Fund," instead of the usual 1*d.*, and in that way next year the sum raised would be, not £2,000, but £4,000.

Mr. Valentine, in seconding the adoption, said: "It is only three years ago that Miss Heap, at this meeting, of which she was then Chairman, made no attempt to conceal her pride when she told us that the high water mark of £1,000 had been reached. What shall we say, then, when, three years later, double that sum has been reached by the London Telephone Service. Adjectives fail me when I try to express what I think about the people who have contributed to that success. In the Old Book we read—'This one thing I do'—and I believe that is the reason for the success of this Fund. When we think of Miss Reekie and Miss Wormald, who devote and consecrate their time and labour and thought to this splendid work, and of each one of the collectors, we realise that to them the credit is due; and when one thinks of the amount of healing and of hope which the result of that work must bring to many hundreds of people, I am sure every one of those who do the work must feel amply compensated."

Mr. Valentine announced that Mr. J. F. Stirling had been appointed Chairman of the General Council of the Hospital Saturday Fund.

Mr. Reed, the Secretary of the Hospital Saturday Fund, said that although the meeting was one of joy, as the desired goal had been reached, it was also one of sorrow, as Mr. Preston was severing his connexion with the London Telephone Service, and resigning the Chairmanship of the Hospital Saturday Fund; but pleasure would be felt by all in the announcement that Mr. Preston had agreed to continue as Vice-President of the Fund, Mr. Reed expressed his deep gratitude to Mr. Goss for his untiring work, and to Mr. Stirling, whose assistance was most valuable. Mr. Reed said that the total amount collected for the Hospital Saturday Fund was £75,775; it took a year to collect, and was disposed of in an hour!

Miss Cox gave some interesting particulars with regard to Sanatorium treatment, and quoted a case of a girl being cured and now back on duty.

Mr. Valentine was elected Chairman with complete (and acclamatory) unanimity. Mr. J. F. Page was elected Treasurer, and delegates were appointed. Mr. Preston proposed the re-election of the Misses Reekie and Wormald, whom he aptly referred to as "that tireless and inseparable pair." The proposal was received with acclamation. Miss Reekie, in replying, said: "I must not say what I said last year," and then promptly said it, to the delight of a very sympathetic and appreciative audience—"The work is a joy, and I can only say we should be very much upset if we were not re-elected!" The meeting closed on this happy note, and with a fixed determination in the minds of those present to "aim high" in the ensuing year. For, as Miss Cox reminded us:—

> "Who aimeth at the sky
> Shoots higher much than he that means a tree!"

Culled from the Exchanges.

Battersea.

On Jan. 20 a very successful tea and entertainment was given to the children of the Portslade Mission and Cripple School, at St. Phillip's Parochial Hall, Battersea. A liberal tea was provided at 4 o'clock, followed by two character dances given by children, and a short version of "Cinderella," performed by the Telephonists of Battersea and Latchmere Exchanges. The children, before leaving, were presented with a Christmas stocking and a bag of fruit and sweets, and judging by their happy faces, we conclude they had all had a very enjoyable evening.

City District.

On Jan. 27 the staffs of the City District Exchanges gave their annual tea to 300 poor children at Fairbairn Hall, Canning Town. Each year this function seems to be made more and more successful, and on this occasion the smoothness with which the arrangements worked gave testimony to the care and trouble expended. As on previous occasions an excellent tea was followed by an entertainment by two human marionettes whose idea of humour appeared to correspond exactly with that of their tiny guests, who by their laughter and hearty singing of the choruses—and they know all the popular tunes in Canning Town—left no doubt that they were enjoying themselves immensely.

Then as a climax came the unveiling of the Christmas trees and the presentation of a doll to each girl and a toy to the boys. Mention must be made of the wonderful display of the dolls which were dressed by the staff and, we understand, were complete in every detail. The pleasure of the gifts was greatly enhanced by the fact that the dolls were presented by a fairy (complete with wand), and the toys by Father Christmas (acclaimed as Beaver!) The organisers are to be congratulated on the success that attended their efforts.

The City Exchange will hold their last dance of this season on March 10 at the Stationers' Hall. Dancing will commence at 7 p.m. and conclude at 11.45 p.m., and those desiring to attend should make early application to Miss Eastell, City Exchange.

North.

On Saturday, 3rd instant, the staff of the North Exchange gave a tea party to 150 children who were drawn from the neighbourhood of Barnsbury. The evening was happily spent in entertaining the young life with a short sketch, a ventriloquist and conjuring performance, and lastly a nigger troupe. On leaving, all were presented with an orange and a toy, and the workers had the joy of experiencing one of the sunniest Saturdays on record in giving pleasure to those who have such little brightness in their lives.

Richmond.

A most enjoyable dance was arranged by the members of the exchange staff on Jan. 10. Keen enthusiasm was shown, as a result of which £7 7*s.* 6*d.* was contributed towards the Hospital Saturday Fund.

Victoria.

On Saturday, Jan. 20, the staff of the Victoria Exchange entertained 400 children of the Lambeth Central Mission in the Central Hall, Lambeth Road. When the children were seated flash light photos were taken. From 4 to 5 the children did ample justice to the tea provided, many of them asked permission to take the cakes home to their younger sisters and brothers. After tea, while the tables were being cleared, Miss K. Mann played topical songs, which the children much appreciated judging from the lusty way they joined in the choruses.

An excellent entertainment had been arranged, and included songs in fancy costumes by the Misses Budden and Boucher, songs, sketches, &c., by the members of Miss Holt's Concert Party, who kindly offered their services for the occasion. During the interval between the next item the Mission Choir gave various songs, two members sang solos, and the rest of the choir joined in the choruses, and two small boys rendered "Mammy" and "Home Sweet Home." By this time the Marionettes, Messrs. Wilkie and McGowan, had arrived and gave a very fine entertainment.

At this stage of the proceedings, Mr. Brown, Secretary of the Mission, proposed and the Rev. Thomas Tiplady seconded a vote of thanks to Miss Ashmead, Miss Drinkwater, and the staff of the exchange for so kindly giving again the tea and entertainment. He said they were very grateful indeed, especially as the Mission was sadly in need of funds. The children showed their appreciation by loud and prolonged cheers. Miss Ashmead replied to the vote of thanks, said it was a very great pleasure for the staff to give the tea, and that all present had enjoyed themselves as much as the children.

Then arrived for the children the most exciting time of the evening, the distribution of books, dolls, toys, &c., by Father Christmas (Mr. F. Negus). Father Christmas made a most impressive speech to the effect that "he had in his time travelled many miles and given away many thousands of toys to various children, that only the previous evening he had travelled all the way from America by aeroplane on purpose to present the children with all kinds of good things." He then proceeded to distribute the toys, books for the bigger girls, dolls for the others, kindly dressed by the staff, knives, pistols, guns, and tops for the boys. As the children filed out, a bag containing fruit, sweets and a penny, the latter very kindly given by Miss Rushworth, was given to each child.

The huge Christmas tree was presented by Messrs. Moyes Stevens, florists, of Victoria Street, "in recognition of the splendid service received by Victoria during the year." Messrs. Smith & Turner, Engineers, attached to Victoria, very kindly lit the tree with electric lights.

Thus the evening concluded, grown-ups as well as children having spent a most enjoyable time. Truly it is more blessed to give than to receive!

Park.

On Saturday, Feb. 3, the staff of Park Exchange entertained nearly 200 children of the Notting Hill district. It was stipulated that only very poor children should be invited, and the kiddies more than fulfilled this requirement. Each child on entering was presented with a gay-looking handkerchief—these the recipients gazed upon with great pride and joy. Tea commenced at 4 p.m. and for fully an hour very little could be heard save the clatter of the tea-things as the youngsters did justice to the goodies provided for them.

Before deserting the tea hall a few words were addressed to the children by the Vicar asking if they would like to demonstrate their thanks in the

way they knew best. The suggestion was unanimously carried out by three hearty cheers which rent the air.

After tea the little guests were taken downstairs to see a fairy play performed by members of the staff. All eyes watched with joy, sometimes not untinged with awe as witches, fairies, kings and queens flitted across the stage in turn. The next item on the programme was the distribution of toys. There were beautifully-dressed dolls for all the girls and wonderful penknives and games for the boys. Yet another surprise awaited the little ones for on departing for home each hugged a parcel containing an apple, an orange and a bag of sweets.

Like so many little Oliver Twists they "asked for more"—parties.

Paddington.

A Tea—which has now become an annual event—was given for the third consecutive year to the scholars of the L.C.C. Schools in the Cosway Street Schoolroom on Saturday afternoon, Feb. 10. There were over 350 happy boys and girls whose ages ranged from seven to twelve, and whose faces testified of their enjoyment of the Paddington Exchange hospitality. What seemed like miles of children were all cleverly marshalled and directed by Mr. Mortimer and Miss Mitchell, the Headmaster and Headmistress, who both combined kindly discipline and breezy geniality to an amazing degree. The signal having been given the "busy hour" at the "Board" began when the young guests dealt with a heavy load of bread and butter, jam, jellies, cakes, swiss rolls, &c., with incredible speed. All previous records having been broken and no casualties being reported, there was a breathless silence followed by the Big Bang when nearly 400 of Tom Smith's (Christmas) Cracker Battery opened fire. Messrs. H. Solomons and A. Ryder of the Engineer's Section, then sang and played some present-day classics and led spirited and hearty choruses.

Then followed a Punch and Judy Show—with no dog Toby but a mechanical crocodile (R.S.P.C.A., please note). The time-honoured drama having merrily run its course to the squeak and gibber of Mr. Punch, the scene then changed and Mr. Vince, that prince of conjurors and ventriloquists, appeared, and for one hour charmed and mystified both juveniles and adults alike with his resourcefulness in sleight of hand and humorous imitations, &c.

Unqualified approval of everything having been signified in the usual way, the young people slowly and wistfully melted out into the drab surroundings of Edgware Road, each carrying away a bag of goodies, a bright new penny and happy memories of a very enjoyable afternoon.

The Committee desire to thank each and all who in any way contributed either by money or assistance to make the afternoon such a very great success.

LLANDUDNO SOCIAL GATHERING.

THE Llandudno Telephone Staff held their annual social on Jan. 31, at Payne's Cafe. Amongst those present were Mr. J. Dickson, Sectional Engineer, and Mrs. Dickson, Mr. T. Jones, Postmaster, and Mrs. Jones, and Mrs. Young, wife of the late Postmaster. The staff from Colwyn Bay, Conway, Deganwy, Llanrwst, Old Colwyn, and Penmaenmawr Exchanges attended almost in full force.

During the intervals between games, competitions, and dancing, songs were rendered by Misses O. Jones, and I. M. Owen, and Messrs. C. Brown, J. Roberts, and R. Griffiths. Music for dancing was provided by Mr. J. A. Robinson, Inspector, and his son, Mr. H. Robinson.

The arrangements were in the hands of the following members of the staff:—Misses Rich and W. J. Jones, Telephones, and Messrs. J. A. Robinson, C. Wright, E. Williams, Engineers.

MANCHESTER TELEPHONES.

MISS M. G. RICHARDS, Supervisor, Traffic Section, resigned on account of marriage during December.

Miss Richards has seen many changes in the telephone service. She commenced her career with the Mutual Telephone Company, and was at a later date employed by the New Telephone Company, which was afterwards absorbed by the National Telephone Company. She was made Supervisor, Central Exchange, in 1900, which post she held until 1907 when she was appointed Matron.

Miss Richards was a very efficient and capable officer and was held in high esteem by all members of the Service. She was presented with many handsome presents from the Traffic Department, District Office, and all the exchanges in the Manchester area. We wish her all the best of health and happiness in her new sphere.

MISS M. G. RICHARDS.

OBITUARY.

MR. ARTHUR MARTIN.

WE deeply regret to record the death from heart failure and exhaustion whilst suffering from cancer of Mr. ARTHUR MARTIN, late Inspector of Telephone and Telegraph Traffic, at Headquarters, who retired in 1918. Mr. Martin, who was born in 1858 at Harrington, Cumberland, was perhaps better known as District Manager at Liverpool under the National Telephone Company's *regime*, and as Assistant Provincial Superintendent at Leeds, at both of which places he had hosts of friends. He entered the Telephone Service at Liverpool in the pioneer days of 1881, and from 1892 to 1899 was a most popular and successful District Manager there. We are glad to learn that Mr. Martin suffered but little pain from the cancer, which was only diagnosed a month ago. We offer our sincere sympathy to his widow.

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WHEN THE TELEPHONE CAME TO ENGLAND.

BY ARTHUR E. COTTERELL.

IN the July and August issues of the JOURNAL under the title "The Telephone Companies of Great Britain and Ireland," I endeavoured to trace briefly the evolutions which ended in the unique position held by the National Telephone Company.

I took for my starting point the establishment of the London Telephone Exchange in August 1879. It has occurred to me since that it would be interesting to many of the readers of the JOURNAL if some details were given of the earlier movements in this country subsequent to the patenting of Bell's Telephone in the British Isles on Dec. 9, 1876, some nine months later than the original patenting in America.

Although the late Sir William Thompson (afterwards Lord Kelvin) described Professor Bell's researches and exhibited a crude model of one of Bell's earlier instruments at the meeting of the British Association in Glasgow in 1876, it was at the next meeting held in Plymouth in 1877 that the first public exhibition was given of the telephone in actual working by Mr. (afterwards Sir William) Preece.

During that same year Professor Alexander Graham Bell visited England, two notable events being the address which he delivered to the Society of Arts on Nov. 30, 1877, and his appearance on Oct. 31 before a crowded meeting of the Society of Telegraph Engineers.

Before the close of the year certain business men had vision to perceive that this marvellous invention was likely to revolutionise business and social intercourse. Headed by Mr. James Brand, they secured the sole rights for these islands, and opened an office under the title of The Electric Telephone Company at 115, Cannon Street, London, E.C. This office was probably opened in 1877 but certainly not later than January 1878, as may be gathered from newspaper extracts which appeared in a little book entitled "Bell's Telephone," edited by Miss Kate Field, which was published in 1878. From the advertisement which appeared on the first page of the book referred to, it is gathered that the Company was prepared to execute orders for the rental or purchase of telephones and to give estimates for the construction of telephone lines. It was also mentioned that local companies would be established in all the principal towns in the United Kingdom.

No mention was made as to telephone exchanges, and as a matter of fact the first exchange in this country was not opened till after the middle of the following year when the one at 36, Coleman Street, London, was inaugurated as before stated in August 1879.

Presumably it was known however by the Syndicate and others that the Post Office had telegraphic exchanges in certain towns such as Newcastle-on-Tyne, Hull, Bradford and Middlesbrough, the existence of which obviously indicated the practicability of telephonic exchanges, the public use of which would be so greatly facilitated by the adoption of an instrument which needed no skilled manipulation.

Although the Syndicate, which was registered under the title of The Telephone Company, Limited, in the following year (June 14, 1878), used instruments which comprised two Bell telephones, which we now call Bell receivers, associated with a box containing an electric bell, push button and switchhook, thus

using one of the telephones as a transmitter and the other as a receiver, the results appear to have been not a little satisfactory as it appears from Miss Field's book, that quite early in 1878 the apparatus was being used for private wire purposes by at least 49 important persons or firms, &c., in London and the Provinces, including Windsor Castle, Osborne House, and various railway, banking and insurance companies.

In connexion with Osborne House it may be recalled that the telephone was exhibited there to Her Majesty Queen Victoria on Jan. 14, 1878, Professor Bell and Colonel Reynolds being presented to the Queen.

After Professor Bell had given the Court a brief lecture explaining his invention, telephonic communication was opened up with Osborne Cottage, the residence of Sir Thomas Biddulph, where the apparatus was under the management of Mr. F. A. Ormiston, who was the first to address the Royal party. The Queen conversed with Sir Thomas and Lady Biddulph, and later Miss Kate Field, who was at Osborne Cottage, sang several songs and delivered the epilogue to "As you like it," all of which were heard distinctly. As the evening wore on telephonic connexion was established from Osborne House to Cowes where a quartet sang part songs, the working of the line being superintended by Major Webber. The circuit was next extended to Southampton from whence Mr. (afterward Sir William) Preece talked with Prof. Bell, and lastly came the tones of an organ, which was being played in London. Her Majesty, the Princess Beatrice and the Duke of Connaught, and the entire Royal Household evinced the greatest interest. These details of the telephone at Court are extracted from the report which appeared in *The Times*, Jan. 16, 1878 (reprinted in Miss Field's book).

I remember that Mr. Ormiston when speaking of the event some time afterwards said that when he had the honour of asking Her Majesty whether she could hear him the Queen laughed before replying "Yes."

Impetus was given to the development of telephony in 1878 when Professor Hughes discovered the microphone and Edison invented his lamp black transmitter, which was shortly succeeded by Blake's transmitter; the last-named being destined to be used almost universally for many years. For purity of transmission of speech it has probably never been surpassed, but it needed somewhat frequent regulation and was swept away to give place to more powerful instruments in later years when the trunk wires became extensive, and with the introduction of the "common battery" systems of working.

During the years in which telephones were connected by means of single wires with the earth as the return, the Blake instrument being less powerful than the later types was more suitable for that reason. With more powerful transmitters the troubles arising from induction between wire and wire would have been magnified.

Edison's chalk receiver in conjunction with his transmitter evoked considerable interest, particularly because its reproduction of speech was so loud as to be heard all over quite large halls. Such efficiency, however, was partly its undoing, as a medium of business communications, as the users usually wished to be the sole recipients of conversation. It was also regarded as troublesome to have to turn a handle all the time when listening and to have to moisten somewhat frequently the chalk cylinder, and occasionally regulate the contact between the cylinder and the metallic tongue which by its slipping gave motion to the mica tympanum.

The Edison Company which was formed in England in 1879 and which ultimately opened an exchange in London in opposition to the Bell Co. (The Telephone Co., Ltd.) endeavoured to conduct a private wire business. For the reasons just indicated it is probable that their success was not very great, but as an example that they did have some business, I may mention that I quite well remember a firm in Birmingham, who at the close of 1879 or early in 1880, had a line from their showrooms and offices in Cannon Street to their foundry in Bordesley, some two or more miles distant. I may add that after a few months use of the Edison instruments they called in the Midland Telephone Co. and were glad to be provided with Bell and Blake combination sets.

A thing which struck me at the time was the frequency with which in those early days the names of new men appeared as manager or secretary of the Telephone Co. I recall the comings and goings, within quite a few months, of such names as Ormiston, Saunders, Lewis and White. The officer who could claim probably the earliest association with the enterprise was the late Mr. Thomas Fletcher, who was engineer to the original Electric Telephone Co. and became chief engineer to the United Co., and next to him Mr. C. J. Phillips who was the electrician. Mr. Fletcher was of course well known to many readers of the JOURNAL, having come over to the Post Office on the engineering staff at the transfer. Mr. Phillips, who happily is living at Orpington, was Provincial Superintendent for the Southern Province of the National Telephone Co. at the time of the transfer and one of the high officials who did not come over to the Post Office when the telephones were transferred. As far as my memory serves me, and I do not think it is at fault, there remain only four other names of officials who were prominent in the telephone companies in the year 1879, towards the close of which telephone exchanges were being opened in a few of the principal towns, viz.:—Mr. Kenneth MacIver, Secretary of the Lancashire and Cheshire Telephone Exchange, who was stationed at Manchester; Mr. R. Haywood Claxton, the Liverpool Manager of the same Company; Mr. Robert Ryder, the Secretary of the Midland Telephone Exchange (under whom I entered the Service); and Mr. Joseph Poole, who, I understand, took part in the installation of the Manchester Exchange, and is well known as the author of that admirable work, "The Practical Telephone Handbook." A number of men whose names are written large in the history of the telephone in the British Isles entered the Service within the next year or so but cannot be referred to here, as in this article I set forth to treat only of the period up to the end of 1879.

On Nov. 27 of that eventful year, the Attorney-General filed an information on behalf of the Crown against the Edison Telephone Co. in order to enforce the rights of the Postmaster-General. The action did not ensue until the close of the following year when, as is well known, a verdict was given on Dec. 20, 1880, in favour of the Postmaster-General establishing that the telephone was a telegraph within the meaning of certain Acts of Parliament. In transgressing the chronological limits of this article, as defined in the preceding paragraph, my excuse must be that reference to the verdict merely rounds off an important event commenced in 1879. Having trespassed so far, it is perhaps permissible to extract a few words from the judgment of Mr. Justice Stephen who in dealing with the definition of the Postmaster-General's rights and privileges, said, *inter alia*: "It would include . . . electric signals made, if such a thing were possible, from place to place, through the earth or the air." A special interest attaches to those words in view of recent achievements in wireless telephony.

NORWICH TELEPHONE SOCIETY.

A SOCIETY to be called "The Norwich Telephone Society," has been formed for the purpose of periodical readings and discussion of papers on matters of interest to the staff employed in the telephone service. The first meeting of the Society was held on Friday, Jan. 26 last, when the President, Mr. C. F. Ashby (District Manager) gave an address on the growth of the telephone service, with some interesting reminiscences covering a period of over 35 years. The meeting was well attended by members of the staff who took active interest in the discussion. It is proposed to hold regular meetings of the Society monthly.

HOW THE TELEPHONE WORKS.

BY A. CROTCH.

VII.

Subscriber (No. 450) requires No. 365. He lifts receiver.

Rotary Line Switch. Current from exchange battery circulates round loop, *via* coils of line relay and contacts of CO. Line relay energises and its contacts close.

If selector busy on whose contacts line switch wipers rest, the local contact is to earth :—

Earth is therefore brought through local wiper, local lead, through lever 4 of CO relay to lever 1 of line relay and one end of coils of CO. The other end of these coils is also to earth through lever 2 of line relay.

Rotary switch magnet is earthed at its contact, is actuated and its armature, on return, steps wipers forward to next contact.

If selector on this position is disengaged the local contact is disconnected, hence :—

No earth is picked up at local wiper, circuit of battery is therefore through to CO coils whose other end is earthed through lever 2 of line relay. Rotary magnet is thus in series with CO : current insufficient to actuate former, but CO pulls up.

Subscriber's loop now through to switch wipers :

Line relay dis' : lower end of CO coils was earthed at line relay lower armature, but this relay now cut off. Copper slug on core, however, causes release to be delayed until local lead has made earth at selector relay SB.

Subscriber's loop now through to selector *via* contacts of latter's relay SD, and relay SA coils. Fig. 24 shows this : the energised relays being shown in full black :—

SA actuated and applies battery to the loop (this was previously done by line relay, now dis'). Armature of SA earths SB's coils, latter pulls up and earths local lead by lever 1 (as already stated) and keeps CO of line switch actuated.

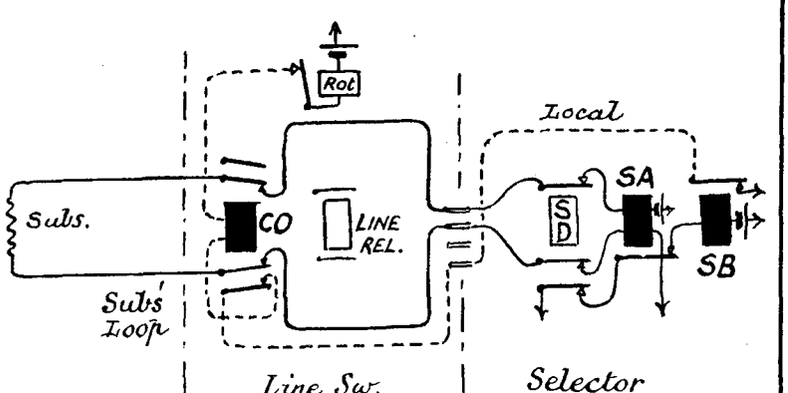


FIG. 24.

Subscriber's line through to selector, relays SA and SB actuated. Subscriber dials first figure (3) of required 365 subscriber.

Selector. Each disconnexion of the loop releases armature of SA which falls back, making tapping (earth) contact on its back stop. Each tap cuts off earth from SB, but SB does not release between the taps. The taps, however, furnish earth to SC and SV which are in series with each other. SC also retains its armature throughout the tapping. SV follows the taps and is actuated three times, thus raising selector shaft to third level.

(Going back a little. The first tap actuates SV and SC as we have seen, and raises shaft one step. This movement of the shaft closes the contacts at the top of latter which remain closed throughout the operations. The top contact, together with the closed contact of SC, put relay SE to earth at lever 1 of SB. SE is therefore actuated and its contacts closed, but the rotary magnet SR cannot operate, as the end of its circuit is dis').

When taps cease, SA is again actuated and earth applied to SB (whose armature has hung on). SC and SV (in series) are deprived of their earth. SC does not release, but by its contacts holds SE actuated. SE's upper spring now establishes another path to earth by means of the connexion to the armature of SA : this locks SE.

The selector shaft is now at the proper level but not yet on the first contact, *i.e.*, it has not yet made any rotary motion.

SE locked. SC now releases and the rotary magnet is actuated by current finding earth at SB1, through contacts of SC. SR thus gives the shaft the first rotary step. The release of SR's armature then breaks the circuit of SE (and by SE) of itself.

Wipers now on first contact of third row. If connector on this first step is engaged, the local contact is earthed :—

The local wiper is connected to one side of SE and this relay is energised, its contacts close and again actuate the rotary magnet, driving the wipers to the next contact. If this, and all the 10 contacts are busy—that is, no idle connector to be found—the shaft is rotated an eleventh step. The cam then operates and the " busy " tone is given to the calling subscriber.

When a disengaged connector is found, its local contact will be disconnected :—

Relay SE will find earth *via* contact of SR, coils of SD, cam-springs and lever SB1. That is, SE and SD will be in series. The current will be insufficient to actuate SE but will pull up SD. The closing of S.D's contacts brings the loop on the wipers and through to the connector ; it also disconnects SA and consequently SB. With the disconnexion of SA, the battery is taken off the loop but it is restored by relay A of the connector. The release of SB takes earth off the local lead, but this action is delayed until a fresh earth is furnished through levers B1 and D1 on the connector. Fig. 25 shows the subscriber through to connector.

Subscriber's loop through to connector : relays A and B actuated. Subscriber has dialled first figure (3) of wanted number (365). He now dials second figure (6) :—

Connector. (J, the booster relay, pulls up, finding earth through levers F4 and B4. Its armature is attracted and locks the relay through D5. J cannot complete his operation until lever D1 moves over.)

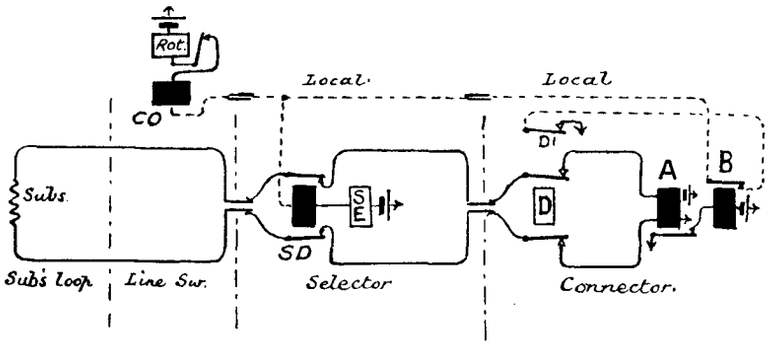


FIG. 25.

Tapping of figure 6. First tap actuates V and C, steps up connector spindle and actuates shaft-springs. C's armature pulled up and retained by its slow action.

Second and succeeding taps pass through V and C *via* armature of latter and step up connector to sixth level.

After this second set of impulses, subscribers loop again restored, A re-energised, B confirmed and C (though slowly) releases its armature.

On falling back of C's armature, its back stop connects through G2 to relay E, H6 and rotary magnet R and battery.

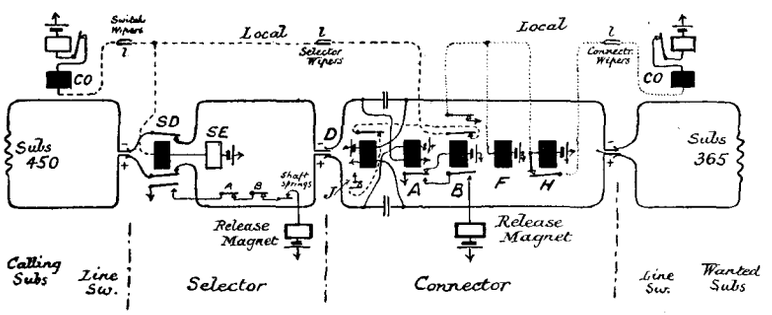
E's armature attracted and E locked by its means.

Third figure of 365 now dialled :—

A's armature falls back at each disconnexion and puts earth on E and R as above, actuating rotary magnet five times and bringing wipers on the fifth contact.

If wanted subscriber is engaged, his local contact is to earth :—

E is deprived of current but retains its armature. Relay G finds earth through H3, E's contacts, local wiper and subscriber's local contact. G pulls up and applies the busy tone to calling subscriber through G3. When E lets go, the path to G's coils through E's contacts will be broken but it gets another earth through its own lever G1.



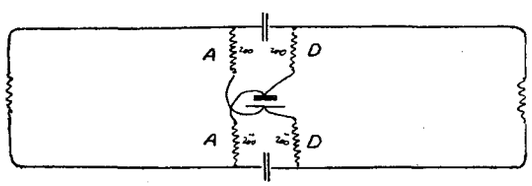


FIG. 26.

If wanted subscriber disengaged :—

His local contact is connected through to his cut-out relay and rotary magnet of line switch, with its battery. A path is open from the local wiper of connector, through the contacts of E, to one end of the 125-ohm coil of H, the other end being to earth at G1. A current flows (not strong enough to energise rotary magnet) energising CO (breaking its contacts but making no new ones) and relay H. As soon as H pulls up it is held by its own 1,300w. coil and the called subscriber's loop is brought to the wipers of the connector, whose local wiper is earth through H5.

By the armature F1 of relay F the calling generator (and battery) are applied through Fs 200w. coil to wanted subscriber's loop, its earth being through RR. The bell is then rung, through the condenser. When the subscriber replies, he completes the loop and the application of the battery between the rings energises F, which is then locked by its own armature F2 and 1,300w. coil.

The closing of F's upper and lower contacts puts the wanted subscriber's loop through to relay D, which responds and this puts the two subscribers through to each other *via* the two condensers, the wanted subscriber's side being supplied with current by relay D and the other by relay A—whose connexions to this loop are reversed, thus reversing the battery. This was formerly done to actuate the calling subscriber's meter but this is now effected in another way.

It will be remembered that the local lead from calling subscriber's CO relay was earthed at D1. The closing of this contact puts the lead through to J's contacts. J is deprived of current by closing of D5 but his armature is retained by the slowing-down action of the copper slug. Whilst this lasts, the booster battery is applied to the local lead, this battery augmenting the common battery on the calling subscriber's meter and causing it to register. As soon as J's armature is released, the local lead is again earthed.

The two subscribers are now through to each other, the two coils of A and those of D serving as impedances between the battery and the lines.

Fig. 26 shows, in skeleton, the whole circuit with subscribers "through." Both local leads are earthed, one at B1 and the other at B2 of the connector, and the various earths are made on these leads. The calling subscriber's loop is supplied with current from relay A and the other from D. The local contacts of both subscribers are earthed, thus earthing their positions at all the local multiples and rendering them "engaged."

Clearing.—Both subscribers hang up. The breaking of the wanted subscriber's loop causes D to release. The breaking of the other loop de-energises A and its armature releases—B following. The release magnet now finds earth through A and B armatures, and releases the connector shaft, restoring the shaft springs to normal. The release of B1 takes earth off F, H, local wiper and wanted subscriber's CO relay. B2 takes earth off local lead to calling subscriber, thus de-energising his CO relay and relay SD. SD4 now earths release magnet of selector through armature of SA and SB2 and selector shaft is released, disconnecting the shaft springs, and all is thus restored to normal.

(To be continued.)

THE MURRAY MULTIPLEX.*

BY W. P. MORRIS.

THE greater part of my address will have to be a description of apparatus. So far as the multiplex side of our working is concerned it is very similar to your Baudot working. The chief difference is that while you work a true quadruple duplex we work multiplex one way only, and use the Morse key as a return. This seems to puzzle a good many people, though it is simple enough. Take the transmitting end first. The solid ring of the transmitting group is connected to the split of the relay, and signal combinations set up on the transmitting segments pass to line just as in any ordinary key worked duplex set. Received signals actuate the relay and operate the sounder. At the receiving end the opposite takes place, the Morse key being connected to the split of the relay in the usual duplex way, and the tongue of the relay is connected to the solid receiving ring. Thus it is obvious that you can work multiplex one way and any system, Creed or anything else you like, the other way.

There is one other point of importance in dealing with a circuit on which multiplex is only worked in one direction. The time of propagation is immaterial and no orientation is necessary. It is only when working multiplex in two directions on a duplex wire that time of propagation has any importance. It has no bearing whatever on our working, and you could screw the plateau round to any point and synchronism would always follow it up. That gives rise to a thought that may be worth following up. It is the practice, I know, to work Baudot sets on metallic loops, involving balancing and orientation. Why not take these two legs of the cable and work in each direction at SX ? By doing so you would get rid of the trouble both of balancing and orientation, and yet have all the facilities of duplex working. The question of induction comes up, of course, but it may be worth while trying it on the shorter lines.

Working multiplex in one direction only necessitates one plateau, and of this plateau we only use four of the rings, in London the second (transmitting) ring and the third (local) ring with their respective solid rings, and in Edinburgh the first (receiving) ring and the third (local) ring, also with their solid rings.

The phonic wheel at both ends is the usual Murray phonic wheel which you use on your Baudot sets. As Edinburgh is the correcting station, the correcting magnet and star wheel mechanism have been removed from the London phonic wheel and are at Edinburgh for use as spares if required. The phonic motors have never given the slightest trouble at either end. The only attention they need is a little vaseline in the lubricating thimbles once a month. There is some difficulty in starting up at high speeds by the ordinary jerk method, and we overcome this by winding a string round the spindle and giving a steady pull until the motor has got into its stride, just as a boy starts a top spinning.

The reed in the Murray is also the same reed that the Post Office use, but with the difference that one weight is adjustable while the reed is vibrating, so that any slight change of speed that is required does not necessarily involve the stopping of the distributor, or even of multiplex working. The reed is screwed on to a wall with the free end upwards. This is in accordance with Murray's definite instructions and I suppose he must have some good reason for insisting on this point. Why, then, do the Post Office authorities go out of their way to do the opposite ? All the reeds I have seen in the Post Office, either at T.S. or elsewhere, have been hung with the free end downwards or else have been laid flat. The vibrator has run for two months at a stretch without even cleaning the contacts.

From the very beginning of using multiplex I set out to find more suitable brushes than the copper wire variety, which are too "finicky" and in my opinion are the cause of a lot of trouble in multiplex working. For about a year I used various kinds of solid brushes, principally of watch spring steel, which gave very fine results up to 50 words per minute per channel. Their only fault was that they chattered a lot, leaving ripple marks and causing wear on the segments, but for conductivity they left nothing to be desired up to 50 words per minute. But now we are using a tin strip of silver solder strengthened by a steel spring, and this is excellent at all speeds and gives no trouble whatever. We find it necessary to trim up the ends of the silver solder brush about every ten or twelve days, and that is all the attention the brushes require. Being one solid strip you cannot get strays to another ring and broken strands lying between and shorting the segments.

One other matter which I think the department could advantageously take up is the Murray terminal box. The segments of the plateau are wired in flexible armoured tubes to plugs, each fitted with 22 terminal pins and these are merely plugged into the terminal box, so that the plateau can be taken in quick time from the distributor down to the mechanic's bench for proper cleaning. The terminal box is also fitted with a switch, which on depressing causes reversals to be automatically sent to line, doing away with the necessity for holding down keys and so forth.

The actual operation at the transmitting end is done by means of perforating keyboards using the standard typewriter board. It has been designed to operate with the least possible distance between the points of perforation and transmission. The message actually starts transmission three seconds after the operator has commenced punching. Thereafter three seconds after an operator in Fleet Street starts punching reception of the message has actually started in Edinburgh. This is a great advantage over Wheatstone or Creed methods, as it means that all operators are practically in instantaneous communication with the other end of the wire. For urgent newspaper messages, race results, &c., its advantages are very obvious. Then if the puncher keeps just a little ahead of the transmitter the saving of RQs is great. This entails no hardship on the operator. We have operators on the Fleet Street staff who can punch at 60 words a minute throughout an eight-hour duty. Or if the transmitters are running at 60 per channel and the operator cannot punch at that speed he has nothing to worry about, as the moment the transmitter catches up to him it automatically stops, therefore his attention need not be taken up by the transmitter.

Depression of a key of the perforator causes selected interposing rods to be placed in the path of the armature of the punching magnet. The depression of any key also closes the magnet circuit so that the armature is attracted and the punches driven through the paper. The perforator has other functions to perform besides the punching of letters. As this is a page-printing system it is necessary for the punching operator to send back the carriage of the distant printer for new lines just as a typist does. But in this case the printer carriage is 400 miles away so the puncher cannot see it. There is a scale and pointer on the perforator, and each time a key is depressed the pointer advances one division. There are 72 divisions on the scale, corresponding to the 72 letters which can be printed on one line, but when 62 letters or spaces have been punched a pair of contacts is closed causing a red lamp to light up and thus warning the operator that, after completing the word he is on, he must give the signals for the carriage to be returned and the paper to be fed up. There is also a back space key for rubbing out errors. An experienced operator knows by instinct when he has made a mistake. Suppose a puncher in the word LONDON punches LONFON, by the time he has got to the end of the word he realises his mistake, so he back spaces three times, punches the Erase signal three times and then goes on DON. At the receiving end these erase signals leave the printer unaffected, it does not even space, so that the word London appears on the printer message without any trace of the error.

The perforator has a very light touch and is exceedingly rapid in action, each perforator being automatically tested at the works at 300 words per minute before delivery. The tape is visible up to the last letter punched.

The slip used is rather wider than the Wheatstone punched slip and perforations are made across the slip. You will notice if you examine these slips that the feed hole is set slightly in advance of the message holes, and this instantly shows which is the beginning or end of any slip.

While the puncher is perforating his message it is also passing through the transmitter. The transmitters operate letter by letter by means of a magnet receiving an impulse once per revolution from the distributor (the cadence). Then as the code consists of combinations of five, there must be five needles or peckers. These needles oscillate on a spindle between battery contact bars. The levers themselves are connected to the segments of the transmitting ring.

On working the armature of the magnet by hand the slip is fed forward one feed hole for each operation of the magnet. This operation of the magnet also resets the selecting levers so that they all press against the spacing contact bar, but immediately the magnet resumes its unoperated position the peckers go forward through the perforations and set the selecting levers and segments for the next signal. This lever at the side of the transmitter is the automatic stop and start level. You will notice that when I hold the loop so that the automatic lever is depressed a little the operation of the magnet armature cannot now feed the slip forward, so that all the selecting levers are held against the spacing contact bar until the loop is lengthened. This prevents the transmitter overruning the puncher if he gets behind. There is a free wheel device for quickly running back a slip.

The printer now used in conjunction with Murray's apparatus is the Morkrum typebar printer. The typebar printer you see before you, was designed and even turned out in numbers before the end of a year. They are simple in design and sturdy in construction and give very little trouble indeed. One of the chief things in their favour is that you can see practically at a glance if anything is wrong and where the trouble is.

Like all modern typebar machines, the electrical equipment consists of six magnets and a small motor. The motor drives the cam shaft of the machine and all that is required is that it shall run at a higher speed than the distributor. Five of the magnets are setting magnets just equivalent to your five Baudot setting magnets, and the sixth magnet gives the impulse which permits the motor to revolve the cam shaft. The upper part of the machine is simply part of a standard typewriter, while the lower or telegraphic part of the printer was designed and made by the Morkrum Co. It is a small compact unit with a minimum of parts and few adjustments, most of which rarely need attention after the first setting.

The setting magnets are connected directly to the receiving segments of the distributor, no relays, condensers or other intermediate equipment being required. The receiving brush passes over the segments connected to the printer and thus sends the desired signals to the five selecting magnets of the printer. The magnets, when operated, release triggers which act against selected combs or code bars, pushing the selected ones away and forming a combination amongst the combs. Immediately this is done current is given from the local ring to the printing magnet which releases a clutch and permits the motor to revolve the cam shaft once, and all the rest of the operation is done by this one revolution. The typebars are

* Paper read to Edinburgh Telegraph and Telephone Society.

attached by links to a number of push bars, and when a combination of the code bars has been formed one of these push bars, rising in the slot of the code bars, projects higher than its fellows, and the projecting push bar is swept forward and causes the type face to strike the paper. Functions, such as the returning of the carriage, feeding up the paper and so on, are done in exactly the same way except that the push bars in these cases actuate other levers instead of type bars.

On each type bar there are two matrices, one printing a letter and the other a figure or punctuation mark. When the shift push bar is moved forward it pushes directly against a bell crank attached to the shift rocker and rotates this slightly. This rotation raises the entire type-basket to the proper height, bringing the secondary characters on the type bars into printing position, where it is held by a latch. The ribbon feed mechanism is the ordinary L.C. Smith standard mechanism.

Murray also produces a re-perforator which will have its uses when multiplex is more extensively used for news work. It is a very simple little machine, comprising five magnets and a punch block, and can be worked in parallel with the printers so that the news coming on all or any of the channels can be re-transmitted to another wire.

The traffic over the *Scotsman* wire is very exacting and varies very little from week to week, the average night's work being 60,000 words, with 80,000 the highest night's work we have ever done. The Murray eats up this traffic easily and we are generally clear about 11.30 p.m., two hours before the paper goes to press. Our normal speed of working is in the neighbourhood of 200 words per minute. There are nightly four columns of stock market quotations, so that for nearly an hour the four channels are engaged in pouring out nothing but figures. American operators would faint if they were called upon to transmit figures and nothing but figures for an hour.

Major Jayne, in opening the meeting for discussion, stated that he had seen it remarked that page printing was less successful in America than the tape printing.

Messrs. Cooper, Holmes and Dodds took part in the discussion, and the proceedings terminated with a vote of thanks to the lecturer and the chairman.

THE LONDON SCHOOL OF TELEPHONE OPERATING, CLERKENWELL.

BY A. M. B. NEWITT,
Assistant Superintendent of Traffic, London Telephone Service.

SOON after the National Telephone Company was transferred to the State it became evident that the then existing schools in London Wall and Carter Lane had not sufficient capacity for the training of telephonists to meet the needs for the adequate telephoning of London. The design for the new school was therefore put in hand and was completed shortly after the outbreak of the war in 1914. The actual building of the equipment had, however, to be postponed until last year. Now that it is completed it is thought that some notes on the design, and description of the apparatus installed may be of interest.

In order to provide efficient training it is essential that the equipment of an operating school should be as up to date as possible in every detail, and that the conditions under which both the learners and the teaching staff work should be conducive to the best results.

Although the primary object of an operating school is the training of telephonists, it is also used for the further training of officers destined to take up duties involving exchange supervision and control.

Before describing the apparatus in the new school, and in order that the reasons for its provision may be better understood, it may be desirable to review briefly the system of training adopted in the London Telephone Service.

The curriculum consists of a series of lectures on telephone operating with intermediate periods devoted to study, practical work, and the answering of test papers. A learner should leave the school equipped with a thorough knowledge of the principles and practice of telephone operating. She should have a thorough knowledge of the names and functions of the various pieces of apparatus she uses in her work and a considerable knowledge of the apparatus at the subscribers' end of the line; as such knowledge tends to the sympathetic appreciation of the trouble and difficulties of subscribers. This knowledge of the conditions at both ends of the line also enables a telephonist to realise the importance of her own position in the telephone organisation, and a proper appreciation of this must of necessity re-act beneficially on the Service.

In addition to the principles already referred to the training of a telephonist must include the training of the ear, in order that the demands of subscribers and other telephonists may be accurately heard, and the training of the eye in order that the connexions demanded may be set up accurately and expeditiously.

After many years' experience in the London Wall and Carter Lane Schools, it became evident that, although extremely useful work can be done with the apparatus provided, there was much room for improvement, and certain modifications and additions have been made in the new equipment at Clerkenwell.

These improvements include (1) an increase in the size of the subscribers' multiple on the practice switchboard; (2) certain modifications to the switching arrangements on the calling monitor's desk; (3) the introduction of artificial lines designed to reproduce actual transmission conditions; (4) greater facilities for passing junction calls; (5) the provision of a working model switchboard in one of the lecture rooms.

The school accommodation in the Clerkenwell Exchange building consists of two lecture rooms, one room set apart for study, one examination room and the practice switchroom.

These rooms have together accommodation for the simultaneous training of about 140 learners.

In lecture room No. 1 the desks are arranged on tiers each about 6 inches high, so that each learner has an uninterrupted view of the model switchboard which is provided for demonstration purposes. This model switchboard consists of two panels, that on the left side being equipped as an "A" board, and that on the right side as a "B" board.

The "A" side is provided with a strip of 10 calling equipments, 20 outgoing junction jacks and a block of 100 multiple jacks, panel and register pilots and a key shelf equipped with two pairs of cords with speaking keys, supervisories and register keys. Two of the calling equipments can be operated by an instrument provided with a coin box. This instrument can be used to illustrate the calling of either an ordinary subscriber or a coin box. The appropriate calling signal can be put in circuit by means of a switch under the control of the lecturer. The multiple jacks are wired to the calling jacks in the ordinary manner. Subscribers' and effective position registers are provided which can be operated by the depression of the register keys on the key shelf. On the "B" side panel, multiple jacks only are provided, and the key-shelf equipment consists of two incoming plug-ended junctions which are wired to the outgoing junction jacks on the "A" side. A table instrument is also provided in connexion with a multiple jack. With this apparatus it is possible to illustrate the following connexions:—

(*a*) A call between two subscribers on the same exchange.
(*b*) A call from the call office for a subscriber on the same exchange.
(*c*) A call from either a subscriber's circuit or a coin box circuit on one exchange to a subscriber on another exchange.

Current is supplied to this board by means of a flexible lead connected to a wall plug so that when not required it can be disconnected and the board moved to one side.

This lecture room is also provided with various maps illustrating the London Telephone Administrative Area, the junction centre scheme, &c., and charts of the various service markings, pegs, &c., used.

Lecture room No. 2 has seating accommodation for 25 learners. Each desk is provided with an instrument jack wired in connexion with an amplifying circuit which can be connected to any working position in the Clerkenwell Exchange. This circuit is so arranged that it takes only a very small amount of the original current used on the position and the transmission and reception of the Clerkenwell telephonist is for practical purposes unaffected by the bridging of the 25 learners across her circuit.

Owing to the shortage of accommodation in the building, due to the housing of the Bishopsgate Exchange, it has been necessary to make temporary arrangements for the study and examination rooms.

The practice switchroom is provided with the following apparatus:—

"A" learners' positions	24	
Three-panel dummy positions	2	
"B" learners' positions	9	(1 unequipped)
Two-panel dummy positions	1	
Information desks	2	
Chief supervisor's desk	1	
Calling monitors' desks	8	

In addition to the above, three private branch exchange switchboards are provided for training telephonists destined for this class of work.

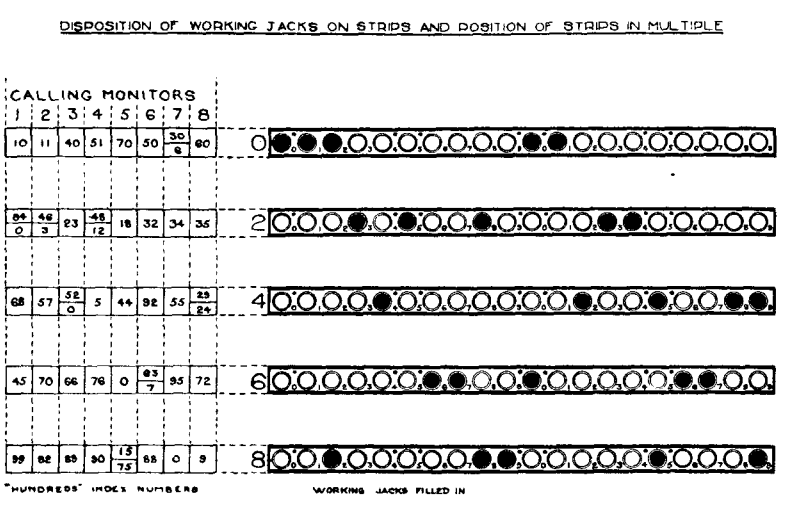
The 24 "A" positions are divided into four groups of 6 positions each, each group representing a different exchange thus:—

Positions 1—11	Gerrard.
„ 13—23	London Wall.
„ 25—35	Victoria.
„ 37—47	Clerkenwell.

They are of the C.B.1 full multiple type and are together equipped as follows:—

Subscribers' multiple	10,000
Outgoing junction multiple	600
Answering equipments	3,200

Each "A" position is provided with 8-cord circuits complete with cords, supervisory signals, combined ringing and speaking keys, effective and secondary register keys, order wire ringing key, and 50 order wire keys. The standard pilot lamps are also provided, *i.e.*, subscriber's panel pilot, register pilot and instruction circuit pilot. The fee junction order wire pilot is also provided, but for the time being this is not being used as there is no need for it at present under the new tariff. Ticket clips and holders, stumps for holding reminder rings, and register key covers are provided on the standard basis.



—Fig. 1.—

The cords, speaking and ringing keys, and register keys, are coloured in accordance with standard practice.

Each group of three "A" positions is under the control of one calling monitor and one patrolling supervisor.

Supervisors' circuits are therefore provided on the basis of one to each three learners' positions.

As already stated a 10,000-line subscribers' multiple has been provided, which is repeated every 9 panels on the "A" board and every 6 panels on the "B" board. Of this multiple approximately only 250 jacks are actually wired, the remainder being provided with bushes only and suitably backed to screen the light.

This large multiple field has been provided because it has been found that telephonists trained on a large multiple are, generally speaking, more efficient that those trained on a small field. This has already been proved by the experience gained in the temporary schools which have been provided from time to time in working exchanges.

When compiling the list of actual working lines, the following facts were borne in mind: (1) the numbers selected should consist largely of those in which it is known that difficulty in transmission is experienced, that is to say, they should consist of cases of adjacent fives, and nines, twos and threes, "doubles" and sevens, &c.; and (2) they should be spread as far as possible over the whole of the multiple field.

In order to cut down the number of strips of jacks having varying numbers of working lines on them, the following method was adopted:—A plan (Fig. 1) of 100 multiple jacks was prepared, and the lines it was desired should be working in each strip were specially marked. The hundred numbers of the blocks in which these working lines should appear were then placed at the side. The numbers were then read from the finished chart.

From this it will be seen that by adopting this method it has been possible to arrange for a great variety of numbers extending over the whole of the multiple field and, at the same time, the number of strips of jacks on which the working jacks vary has been kept as low as possible.

Eighteen further numbers in the multiple are used for giving the "out of order" tone. This can be disconnected and the "engaged" test substituted at the discretion of the chief supervisor, by the operation of a switch on a panel of the "B" board.

The following numbers are also working in the multiple and are terminated on the information desk.

Fire line	100
Police line	400
Salvage line	8,000
Controller's office	2,000

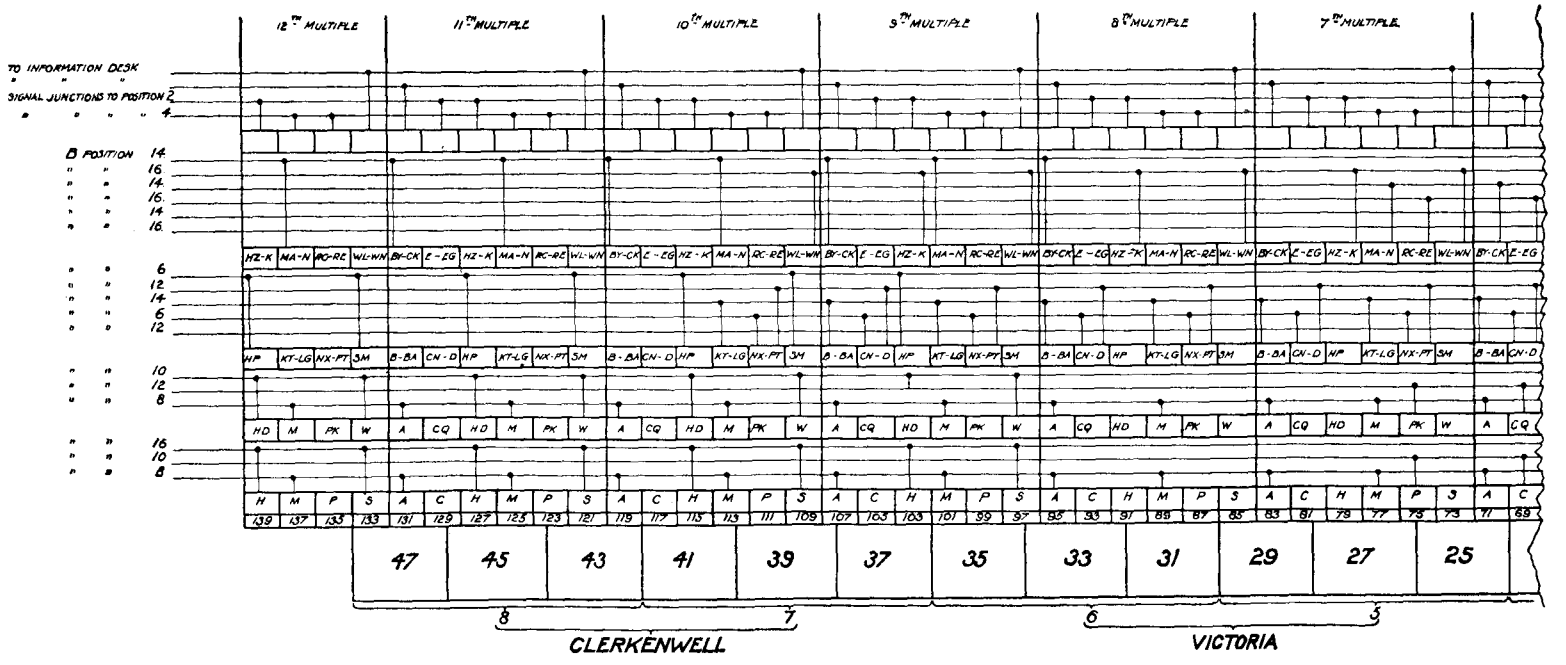
The number of the circuit for Ambulance is CQ. 6300 and this is worked on multiple number 2000 on a "hospital" basis.

About 5 per cent. of the multiple is pegged with pegs denoting spare and ceased lines, transferred circuits, &c., in fact every type of peg to be found in use in London exchanges is represented. Auxiliary marking is also provided to the same extent as would be found in a working exchange of similar size.

The outgoing junction multiple repeats every 6 panels and has 5 strips of 20 jacks per panel. The two bottom strips in each panel are without designation strips, and accommodate straight order wires, the remaining three are provided with designation strips for the accommodation of the smaller order wire groups, the signal junctions, and the Service lines.

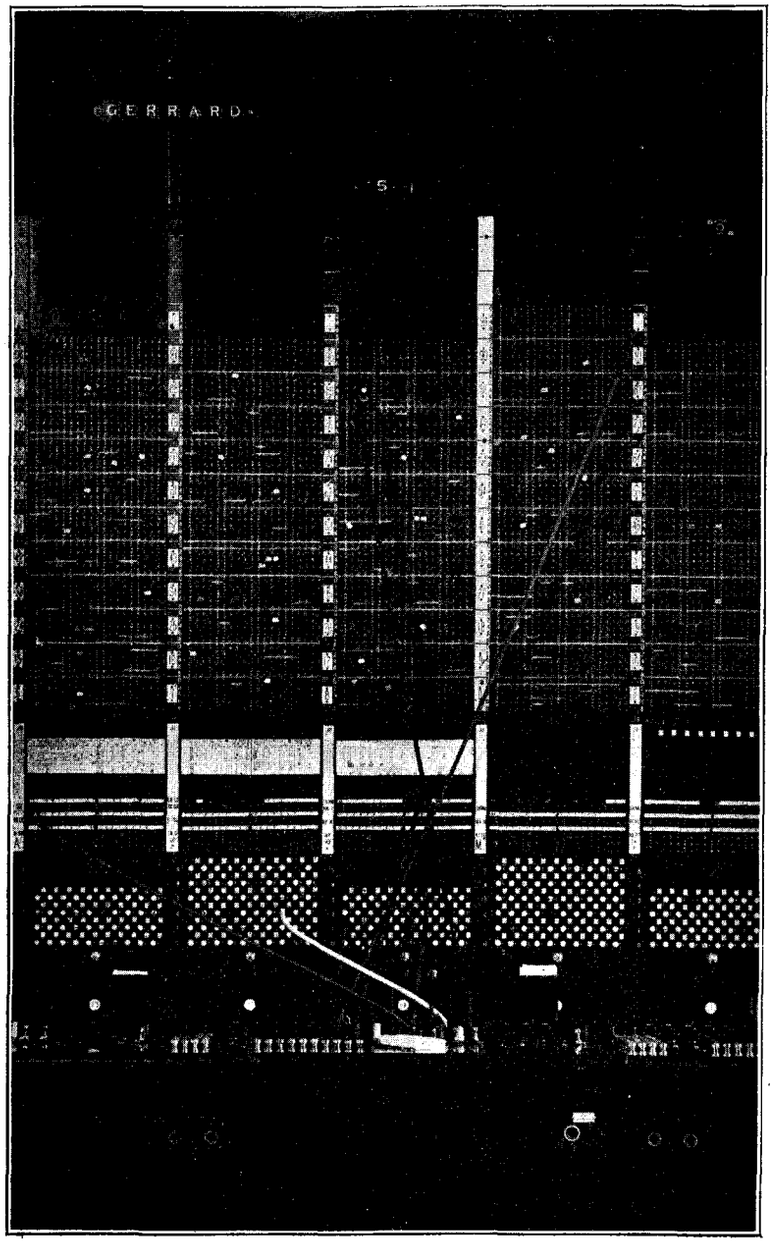
The junctions have been arranged on the jacks with a view to giving the learners practice to as large a number of exchanges as possible with a minimum of wiring. This has been accomplished by repeating the working jacks every third panel, the designation of the junctions, however, being altered in the latter panel in each case. It will be seen that this arrangement gives the learners the opportunity to handle calls to about twice as many exchanges as would be the case were the ordinary wiring methods adopted. A further saving in wiring has been effected by allocating to each calling monitor certain definite junction groups over which they can obtain connexions.

CABLING ARRANGEMENTS OF OUTGOING JUNCTION MULTIPLE—"A" BOARD



—Fig. 2.—

In no circumstances must calling monitors pass calls for exchanges other than those shown as being available to them. This proviso is essential because, although the whole of the junctions appear in front of the learner, only selected groups are wired and available for use at that position. A reference to Fig. 2 will make this clear. The signal junctions and service lines are available to all the calling monitors and are wired throughout on a normal 6-panel repetition. The whole of the junctions except those to trunks (record lines), toll and telegrams terminate on the "B" positions. The order wires have been treated in a similar manner to the junctions, that



CLERKENWELL OPERATING SCHOOL. TYPICAL "A" POSITION.

is to say, the order wires in connexion with the junctions in panel 1 have been teed to those in connexion with the junctions appearing in panel 4 and so on. Arrangements have been made for first and second choice order wire keys, by the simple expedient of teeing two order wires together, giving them the same code and labelling them in accordance with standard practice.

The service lines and the circuits for trunk, toll and telegram calls are terminated on the information desk.

In order that the conditions in the school shall approximate, as nearly as possible, those obtaining under actual working conditions, artificial cable has been provided to the order wires, thus giving them the transmission equivalent of the actual order wires.

An average of 10 working answering equipments is provided per "A" position (240 working circuits in all), the remainder of the 3,200 equipments provided being dummies with number plates and lamp caps only. The working jacks are installed on alternate jacks on one strip and in such a manner that not more than five appear in any one panel.

(To be continued.)

TELEGRAPHIC MEMORABILIA.

Now and again, even in these days, one catches a glimpse of the working of the Post Office (War) Relief Fund. One may feel the kindly sympathetic atmosphere which still surrounds the working of that remarkable organisation, perhaps the finest piece of corporate effort the Post Office has ever made. Here and there one comes up against the cruel aftermath of the war in the shape of certain instances where colleagues, apparently fit and well upon "discharge," have subsequently succumbed to some insidious effect of the great struggle. Such cases readers will be glad to know are by no means overlooked by the fund but have received and are still receiving the same quality of helpful solicitude as was so marked a feature during hostilities. Other instances, too, have come under notice in which the work of the fund is still being carried out in connexion with the care, education, and maintenance of war orphans related to Post Office officials.

The Annual Report is largely, pre-eminently and naturally a financial statement into which the view-point of this paragraph does not so completely intrude; hence it seemed right that just these few lines should be written by one who can honestly testify to the continuous care and to the continuous kindliness which still pervades every action in the administration of the fund This is no appeal for further donations which fortunately are not needed. It is simply a voluntary reminder to all concerned of the good work which is still going on thanks to the generous contributions of the many contributors.

The Cable Room Sports' Club held an admirable Smoking Concert at the Talbot Restaurant on the 2nd ult. the musical talent being of the usual high order. A feature of the evening was the presence of Messrs. N. Curtis-Bennett and G. H. Barson, two of the most active members of the Civil Service Sports Council. Mr. P. H. J. Halls (Chairman) having introduced the visitors to the gathering, Mr. Curtis-Bennett in an aptly phrased speech gave voice to the sincere gratitude of himself and his colleagues upon the hearty manner in which the Cable Room had thrown in their lot with the C.S.S.C. during that early period in the history of the organisation when friends and helpers were much fewer than they are to-day. The speaker again thanked the Cable Room Sports' Club for that hearty co-operation of their leaders who had had the imagination, the foresight and the confidence almost from the first to unite themselves with that democratic movement in the Civil Service which was now well under way. He sincerely hoped that before long the Civil Service would not only have a place in the front rank of the athletic world, but would be able to create a more sympathetic atmosphere around the general public and would convince the latter that Civil Servants were neither drones, wasters or any other of the sundry approbrious things amongst which a certain section of the press had unjustly placed them. It was gratifying to see that a number of old associates of the Cable Room had taken the opportunity of renewing old acquaintances, Messrs. T. Bird, E. Griffith, Lecomte and Moody being of the number. It was stated during the evening that the Council are taking steps to secure a sports ground at Eltham and has already secured some 25 acres for a Civil Service ground at Portsmouth.

The sudden death of Mr. R. Rudham, Overseer of the Cable Room, C.T.O., on Feb. 20, at Hastings, to which town he had moved upon retirement from the Telegraph Service came as a shock to those of his colleagues who were still on the active list. "Bob" was a man of many parts. An ex-R.E. he had spent some time in Cyprus during the last Anglo-Egyptian campaign and had very considerable experience on the practical side of telegraph construction and maintenance both at home and abroad, military and civil. He had a fund of information stored during his contact with life in English villages and materially added to by his voracious appetite for reading. He was an excellent *raconteur* of the pre-war army style, but an earnest student of science. He was among the first to claim the Technical increment as he already possessed the necessary certificates when the Post Office Circular appeared announcing this charter of the telegraphist student. One of his hobbies was trigonometry to which it was an easy step to astronomy, qualifying in the latter upon his first examination. As a relief to these studies he was a lover of Charles Dickens and was a complete encyclopædia of Dickensonia and its characters. With all the old respect for the discipline of the army in all its stern rigour his was the tenderness of the heart of a woman for all in trouble or distress. Thus we leave you, rugged dear old fellow, with your heart of gold!

About the same time the death of Mr. C. Millish, formerly of the Foreign Gallery and of the Cable Room, was also announced, due to an acute attack of pneumonia. He passed away in his 68th year.

Private information has reached this country from our friends in France to the effect that the telegraph administration of the latter has definitely adopted the principle of automatic transmission for use in conjunction with the Baudot type-printing telegraph system. Not only so, but according to my informant, a most reliable source, successful experiments have been carried out on one of the Paris-Lyons circuits at 200 instead of the conventional 180 revolutions per minute. It is confidently estimated that one of the types of Baudot receivers which has been in use for several years at the lower speed will give equally good results at 250 r.p.m. The *moteur phonique* of Lacour will certainly be utilised in connexion with this increased speed of running and it would be no surprise to the writer if the Western Electric type of vibrating reed were also introduced into the arrangement.

This is very welcome news to those of us who for years have been able to see the possibilities of the use of keyboard perforators with the Baudot system.

It is not likely that the increased speeds will be of much utility on the Anglo-French circuits as most of these are already exploited to their full K.R. value. These evidences, however, of the silent, thoughtful work which has been going on in the laboratories of the Rue Brune, Paris, are gratefully welcomed in this country as a token that our nearest continental neighbour is tackling the problems of wire telegraphy in real earnest. It should, however, be stated as an act of simple justice to the engineers of the British Post Office, that the possibility of utilising the 1909 model of Baudot receiver at these increased speeds was tested out successfully some years ago.

According to the latest advices from Copenhagen by the time our April number is in the hands of the printers, the Great Northern Telegraph Company will have re-established direct telegraphic communication with Japan *via* Vladisvostock through the Blagovestschensk line. Relief will thus be given to the Petrograd-Irkutsk-Pekin line which has had to carry the Japanese traffic in its entirety.

On Feb. 20 last telegraphic communication by means of a land wire was opened between India and Jelalabad and Kabul.

Much has been heard and written of the submarine cable schemes projected by the Italian Government for establishing telegraphic communication between Italy and North and South America. It is probable that the following announcement which recently appeared in *The Times Trade Supplement* definitely places the scheme on a sufficiently sound financial basis to justify the placing in hand of the contracts :—

> "An agreement has been concluded by the Italian Government with a company which will lay a series of submarine cables. One will stretch from Fiumicino (Rome) to South America. Another from the same point will link up the Azores, where it will connect with a cable to New York. The "Italian Cable Company" (La Compagnia Italiana dei Cavi) will lay a third, from Brindisi to Greece. In South America, during the past few months, about sixty million Italian lire have been subscribed for the first-mentioned cable, and subscriptions continue to come in. In Italy a syndicate of Italian bankers is supporting the financing of the scheme."

In any case it is the most definite item of the long talked-of project which has yet come under notice in this country.

Last month the Indo-European Telegraph Company's route to Persia was re-opened. The company has not yet recovered control of the entire circuit, but the British and German Governments are at present bridging the gap between London and Warsaw so that Persian traffic by this route may now be accepted in the British Isles for despatch forward.

It is sadly *à propos* of the company's renewed post-war activities to be compelled in the same issue to place on record the decease of one who was so intimately connected with the fortunes of this enterprise as the managing director, Mr. Thomas W. Stratford-Andrews, who passed away in the latter part of February. Mr. Andrews took up the post of managing director to the company in 1899, succeeding his father in that position, having assisted the latter for the previous three years, or from the time when he returned from his technical training in the Siemens-Schuckert works in Berlin.

A portion of this "student" period was apparently spent in very practical experience with an expedition which journeyed some 800 miles up the Amazon in order to lay a telegraph cable for the Western & Brazilian Company. Less than a year after his entry into the service of the Indo Company, he was sent on a tour of inspection of the Company's land-lines through Russia and into Persia as far as Teheran. This journey was performed on horse-back through Russia and across the Caucasus. Seventeen years later he passed over the same route in a motor-car !

It was under Mr. Andrews' direction that experiments were conducted which resulted in direct Wheatstone working over the Company's lines between London and Teheran, and subsequently between London and Karachi over the India office system. The writer has a descriptive pamphlet on these extensions written by Mr. Andrews which he much prizes and which also describes the London switching arrangement for through working to certain provincial offices of the company. The deceased was thanked by the then Russian Government and decorated by the Shah of Persia for services rendered.

The *Electrical Review* has corrected the somewhat misleading announcement in the daily press which led to the belief that a new Atlantic cable had been laid between this country and the U.S.A. What happened was simply that one of the circuits had been extended to Boston instead of terminating in New York.

We gather from Chinese sources that the Ministry of Communications there has made the following, to Western minds, rather curious declaration ? It reads as follows :—"As all the telegraph, telephone, and radio buildings and installations throughout the country are absolutely public property, no one is entitled to sell or mortgage them, and that if the provincial authorities or foreign interests enter into any such agreements the Government will not recognise their validity."

The launching of the new *Faraday*, the second cable ship of that name owned by Messrs. Siemens Brothers & Co. Ltd., was successfully accomplished at Jarrow from Palmer's shipyards. She is destined to take the place of the first *Faraday* launched nearly 50 years ago and which, has laid, in round figures, about 50,000 miles of submarine cables including no less than eight across the Atlantic. The new boat is 415 feet in length over the triple bow sheaves. Her four tanks have a total cable carrying capacity of 92,000 cubic feet, and her oil fuel storage is sufficient for a steaming radius of 10,000 miles. The total accommodation for officers, crew and cable staff is 150. Testing room, workshops, refrigerator and fresh-water storage are also provided, all of ample proportions. What optimists these cable people are to be sure and in these days of wireless enthusiasm too !

The following extracts from a lecture by Dr. H. W. Nichols (an illustrated report of which recently appeared in the *Electrical Review*) is bound to be read with the keenest interest by those who are following the developments of radio science. Dr. Nichols has the chargeship of the Research and Development Laboratories of the American Telephone and Telegraph Companies, is a particularly painstaking scientist and has successfully experimented in carrier-current systems as applied to wire telegraphy and telephony. He has also combined wire and radio telephony by which vessels suitably equipped may be communicated with from two to three hundred miles out at sea.

Dr. Nichols is continuing his researches in the direction of carrier-current working as applied to wireless transmission and in the lecture mentioned said :—

> "The ether was more like a condenser than a copper wire, and this necessitated the use of high frequencies. Further, the characteristics of the ether were very much more variable than those of a copper wire. There was a tremendous difference between day and night characteristics of the ether, and even between parts of the same day ; in fact, on short-wave lengths there were variations from second to second which it was very difficult to take care of.
>
> The most important factors in long-distance radio-telephony were the use of long-wave lengths (to reduce the power to as low a figure as possible, because in the summer the amount required for transatlantic work might be of the order of 1,000 kw.) and not to use any wider range of frequency than could be avoided. The frequency required for good transmission of the human voice was about 3,000 cycles, and something higher for music. The range of wave lengths at present available for transatlantic communication had been fixed by the London Convention at 8,000 metres and upwards, and it was not likely to be changed much in the near future. The longest wave length which was likely to be used immediately was probably 30,000 metres, which was 10,000 cycles, and allowed a range (as between 8,000 metres wave length) of 27,500 cycles for transatlantic communication. Modulating in the usual way, there would be produced a carrier and two side bands, each of the latter being 3,000 cycles wide or 6,000 in all. That would allow for about four radio-telephone channels without any provision for telegraph channels, but the transmission of only one of the side bands would enable two telephone channels to be used and leave room for radio-telegraph channels. Apparatus had been built which conformed with these ideas, economising in power and, by sending out only one side band, occupying the minimum frequency range."

These developments, indeed, may not be far away as regards their realisation for practical purposes. That they are viewed by the best authorities as amongst the sure future methods of exploiting the ether for long-distance rapid communication appears certain. The provision of two telephone circuits across the Atlantic plus additional telegraph circuits from one radio carrier-current circuit would represent an immense economy upon the present system.

Dr. Nichols, however, fully realises the difficulties ahead. By means of slides he showed his audience the curves taken of signal strength across the Atlantic as experienced during the recent transatlantic trials, in addition to the noises met with. These curves showed very clearly how "the strength of signal is greater at night, and was stated to have been over 20 times stronger at 3 a.m. than on the previous afternoon.

Similarly, the variations in noise were plotted, and their effect at times was such as to reduce the intelligibility to 20 or 30 per cent. as against the average of 60 per cent. with wire telephony. The experiments had shown that reasonably intelligible speech could be transmitted from New York with 60 k.w. there for 14 or 16 hours of the day, although late in the afternoon on some days no signals came through at all. In the summer the noise increased enormously, and the worst period appeared to be July and August ; it was for these reasons that the experiments were to be continued for a full year in order to determine all the data necessary to enable a transatlantic radio-telephone service to become a sound commercial proposition."

Psychology.—Although we fear that there is much groping in the dark, and not a little charlatanry about some of those who profess to practise this science there is no doubt that it has a considerable field of usefulness. What we have to beware of is, that "psychology" or "psycho-analysis," shall become a catch-word, used by all and sundry with but the haziest notion of its meaning or implications. We have already seen "reconstruction" and "efficiency" used to death. Those to whom they mean anything go on with their work and say little.—*The Electrical Review.*

J. J. T.

The
Telegraph and Telephone Journal.

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Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. APRIL, 1923. No. 97.

FRENCH TELEPHONE PROJECTS.

VARIOUS rumours of denationalisation of the telephone service in Europe have been current recently, but the mountain has been in labour with the usual result. It is true that the Italian system is being handed over to a private international syndicate, but in Spain events are moving in the opposite direction, while in France, where so much rumour was rife, the department of Posts, Telegraphs and Telephones is not only still in control but is astir with comprehensive projects of technical and financial reform. M. Laffont admits that a telephone crisis exists and that it is vain to deny its gravity. Complaints of the local service are loud and the shortage of interurban and international circuits renders the advantages of long-distance communication illusory. He denies, however, that the cession of the Government monopoly to private capitalists would solve the difficulty, which has arisen largely from the difficulty in obtaining material since the war. The remedy, says the auditor to the Council of State, lies in organisation and equipment.

Steps are to be taken to extend the trunk line system, to reconstruct the exchanges, and to increase the use of cables for long-distance lines, underground schemes are proposed, and it is proclaimed that the extension of automatic systems will effect economies in the cost of working. Bordeaux, Nantes, Le Havre, Rouen, Rennes, Montpellier, one of the Marseilles exchanges, and two of the Lyons exchanges are expected to be converted to that system by 1926. The conversion of Paris to automatic working is scheduled to be commenced in 1924 and is estimated to occupy eight or nine years. It is proposed to spend 200 million francs a year for ten years on telephone development, and it is pointed out that these sums will not represent an expense to the State but a particularly remunerative investment. By means of financial reforms, improved organisation and equipment, receipts will be increased, and it is expected that at least 20 per cent. will be obtained on the capital engaged. Commercial tariffs will be introduced, of the nature of which we have no information, and collaboration with the public and with private initiative will be encouraged.

The programme is a good one, but it must be admitted that there is room for considerable improvement and expansion of the telephone in France to make the system adequate to its industrial and agricultural importance. We shall be glad to see our neighbours take their proper position in European telephone development and shall watch with great interest the progress of the projected schemes, especially that relating to the improvement of international facilities in which our interest is a lively and immediate one. It is a project, moreover, to which we in this administration shall extend, as far as we are concerned, our hearty co-operation.

HIC ET UBIQUE.

MR. NEVILLE CHAMBERLAIN has left the Post Office for the Ministry of Health after perhaps the briefest tenure of office on record. In taking leave of the staff he expressed his regret at abandoning the work before having had the opportunity to do more than appreciate its scope and possibilities. He is succeeded by the Right Hon. Sir WILLIAM JOYNSON-HICKS, Bart., M.P.

ON March 10, Major Purves, Mr. Hart, Mr. Hill and Mr. Trayfoot left for Paris to take part in the preliminary conference called by the French Minister of Posts, Telegraphs and Telephones to consider the possibility of extending the scope of long-distance telephony in Europe. The invitations were confined to countries in Western and Southern Europe, and the consultation will probably be limited to the discussion of engineering and traffic problems involved. No doubt our representatives will take advantage of any opportunity which may offer to solve some of the problems of Anglo-French telephone communication.

AMERICAN telephonists do not apparently accept the jokes and cartoons of irresponsible humorists at their expense so philosophically as their European sisters. The young ladies of St. Paul, Minnesota, outraged by the efforts of a Mr. Webster, cartoonist to the Pioneer Press, called a mass meeting and protested against the "insulting," "untrue," "ridiculous" and "silly" pictures which represented a subscriber as having to wait three-quarters of an hour for a call. "The telephone service this Webster person describes may be true of New York," said one of them. We think here they showed a fundamental misapprehension of the mentality of the humorist. They surely should have known that it is always one's own service that is the worst on earth. Besides, they should have remembered that New York (and Stockholm) are the chief luminaries of the telephone world. This reminds us, by the way, that a Stockholm comic paper recently represented a shoemaker as having his revenge on a telephonist. "How did you do it?" asked a friend. "Well, the customer who just went out is a telephone operator and I gave her the wrong number." Thus all our idols are shattered.

THE annual report of Posts and Telegraphs for India for the year 1921-22 gives the following statistics of the number of telephones working at March 31 :—

	1921.	1922.
Assam	147	135
Bengal	8,357	10,561
Bihar and Orissa ...	447	487
United Provinces ...	1,336	1,663
Central Provinces ...	469	493
Rajputana	124	141
Punjab	4,619	5,117
Bombay	9,947	10,790
Madras	2,732	3,133
Burma	3,952	4,547
	32,130	37,067

11,973 of these were owned and maintained by the Government ; 1343 were not operated by the Post Office Department; and 23,958 were owned by private companies. In addition, 1,100 telephones were not connected with the exchange system.

WE have received the current issue of the Irish Army Journal *An t-Oglach*, a new venture. Amongst other articles of interest is one on the Radio Service, showing the prompt realisation by the Army of the value of the wireless service, illustrated by photographs of the Headquarters Wireless Station, the interior of the radio repair shop, an operator on duty, and the chiefs of the signal staff. The journal is well got up and well edited, and we wish it all success.

ACCORDING to the *Wall Street Journal*, there are approximately 23,000 stations added to the automatic telephone system in New York City, in the Pennsylvania, Academy and Walker exchanges. In 1923 the New York Telephone Company expects to establish the machine-switching system in the Jerome exchange of the Bronx, Rhinelander on the east side, another in a section of sashington Heights and one in Westchester. Brooklyn will see three exchanges using the automatic system, Applegate, Windsor and Nevins.

In 1924 Lackawanna, which will cover the populous Times Square district, will be put into operation, but it will be 15 years before the City of New York telephone system will be entirely changed to automatic operation. This will include Manhattan, Brooklyn, Westchester, Staten Island and Queens.

THE *Telephone Engineer* states that a revision of telephone rates in New York has been ordered by which the charges to large users will be increased and those to small users decreased. "The new schedule," says the commission, "should aid rather than check development, and subscribers to business service, to whom the value of the service is greatest, will pay a more equitable proportion of the company's revenue requirements."

PROGRESS OF THE TELEPHONE SYSTEM.

THE total number of telephone stations working at the end of January was 1,033,497, a net increase of 5,239 over the December total ; 371,266, or just over one-third of these stations were proper to exchanges in the London telephone area, the remaining 662,231 being connected to exchanges in the Provincial telephone districts.

The recent definite development shown in the number of residence rate subscribers was maintained during January, 1,505 new subscribers being added during the month, making the total at Jan. 31, 150,397. Six months previously there were only 139,382 subscribers of this class, so that the average increase is nearly 2,000 per month.

During the month of January 17 new telephone kiosks were provided in public thoroughfares in the Provincial districts, making the total number of these call boxes 391.

Particular attention has recently been given to the development of the telephone system in rural districts. As a result of special concessions brought into force last June, over 250 exchanges have been authorised in outlying country districts. Rural party line service also is growing to a noticeable degree. The number of circuits of this class was 6,529 at Jan. 31, 325 being connected during the month. At the end of January 1922, there were only 3,110 of these circuits.

Further progress has been made with the development of the local exchange system.

Among the more important new exchanges recently opened are the following :—

London : Hounslow and Thornton Heath.
Provinces : Lancaster.
Rock Ferry (Liverpool) and St. Anne's-on-Sea.

The following important exchanges have been extended :—

London : Kingston and Park.
Provinces : Ashton-under-Lyne, Bath and Bournemouth.

During the month of February 20 new overhead trunk circuits were completed and brought into use and 36 additional circuits were provided by means of spare wires in underground cables.

OMNIA MUTANTUR.

Time was—not long anterior to my tale—
When in the village (or suburban) inn,
Gathered loquaciously about their ale
The group of talkers sat, and through the din

One theme alone prevailed—Allotments,—for
Each like *Candide* his plot did cultivate.
Both talk and talkers were absorbing : nor
Which most absorbed could I precisely state.

Oft have I marvelled at the stuff they raised :
Giant potatoes with exotic name ;
And learned, no less instructed than amazed,
Magic manures which paved the path to fame.

Then came the Peace ; and side-cars and their cost
Were all their theme, and marrows had surcease.
They talked of carburetter and exhaust
And wiles to baffle a too strict police.

Now this has passed ; and 'midst the clouds of smoke,
While foaming tankards circle and refil,
Nor marrows nor speedometers evoke
The semblance or the shadow of a thrill.

No ! Now alone of Wireless they discourse,
Of valve and crystal set and coil and grid
They dabble in the grammarye of Morse
And "pick up" Madagascar or Madrid !

Strangest of all—though heretofore I knew
The fruits they grew ne'er weighed the boasted pounds,
Nor was their mile-a-minute gospel-true,
I know they do receive the wished-for sounds !

W. H. G.

PRESENTATION TO MR. NAPIER.

On the occasion of his leaving the Traffic Section of the Secretary's Office, Mr. W. Napier was presented by the members of the Section with a bureau in mahogany. The presentation was made by Mr. L. Harvey Lowe, who expressed the feelings of esteem in which Mr. Napier was held and the regret which all felt at his departure. A number of those present had been closely associated with Mr. Napier for very many years, and one and all had the highest regard for him as a friend and adviser.

THE GREAT SLUMP IN PRICES: ITS CAUSES ITS COURSE AND ITS LIMITS.

BY G. F. MANSBRIDGE, M.I.E.E., M.S.Ing.Civils de F.

Foreword.

To survey uncharted country is always interesting, often profitable, and in the following paper I have endeavoured to map out some comparatively unknown economic territory, viz., that around the limits of price which the consumer will tolerate.

The "Consumers' Strike" against high prices in the U.S.A. in the spring of 1920 crystallised in characteristic American fashion the fact that that long-suffering individual—the consumer—has limits of endurance or limits of tolerance beyond which he cannot afford to go.

The engineer is always interested in determining limits of endurance and limits of tolerance; I have therefore tried to visualise the economic position with the eye of the engineer, and notwithstanding the hazy atmosphere and the limited view, to get a glimpse of the unknown country, and to forecast the permanent tolerance which the world can afford to allow with respect to price-levels as compared with 1914.

As the forecast deals with the general level of world-prices, it must necessarily be based on gold prices, so that fluctuations in the relative values of currencies are eliminated. The cognate but separate question of price movements in relation to inflation of currency is also thereby largely excluded.*

We are all familiar with the phenomenon of "the swing of the pendulum," with cycles of good and bad trade and of their attendant high and low prices, and we know something about the causes underlying these cyclic movements, but we know less about the factors which limit the extent of the upward or downward swing, or about those which give a bias to the spring so that the pendulum no longer swings equally to each side of the old zero, and it is to these two factors rather than to the swing that this paper is chiefly directed.

* * * *

REVIEW OF CAUSES OF SLUMP.

A considered examination of the cause of the great and world-wide fall in prices which began in 1920 and is still in progress, involves a review of the conditions which brought about the inflation, particularly as it was the unprecedented magnitude and extent of the inflation that caused the slump.

In February 1920 a comprehensive review of these conditions was put before the Society by Mr. Allen in his paper entitled "Materials and the Present Economic Conditions." The conclusion therein reached was that there was some hope of an early fall in prices. The fall indeed came, but its severity was as unexampled in history as its magnitude was unexpected in the business world.

Both the rise and the fall were in general world-wide, and for a proper vision of the profound economic disturbances of which the changes in price were reflexes an equally comprehensive view-point is necessary. For many purposes, however, the position in this country reflects in character, though not in extent, the price changes throughout the world.

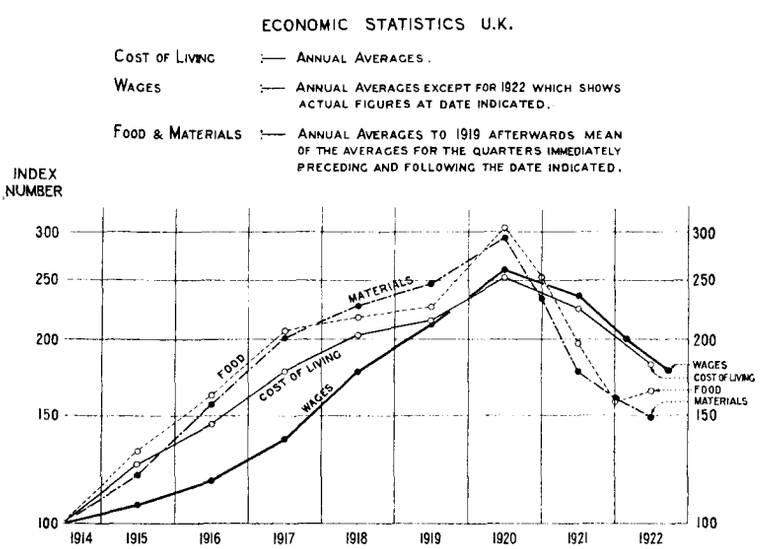
Graph I shows index figures, with 1914 as a basis (100), for the period 1914-1922, for

(*a*) The rate of wages averaged throughout the principal industries of the United Kingdom.

(*b*) The cost of living (U.K.)

(*c*) The average prices of commodities (wholesale, U.K.).

* White Papers Cd. 434 and 734 "Statements of Currency Expansion, Price Movements, etc.," are relevant.



GRAPH 1.

The data shown in the graph are given in more detail hereunder: —

TABLE 1.

Index Numbers (United Kingdom) for
COST OF LIVING
WAGES ...
FOOD ... ...
MATERIALS ...
} July 1914 to end December 1922.

	Cost of Living.	Wages.	Food.	Materials.
1914 (July)	100	100	100	100
1915	125	107	131	120
1916	145	117	162	156
1917	178	137	207	201
1918	203	177	217	228
1919	215	212	227	247
Quarter ended.				
1920—March	228	—	270	317
June	241	260	306	303
September ...	256	—	306	281
December ...	269	—	273	256
1921—March	252	—	231	210
June	227	238	204	181
September ...	220	—	191	172
December ...	204	—	158	158
1922—March	189	200 (At Feb. 28.)	159	162
June	181	—	171	149
September ...	181	177 (At Sept. 30.)	158	149
December ...	179	172½ (At Dec. 31.)	156	152

COST OF LIVING.—Average over year to 1919, over quarter afterwards.

WAGES.—Average over year except where stated.

FOOD AND MATERIALS.—Average of quarterly averages to 1919, quarterly averages afterwards.

Sources:—
COST OF LIVING.—*Labour Gazette.*
WAGES.—Bowley* to 1920. *Labour Gazette* from 1920.
FOOD AND MATERIALS.—*Statist.*

The figures show that as is usual in periods of boom or slump commodities were the first to rise and the first to fall, and wages the last to rise and the ast to fall.

Looking back over the whole post-armistice period one cannot fail to realise that one of the principal factors in both the rise and fall in prices was the psychological element.

During the boom, the man in the street, the man in the shop, and the business world in general talked with growing confidence of the tremendous demand for goods which was being experienced from all over the world, and of the rise in prices being the natural result of this alleged demand, and even to-day the view is commonly held that during the boom period there was indeed an abnormal demand both at home and abroad for goods of all kinds.

But do the cold facts—in the shape of actual business done—support this view? For certain commodities perhaps they do, and even for commodities in general they may do so in respect of a short period measured in months, but over the year 1919 or over the year 1920 they certainly do

* A. L. Bowley—Prices and wages in the United Kingdom 1914-1920.

not except at first sight. Many of the demands were no doubt of a pressing character, their execution having been postponed owing to the war, but their total magnitude was not great, except in regard to money-value.

When the war ended everyone was on short commons, the factories of the world in respect of raw materials, and the consumers of the world in respetc of finished products.

In this country the rationing of food introduced during the war was continued long after the armistice, and the mind of the nation, attuned by rationing, was peculiarly sensitive to signals sent broadcast on the " shortage " wave-length.

But so far from there being a shortage of raw material, the very reverse was the case in regard to many items. For the prosecution of the war the resources of the world had been liad under contribution and abnormally large outputs of many raw materials had resulted from the exceptional efforts made, and from the high prices realisable. Moreover, the requirements of the fighting services were so multifarious as to affect every branch of business and domestic life. Consequently the end of the war found the allied nations in control of or actually in possession of enormous quantities of stores of all kinds, most of which had sooner or later to be declared surplus; some have even yet not been entirely worked off.

But in the abnormal conditions, brought about by the war and continuing long after the Armistice, much of this raw and semi-manufactured material, mobilised as it was for war purposes, was deflected out of the ordinary trade channels, and was not readily available for trade, and as during 1919 there was much congestion on the railways and at the ports there set in a period of artificial shortage, *i.e.*, a shortage at the vital point, namely, the world's factories.

To employ a military analogy, there were ample supplies of munitions at the home bases but not at the fighting line, the transport was working badly, and the co-ordination between base and fighting line was defective.

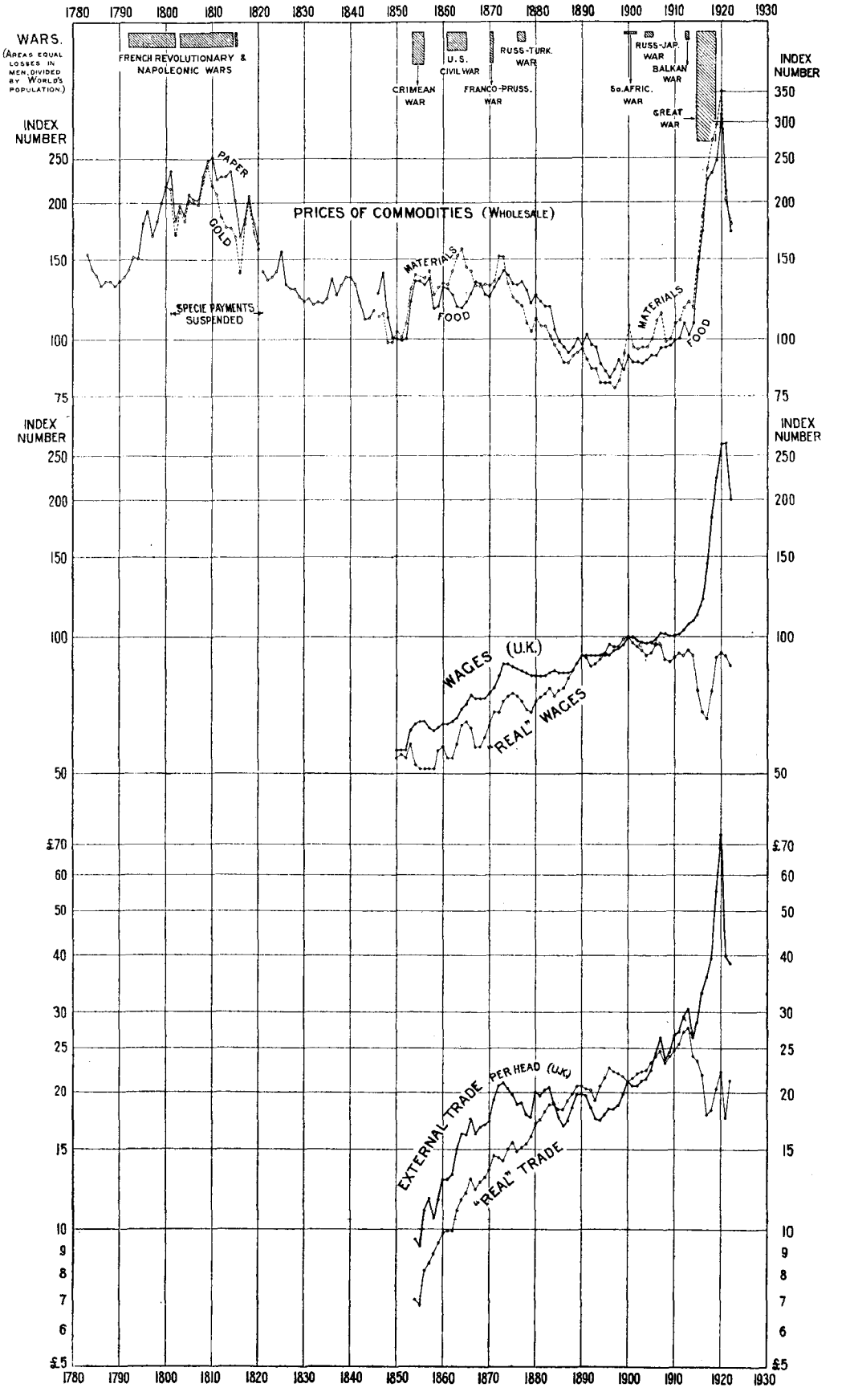
The knowledge that very large quantities of certain raw materials, no longer required for war purposes, were held under Government control, served as a steadying influence for a time, but notwithstanding the existence of these surpluses, there is no gainsaying the fact that, in regard to many items, manufacturers and traders experienced great difficulty in replenishing their depleted stocks.

This artificial shortage was soon reflected in a pronounced and sustained rise in market prices—a rise, as usual, quite disproportionate to the (apparent) excess demand—which more than neutralised the small reduction that preceded and accompanied the armistice period.

The fact is often overlooked that market prices at any moment are governed not so much by the actual supply and demand ratio at that moment as by the opinion of the men who make the market as to whether supply or demand is likely to be the preponderating factor in the near future.

As soon as a shortage is deemed reasonably certain, buyers expedite or anticipate their purchases, and in consequence of such purchases ahead, and of the effect of market sentiment, a shortfall of 10 per cent. in supply may result in a 50 per cent. increase in price for the time being. In the long run the average price must be governed by the ratio between Production and Consumption (Supply and Demand), but the principal factor determining the price at any moment is the market opinion at that moment.

Thus the effects arising largely from the inefficient functioning of the circulatory system were attributed to starvation. Hence the rise in market price became cumulatively greater as buyer after buyer entered the market either as a genuine purchaser to meet requirements or simply as a speculator.



GRAPH II.

The "snowball effect" of price movements was seen in a specially pronounced form in those industries in which wages were regulated by the selling price of the product. but wages and prices in other industries were not slow to follow suit, and with the rise in wages came the usual partner, a fall in output.

Moreover, manufacturers found orders so plentiful—in relation to their reduced output—that they would not take them except with the proviso—a temporary war expedient—that the buyer would pay such additional charges as might be involved by increases in wages or increased rates for coal, &c., becoming payable by the manufacturer during the execution of the order. This "cost variation" plan, deeply imbedded into the business fabric during the war, was in no small measure instrumental in increasing prices, inasmuch as the manufacturer's incentive towards resisting increased charges for material or labour, was reduced by the ability thus given to pass them on to the consumer.

During the first half of 1919 there was undoubtedly a considerable volume of business from home sources, from overseas Dominions, and from foreign countries for goods unobtainable during the war; probably also some of the savings accumulated by the public during the war—when economy was a cardinal virtue—were released, and the resulting business, ephemeral though it proved to be, served to increase the general confidence. Buyers who at first had held back, waiting for the boom to die down, became convinced that there was more to lose than to gain by waiting, and added their quota—and often more than their quota—to the Order Books.

By the autumn of 1919 the position had become acute, and the buyers of the world, obsessed with the idea of a real shortage, and convinced that prices would continue to soar, were in keen competition in the market to obtain early delivery of finished products, and to accumulate large stocks before prices soared yet further.

The order books of the manufacturers were being filled up for periods farther and farther ahead, and every lengthening of the period demanded for delivery helped towards convincing even the hardened sceptics that the shortage was great and the boom genuine. Meanwhile the "bulls" had been hard at work, especially in America; Dr. Friday, Professor of Economics and Finance, University of Michigan, giving evidence, towards the end of 1920 in connexion with a case dealing with telephone rates in the United States said:—

> *"The tremendous increase in price . . . has been pretty largely a speculative increase brought about by the very fact that prices were rising rapidly after the signing of the armistice and that the speculators thought if prices could rise after the war was over, the rise probably could go on for some considerable length of time.
>
> "As a consequence, we had a very large amount of buying with bank credit for speculative holding, which drove up the price rapidly and to quite an unusual height. At the same time, labour, finding itself fully employed after the war was over became highly inefficient, not only got largely increased rates of wages by the day or week or hour, but turned out less product for that payment, so that the costs also rose abnormally.
>
> "The situation in the fall of 1919 and spring of 1920 is one that was dominated by speculation and by labour inefficiency, both of which are factors which we may expect to disappear by the spring or summer of 1921. We have now some unemployment, and we will certainly have more before the spring comes. This will restore the efficiency of labour and will reduce the cost of production."

The conditions of which Dr. Friday speaks were by no means peculiar to America, save that it is probable that the United States could claim the distinction of having been the greatest exponent of the art of holding goods off the market in the hope of higher prices.

The extent to which, in this country, the boom in trade—but not, alas! in price—was imaginary rather than real can be gathered in some measure from No. 2 graph. This is reproduced, by the courtesy of Mr. Joseph Kitchin, of the City of London, the well-known authority on various branches of Economics, from the comprehensive "Trade Cycles Chart" prepared by him and published by *The Times* (Annual Financial and Commercial Review, Jan. 28, 1921), as now brought up to date (end 1922) it is published for the first time in this paper. The chart is the result of an immense amount of work and deserves intensive study for its comprehensiveness and the interrelation of its components as well as for the ingenuity with which it is constructed and manner in which the data are presented. It is too large for reproduction as a whole in this paper, but a copy is exhibited for inspection.

Of the curves showing Trade, the heavy line represents the amount year by year of this country's External Trade (per head) stated in terms of its money value, 1,900 being taken as the basis (100), and the precipitous rise of the curve for 1919 and 1920 at first sight seems to support the idea of exceptional trade activity. But the volume of trade cannot be measured in terms of money value alone, the thin line showing the "real" trade, *i.e.*, the money values divided by the relative purchasing power of money, tells a very different tale, viz., that the volume of trade for the years in question fell considerably short of the pre-war level.

The results shown graphically are given in detail hereunder:—

TABLE II.

FLUCTUATIONS IN THE TRADE OF THE UNITED KINGDOM.

(1, 2 and 3 from *Board of Trade Journal*, Jan. 18, 1923.)

	Values as declared in Million £					Values on the basis of 1913 prices, in Million £			
	1913.	1919.	1920.	1921.	1922.	1919.	1920.	1921.	1922.
1. Imports ...	769	1,626	1,932	1,085	1,004	678	678	570	659
2. Exports of produce and Manufactures of the United Kingdom	525	798	1,334	703	720	288	372	262	362
3. Exports of Foreign and Colonial Merchandise ...	110	164	223	107	104	86	99	86	89
Totals (1), (2), (3)	1,404	2,588	3,489	1,895	1,828				
Totals on 1913 basis ...	1,404					1,052	1,149	918	1,110
Comparative volume on 1913 basis	100%					75%	82%	65%	79%

Clearly, then, external trade provided no basis for a boom. As to internal trade, it is more difficult to obtain exact data: probably the best indication is that provided by the volume of goods conveyed by rail: Table III shows the relative figures for 1913, 1919, 1920, 1921 and 1922; they also give no support to the idea of an abnormally large post-war demand, especially if allowance be made for the additional rail tonnage incidental to the reconstruction of trade.

TABLE III.

TONNAGE OF REVENUE FREIGHT TRAFFIC ORIGINATING ON THE STANDARD GAUGE RAILWAYS OF GREAT BRITAIN.

(Ministry of Transport Statistics.)

Year.	General Merchandise. A.	Minerals other than Fuel. B.	Coal, Coke and Patent Fuel. C.	Total. A, B and C.
	Million tons.	Million tons.	Million tons.	Million tons.
1913	72	71	226	369
1919	72	57	180	309
1920	72	67	180	319
1921	54	39	128	221
*1922	55	47	192	294

* Estimated—9 months to Sept. 30, 1922 × ⅓.

* *Telephony* (Chicago), Dec. 10, 1920.

Following upon the difficult trade conditions and the highly inflated prices prevalent during the first half of 1919 came the demobilisation of millions of men in this country, in France, in America, and elsewhere.

Taking the United Kingdom alone, I find that during the latter part of 1919 and the early part of 1920 over £100,000,000 was paid out in the form of gratuities to demobilised officers and men. One hundred millions, large sum though it be, is less than 5 per cent. of the total yearly income of the nation, but this was no ordinary hundred millions : it was a sudden access of purchasing power accruing to men who for years had been enduring risk, hardship and privation. A large part of the money, probably more than half, was spent in retail trade and was spent quickly, and, I daresay, without close consideration of price, having regard to the general belief that prices would rise yet further. Simultaneously, similar disbursements were being made elsewhere, in France some 3,400 million francs, and a larger sum in America. Following this access of purchasing power came additional demands upon the small *available* stocks of raw and semi-finished materials in order to provide employment for the demobilised men. Thus another factor was added tending to accentuate the apparent scarcity of materials. I believe that if the effective demobilisation of materials had preceded rather than followed the demobilisation of men much of the post-war inflation of prices would have been avoided and the severity of the slump reduced. Such procedure was probably impossible in regard to much of the material,* nevertheless it is questionable whether the laudable efforts to realise the best prices for the nation's surplus war material did not in the long run result in ultimate losses to the nation as a whole far exceeding the nominal losses which might have resulted from earlier sales at lower prices. The fall had to come, so, the earlier it came, the better.

An illustration of the magnitude of the surplus stocks of material is afforded by the sale of non-ferrous metals (brass, copper, &c.) which realised over £50,000,000, equivalent approximately to the value of half the annual world consumption. The stocks of wool were on an even more gigantic scale. I do not, however, suggest that these stocks were immediately available for commerce at the conclusion of hostilities.

By the time that the orgy of buying had spent itself, much of which, by it remembered, was speculative and not genuine trade, prices had been driven to such a height that the overdue reaction could no longer be postponed.

It is a well-known law in physics that the effect of any action is such as to tend to stop the cause producing it ; a similar law holds with economics ; its effect was felt in America some months earlier than in this country, where the full meaning of the U.S. trade depresion was not at first realised, the American troubles being attributed chiefly to the fact that that country was seriously handicapped in its export trade by the high value in other currencies to which the dollar had risen, a value which eventually became practically prohibitive to the sale of everything save essentials, the zenith being reached on Feb. 5, 1920, when the U.S. dollar stood at 50 per cent. premium over sterling, *i.e.*, the £1 note would buy only $3.20 instead of $4.87.

In this country the riot of price inflation reached its climax in April 1920.

There being no solid foundation for the inflated prices ruling throughout the world, the economic situation resembled that found in nature when snow and loose rock accumulate on a steep mountain side, a single stone dislodged from above sets in motion the upper parts of the accumulation and with ever-growing volume the mass descends to the valley. The stone which started our price avalanche came from America, where the public, incensed at finding that the trade depression was not reflected in adequate reduction in price, instituted the famous "Consumers' Strike" which convinced the doubters that the long-foretold slump was at last really under way.

Once the downward movement had fairly begun there was no arresting it ; with accelerating speed, confidence collapsed throughout the world ; without confidence credit can have no existence, and without credit, trade ceases.

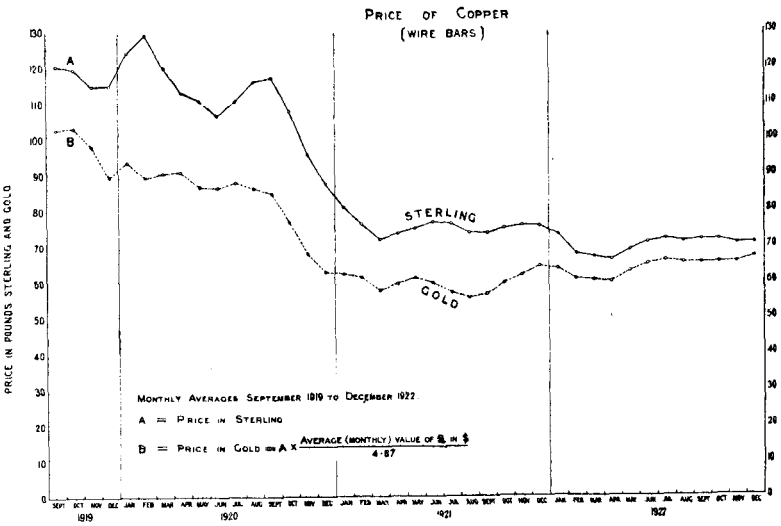
The commencement of the slump found many home manufacturers in a fairly complacent frame of mind because they had their order books full for nine or twelve months ahead ; they became less complacent when they discovered, as most of them did sooner or later, that many of their customers would be unable to pay for the goods. Cancellations from customers abroad and at home came thick and fast. "Distress merchandise" of all kinds was thrown on the market in competition with Government surplus materials. The period of depression and deflation had begun !

I offer, later, reasons for believing that it has by no means finished.

It is not necessary to follow in detail the course of the slump ; it will suffice to remark that the prices of Copper, Tin, Jute, Hides, and of certain grades of Wool, after soaring to unprecedented heights in 1920 had, by the end of 1921, fallen below even the 1913 level.

* *Vide* Reports of the Disposal Board (later the Disposal and Liquidation Commission) Cd. 850, Cd. 1412, Cd. 1640.

In speaking of the depreciation in the dollar value of the pound sterling, Mr. Allen quoted some pertinent instances of the serious effects to Europe in respect of all purchases from the U.S.A. ; the large interest which the Post Office has in copper, of which the U.S.A. is the paramount producer, justifies a special reference to this item ; graph No. 3 shows the average market price of Copper Wire Bars, month by month since September, 1919, in terms of sterling and of gold. The large additional cost to British buyers of copper caused by the depreciation of sterling is clearly indicated, but I would draw attention particularly to the prices for 1921 and 1922 for, as may be seen, notwithstanding that the American price in 1922 was higher than in 1921, the cost to the British buyer was lower, the recovery in value of the pound in terms of gold, *i.e.*, its greater value in dollars, having more than neutralised the rise in the American price, a recovery largely due to the increased effort and efficiency of the population of this country, during the period after the great awakening.



GRAPH III.

I do not propose to deal with the tangle of European exchanges and their kaleidoscopic character, but one aspect of the slump in prices and its relation to exchange problems is specially interesting. During the so-called boom, China alone among the large nations of the world enjoyed comparative immunity from the extravagant increases in price, because the basis of her currency, silver, also rose enormously in price, and, in consequence, the purchasing power of the silver tael for goods produced by gold-basis nations rose correspondingly. Conversely, the fall in prices in gold-basis countries was largely neutralised for China by the fall in the white metal.

Table IV illustrates the position in respect to typical Manchester goods :—

TABLE IV*.

	February 1920.		December 1920.	
	English price. c.i.f.	Shanghai price. (tael=8/-)	English price. c.i.f.	Shanghai price. (tael=4/-)
8¼ lbs. Shirtings	55/-	6.87	25/-	6.50
10 „ „	58/-	7.25	30/-	7.50
White „	70/-	8.75	36/-	9.00
Venetians	208/-	26.00	123/-	30.75

(To be continued.)

RETIREMENT OF MR. R. H. EVANS.

MR. R. H. EVANS, Contract Officer, Gloucester, upon retiring on reaching the age limit, was the recipient of a wallet of National Savings Certificates from his colleagues. A representative gathering of the staff was presided over by Mr. A. E. Ruddock, District Manager, who expressed the staff's regret at Mr. Evans' departure, at the same time assuring him of the assembly's good wishes for peace and quietude during his well-earned retirement. Mr. J. W. Dean, Contract Manager, paid tribute to Mr. Evans' zeal in the performance of his duties. In reminiscent mood, Mr. Evans made a characteristic rejoinder and before the meeting dispersed bade each member personally farewell.

* Report on Commercial Industrial and Economic Situation of China June, 1921. D.O.T.

CORRESPONDENCE.

THE HUMAN VOICE, AS HEARD 300 MILES ON A HOME-MADE WIRELESS SET.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—This is the result of a very crude beginning and with very little expenditure in money.

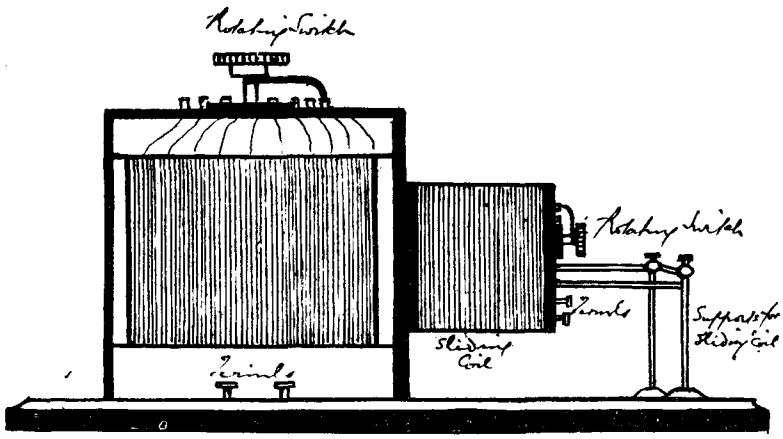
The voice was that of Robert Radford, as Mephistopheles in *Faust* on Jan. 13. It came about in the following way :

Twenty years ago when a friend and the writer were studying Electricity and Magnetism, the latter was given two small reels of S.S.C. No. 28 wire 13w. resistance each. These were placed in a drawer and lost sight of.

In June 1921 the lady of the household discarded a 1 lb. jam carton (a relic of war conditions), and it was promptly acquired finally to become the former for a coil of loose coupled inductance.

The wire and carton were introduced to each other and a coating of shellac varnish completed a neat looking coil with 10 tappings. The winding was performed by hand. The article was laid aside until a visit to London in August 1921 presented opportunity for purchasing 3 ounces of 36 D.C.C. wire and two odd telephone receivers at 2*s.* 6*d.* each. With the D.C.C. wire and a bundle of iron wires (9*d.*) sold by florists for supporting flowers in wreaths, a very efficient telephone transformer was made (at present in use) for the double receiver formed by connecting the telephone receivers with a double piece of wire.

The loose-coupled inductance was completed as follows :—

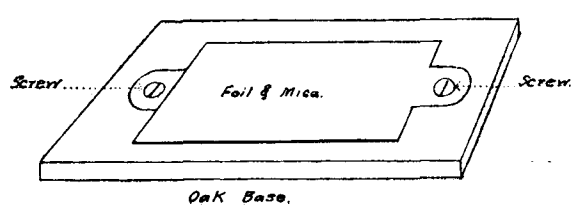


The large coil is wrapped with about 300 feet of No. 24 D.C.C. wire and the small coil as stated above.

The inductance brings in Nauen, Paris, Ongar, Aranjuez, Stonehaven, Berne, Moscow, Warsaw and faintly G.B. As it was inefficient on short wave-lengths, a loose coupler described in Cassel's *Wireless Telegraphy and Telephony* (1*s.* 6*d*). was constructed. This instrument has proved very efficient on short wave-length telephony receiving 2 L.O. and 5 N.O., clearly. A single V. 24 valve was first used, and with this faint telephony from Paris was heard with the big coupler which gave encouragement to try to amplify and bring in the London Broadcasting station, and I was considerably surprised the first night on joining up the small loose coupler to hear with 2 valves : "Hello, Hello, Everybody, 240 calling."

The grid condenser and leak were made as follows :—

Three pieces of mica 2-inch square and 5 pieces of tinfoil were used for the condenser. The leak is simply a lead pencil mark between two screws on the back of the piece of oak, on which the mica and tinfoil are screwed as follows :—



FULL SET, 4 VALVES.

This condenser and leak prove, in use, superior to a bought one (7*s.* 6*d.*) The correct leak resistance was obtained by scraping the pencil slightly away at one point until a good toned signal resulted.

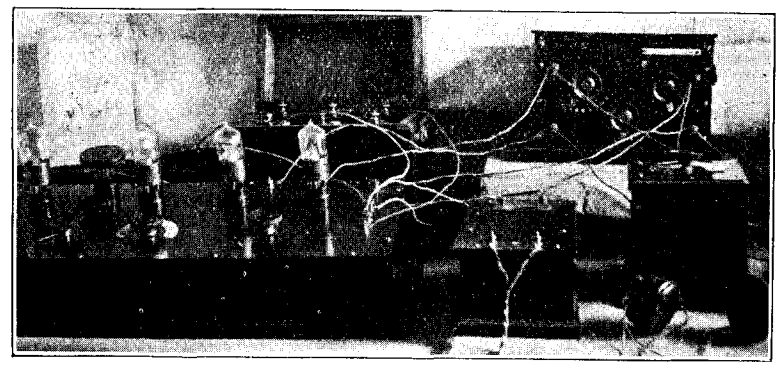
The second valve with a home-made inter-valve transformer were added as described in several text books, and the combination produces low frequency amplification.

A little trouble was at first experienced in wiring the set as it was found that when the wires were fixed neatly to the baseboard the set failed to oscillate freely. The wires were, therefore, loosened and the board covered with brown paper, which improved matters considerably.

On listening in, telegraph signals and the telephone wave came in strong—in fact 4 or 5 C.W. and spark stations could be detected at one time.

The telephone wave is tricky. If it is lost a simple disconnexion of the High Tension Battery and re-connexion will restore it, and this avoids any re-action.

The re-action from other sets is the drawback to thorough enjoyment of the music heard. Violin solos, soprano and tenor voices are very clear, but bass songs are not so clear.



SET AS USED FOR RECEIPT OF 2 LO 5 NO &C. AND FRENCH STATIONS.

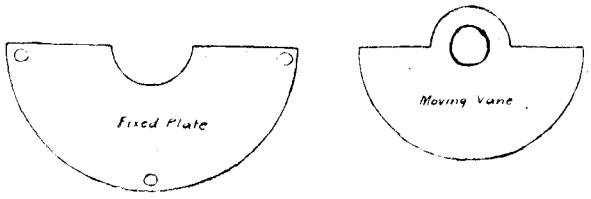
The quality of the speech from 2 L.O. is vastly superior to that usually associated with phonogram ancillary and telephone—tgm. cct. equipment.

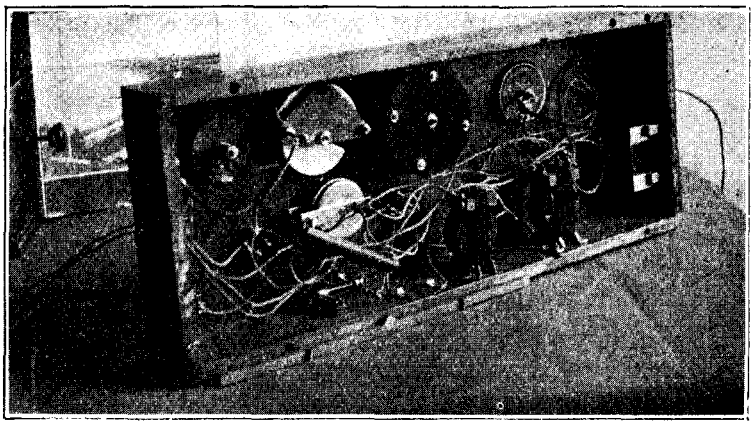
The aerial support was first a 22-foot spruce bough at one end, with the gable end of the house for the second position. The line is a double one, spaced 8 feet and is 38 feet long, total approximately 100 feet. Recently, the distant end of the aerial was raised to 30 feet and increase in signal strength resulted.

The whole equipment is :—

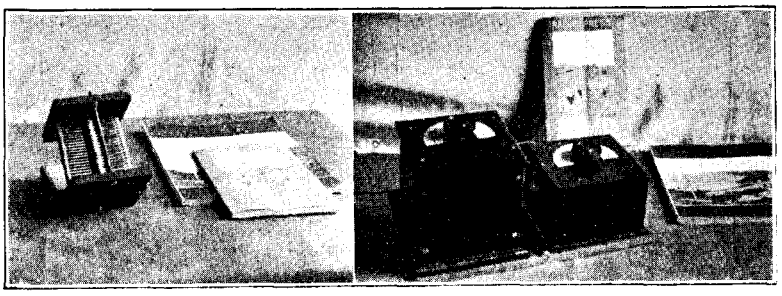
(1) Aerial—double 48 feet long.
(2) Loose-coupler (" Work " handbook, Cassel's, 1*s.* 6*d.*).
(3) 6-volt accumulator (Hart) one filament resistance.
(4) 2 valves and intervalve transformer, grid condenser and leak.
(5) 30 V. high tension dry battery.
(6) 4 condensers (5 plate, 7 plate, 11 plate, 39 plate—fixed and movable).
(7) A low resistance, double telephone receiver and transformer.

The condenser plates are formed of the lids of tins cut to the following shapes :—



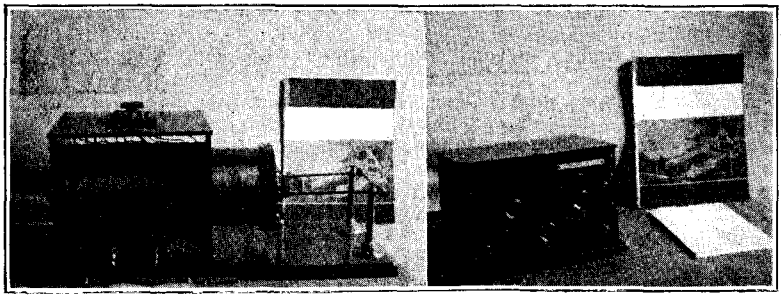


WIRING OF PANEL.



CONDENSERS IN COURSE OF CONSTRUCTION.

THE FINISHED CONDENSER.



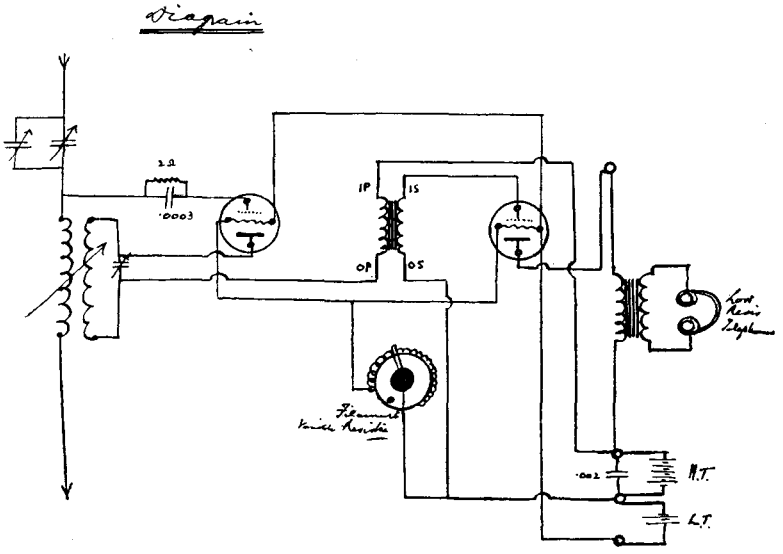
TUNER FOR LONG-DISTANCE TELEGRAPHY.

TUNER FOR BROADCAST RECEPTION.

These are mounted in ordinary wooden cases with brass rods and spindles —very little ebonite has been used.

The equipment has cost under £10 including the experimental licence, but it is worth it when Melba comes in from so great a distance, as was the case on Jan. 17, Melba and the Irish Guards concert were very clear.

The diagram is as follows :—



This, however, is being discarded in favour of a 4-valve panel with plug-in high frequency transformer and a re-action coil connected with the secondary internal circuit.

R. BAXTER.

P.S.—With three valves I hear 2 L.O. with the telephone lying upon a tables Some of the recent concerts have been splendid.

Carlisle, Feb. 8, 1923. R. B.

AN OUTBURST.

TO THE EDITOR OF THE " TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—Telephones are progressing ! In this enlightened age—the age of automatic telephones and every conceivable contrivance for efficiency, we are informed that manual ringing is again standard as it was in the days of " once upon a time."

Can it be possible, one wonders ! For that is the effect of the present arrangement whereby signal junctions terminate in jacks at the incoming end.

All sorts of strange happenings occur, and numerous difficulties are obvious. With the double supervisories as on the " A " side, it is difficult to follow each connexion accurately, with the result that some subscribers are rung too much, while others are not rung enough. This happens naturally on short conversations and long clears, particularly as many of these connexions are established on lending junctions and come through junction centres.

In the case of an ordinary engaged call—the engaged signal is connected, and the telephonist has the added irritation of watching the corresponding supervisory bob up and down until the connexion is cleared.

In effect this has been found a very bad principle as it leads to telephonist becoming accustomed to seeing supervisory flashes that it is *not* necessary to answer. And this principle operates again in the case of single clears—these have merely to be ignored—the " B " telephonist cannot challenge and disconnect.

All these calls, calls that are received over jack-ended signal junctions the " B " telephonist controls in a measure, and yet has no control over the connexion ; for practical purposes the method is perplexing and confusing, for double supervisory signals are no help in " B " working.

It follows naturally that this system is much slower, due to the operations involved, *i.e., plugging in, and using two cords in the place of one.*

Keyless ringing for " B " working has proved so reliable in general, and has been appreciated so long, that to one who has suffered from supervising jack-ended junction working comes the thought are we really progressing !

M. B. PYNE,
Supr. in Charge.

Purley Exchange.

" AN ADVERTISEMENT."

TO THE EDITOR OF THE " TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—I read, with some amusement, " Yorky's " criticism of a specimen presidential address quoted in our advertisement, which it is my duty to comment upon.

His opening remarks appear to consist of a modest rejection of "Civil's" appreciation of the engineers, and a little "home truth" which was, perhaps, realised by "bitter" experience.

The letter contains much philosophical reasoning, which, I think, cannot have been wholly appreciated by your readers. Doubtless, "Yorky" can speak with authority on the matter of repeat faults, and I can quite believe him when he says that "An elusive 'dis' or 'short' promotes mental disorder."

He is almost certain that engineers cannot operate. I consider that this is disparaging the intelligence of the engineers generally. I venture to say that any engineer with exchange experience might be able to perform any ordinary operating procedure.

It is with condescending tone that Yorky states, "Civil is rather to be admired because . . . she treats the unreasonable in a lighter vein," but I think he will agree, after perhaps "a little after-thought," that no amount of "fore-thought" can put her right with the engineers, now.

Yorky's subtle humour and delicate satire are traits that might be developed to advantage. He would do well to commence a Preparatory Course under "The School of Orators" with a view to obtaining our diploma. We do not undertake the finding of suitable situations for our students, but we would suggest that he might do well in a Government Department, engaged on the composition of Service Instructions and other light literature.—Yours faithfully,

"THE LONDON PRINCIPAL."

Gerrard, March 15, 1923.

CORRESPONDENCE.

WAR TELEPHONISTS IN EGYPT.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

As a telegraphist I have been interested in the trials which telephone operators undergo in British exchanges. I wonder if any of them have been afflicted with the pantomimic methods that I encountered during the war in Egypt. I took over a panel of the Suez civil exchange, which was to be used for military subscribers, with a feeling of pleasure. It was in the manager's private office and overlooked the main street.

A few days' experience on the panel (60-line, drop indicator, generator ringing), somewhat clouded the prospect. It was hard work indeed. Almost all of the numbers were answered by natives and the indicators never remained closed for a complete minute, owing to incessant ringing during conversations.

I was nearly deafened by the fearful rattle from generators on the lines, when speaking.

One morning I happened to be at the principal railway station when I saw the native station-master answer his 'phone. This was his procedure :—

1. Rings excessively for exchange.
2. Without answering continues successive rings.
3. Finally an answering ring came.
4. Bullies the exchange for delay and passes his call.
5. Replaces 'phone and refers to time table.
6. Rings the exchange.
7. Gets answering ring and speaks to distant subscriber. Mentions certain trains and says he will look in time table again.
8. Replaces 'phone.
9. Rings, after a few seconds and again replaces 'phone.
10. Gets answering ring, finishes conversation.
11. Replaces 'phone, *without ringing off.*

I sat in the civil exchange next day to observe how the operator there dealt with his 400 lines under such conditions, which were general.

This was his method of operating :—

1. Receives ring but does not answer it, as busy passing topical news to another subscriber.
2. After several rings and *without stopping conversation re topical news,* he rings back to No. 1.
3. Cuts in to No. 1, takes call.
4. Plugs call to number required and rings.
5. Chats to various other subscribers, plugs fresh calls, &c., and, *without cutting in on No. 1, rings on the line at intervals.*
6. Gets many answering rings but never disconnects any line until he receives no reply when he cuts in. Apologises frequently for ringing during conversations.

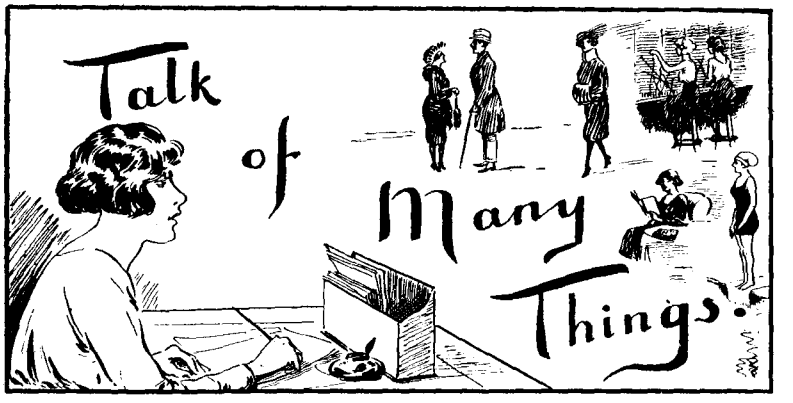
There were four junctions to the military panel next door, and I was not surprised when one day the civil operator tearfully complained that "soldier next door" was "no good." "He been give me de boxe !"

The *official* rules for operating were, however, exactly similar to those in England.

R. R. ROBINSON.

AUSTRALIAN NOTES.

A MOTION agreed to by the Interstate Conference of the Australian Postal Electricians' Union held at Melbourne, favoured the manufacture of telephone and telegraph equipment, including telephones, in Australia. Delegates maintained that if given the opportunity Australian postal electricians would be able to produce any article used in connexion with telephones.



WE print the following vigorous protest received with regard to the paper read by Miss Milnes before the Edinburgh Telegraph and Telephone Society, extracts from which appeared in our JOURNAL last month.

The Editress,

"TALK OF MANY THINGS."

May I submit a few comments on the paper written by Miss Nora Milnes, B.Sc. The lecturer stated that men and women are not equal. My answer to that is that work should be paid for according to efficiency and not according to the accident of sex. Women are not asking for equal pay for unequal work !

Again, the lecturer says :—"The first disadvantage of women is a physical one." Is this the reason why women in the Department's service work longer hours than their male colleagues—also that the pay for a woman is *normally* less than that advertised for a man (see Post Office monthly circular).

Again quoting Miss Milnes, "Women who fought for equality made a point that night work for women should be forbidden."

The history of the recent war reveals that women do not shirk night duty or any other work when needful. It is easy to see that Miss Milnes is unacquainted with the staff of the London Telephone Service.

In a recent issue of *The Times,* a man complained that the Royal Astronomical Society gave a post to a single woman which he thought was unjustified as the post would have provided a living wage for an ex-officer. Several replies were inserted later to the effect that the lady selected had filled the post for a number of years and she was the most efficient person known for the appointment. Also that the complainant, even if he had secured it, would probably have treated the position merely as a stop gap. Sad is woman's lot if sex is to weigh against her in every direction. She must not obtain a post if she is *unmarried.* If she *intends* marrying, she is not worth employing. If she *is* married—Oh, horror !—she must go.

It is agreed, however, that women have still much to learn, and it is gratifying to know that their efforts in certain directions have been crowned with success.

At the present time, a Lady Doctor commands the same fees as her male colleague. Also it is no longer necessary for a woman author to publish under a *non-de-plume* as did the Bronte family and George Eliot. I am not forgetting that women now have a Parliamentary vote, and it was their male *friends* who, after a little persuasion, bestowed it on them.— A. J.

"An Appreciation" Appreciated.

DEAR EDITRESS,

Will you spare me a little space in which to thank Mr. C. Vincent Long for his delightful tribute in last month's issue ? It is good to have such encouragement—I only wish I deserved all the nice things contained in his "Appreciation." I know best how little true they are, alas ; but indeed I shall try to earn them all ; and in the meantime, I must just pray that I am not found out !

When he asks, "What next ?" I tremble. Suppose I could not think of any "Next" ! I should have to make a public apology and hide my diminished head for ever.

Let me confess. Some things I feel very intensely, and I always find a tremendous outlet in writing about them. If they are matters which might eventually prove of benefit to others, I seek to give them publicity. Sometimes, perhaps by a glorious fluke, they evade the vigilance of editorial eyes and creep into print. That is all. There is no particular merit in me.

Nevertheless, I did, indeed, read Mr. Long's letter through three times (for such is feminine vanity), and it pleased me mightily when I remembered that he was the author of an extremely clever parody on "If," which appeared in the JOURNAL a short while ago. Wishing you all success—Yours sincerely,

DOROTHY TURNER.

P.S.—If the "mere male" is going to say such complimentary things about us, do you not think we might give the species a little space in our desirable columns now and again.

That Devon can provide sweet things other than cream and cider was proved at the Social held by the Plymouth Exchange staff on Feb. 22, and corroborated by the flashlight photograph of the Telephonists' Glee Party reproduced in this issue.

In addition to original and amusing games, competitions, dancing, &c., an excellent programme of music was provided by members of the staff, past and present. Miss Westlake and her capable Committee—including Miss Edgcombe who trained the Glee Party—were heartily congratulated on the great success achieved. The musical programme and organisation were also contributed to by members of the Traffic and Engineering staffs, and the company included representatives of every branch of the Post Office, thus emphasising staff unity in the "far West."

Photograph by] [*Stuart, Plymouth.*

PLYMOUTH TELEPHONISTS' GLEE PARTY.

Prizes were given for the most successful competitors in the various games and competitions, and in presenting these, Mr. McDougall, Traffic Superintendent, expressed regret that Mr. Draper, the Postmaster, who had intended to be present, had unfortunately to leave town on business.

The following letter to the Editor has been passed on to me for inclusion in this column:

SUBSCRIBERS AND TELEPHONISTS.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—In a recent publication of the TELEPHONE JOURNAL an assertion was made to the effect that subscribers had only themselves to blame for any delinquencies experienced by them, owing to their lack of regard for the telephonist, and we are led to assume that if only subscribers would improve their manners and tempers, a telephonist's life would be one of contentment and efficiency.

If it is, as we are told, the subscribers who are at fault, then our method of training them must also call for comment. By showing courtesy towards subscribers and trying to inspire confidence, we are surely teaching them to adopt a similar attitude, and it is rarely that one experiences a brusque reply in return for one of courtesy.

How often have we, simply because a subscriber has remonstrated with us for keeping him waiting, not having any idea of the trouble he may have endured—hurled forth a venomous salutation—absolutely word perfect, for the benefit of "observations"—but the expression indicative of the resentment we feel towards the being who has dared to challenge our responsibility. Where is the necessity for a telephonist to be subjected to the gibes of subscribers? Are we not offered a protection in the Supervisor, who is always ready to take up our case, and if warranted, reprimand the offender on our behalf?

We are apt to regard subscribers in the light of necessary evils, especially the "cheeky" office boy and the knowing P.B.X. telephonist, and lay in wait ready to pounce upon them at the slightest provocation. We know some of them need calling to order, but do we attempt to lead them in the right direction? They have been trained, no doubt, to expect continual censure from "the girl" at the end of the line, and this has cultivated a feeling of antagonism.

It can be noticed, that between some telephonists and their subscribers, there appears to be a perfect understanding; the peculiarities and temperaments of even the most menial callers on the board are known, and this understanding provides the interest to what might, to other girls, prove a very irksome duty.

There are probably many telephonists who will disagree on this subject, thinking that an aspersion is being cast on their characters, but as it is well known that the complaints received are very few in comparison with the number of subscribers, it goes to prove that the majority of telephonists train their subscribers in the correct manner.

When we actually have to take up subscribers' complaints, we are able to judge more discriminately, and we find these cases are not always the imaginations of an unenlightened public, who, we are told, are out to wage war on the gentle telephonist.

M. L. FITZPATRICK.

Gerrard Exchange, March 6.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

RETIREMENT OF MR. MORTEN.

The Nottingham Telephone District has sustained a loss in the retirement of Mr. W. V. Morten, District Manager, who has reached the age limit. Mr. Morten had held several important posts in the telephone administration in the last 40 years, during which time he has had charge of such important districts as London City, Leeds, and since 1912 Nottingham. He was the recipient of several presents, which included a case of pipes from his personal staff in the District Office, an easy chair from the Surveyor's staff, and a gold watch from the District Managers, and Postmasters of the North Midland District.

A MERRY PARTY.

SUCH indeed, and of the family type, was the first gathering of what it is hoped will prove to be the *Annual* dinner of the C.T.O. Golf and Bowls Clubs, with, as its distinguished guests several noteworthy members of the G.P.O. North, Secretariat golfers including Commander E. L. Ashley-Foakes (captain of the latter), Mr. J. P. Leckenby and a very old friend of the C.T.O. in the person of Mr. Stuart Jones, Mr. John Lee, the Controller of the latter office, in happiest humour filling the post of Chairman. The repast, skilfully and lavishly laid before us by mine host of "The Ship," was deftly served by an able staff, the tables being daintily decorated with spring flowers—

"And all the yellow daffodils
Which twinkled into green and gold."

The convener of the gathering no doubt acted wisely in arranging separate tables for the sponsors of the two forms of sport, respectively, while the remaining seating accommodation was left to the more sedate "neutrals" of which this poor scribbler took modest place amongst the number. Here was a world of technicalities quite outside one's telegraphic knowledge! Humble apologies are offered if in the following lines the terms of the two ancient games have become mixed! We, the Uninitiated, listened to the quips and jests, smiling pleasantly as we only half understood how it was that someone was *bunkered* at the *nineteenth hole* with *a bias*, or how upon that rather tricky *green* at ——, the club champion in a famous *foursome* bowled his *wood* with such skill that the *niblick* hit his opponent's *jack* and gave him the *knock-out*!

Mr. A. W. Edwards, the C.T.O. golf captain, having twitted the Bowlers to his heart's content, Mr. Donno, on behalf of the latter, replied *et tu Brute*, without the slightest acerbity, indeed with every show of the sincerest pleasantry. Reference to the excellent spirit of fellowship of the Secretariat stalwarts brought their captain to his feet who, suitably responding on behalf of himself and club members, thanked the assembly for their cordial welcome. The speaker *en passant* mentioned the Civil Service Sports Association and its activities to which G.P.O. North like G.P.O. West had very early given its allegiance and co-operation.

The musical programme was excellent, the palm being undoubtedly taken by the youth of the Service, Mr. Owen, in his exquisite rendering of "The Requiem" of R. L. Stevenson, Mr. Godfrey in "I forget," and other items, and also to our kindly friend, Orchard. In writing this eulogy, one is confident that no affront will be taken by our veteran helpers, Frank Hudson and Hayman, for example, who treated the gathering to some rare old favourites.

As for those members of the administrative body who astonished us with the vigour of their vocal powers they indeed must be placed upon a special plane of re-juvenated youth.

There is still room for more members in the C.T.O. Golf Club, and the subscription, 2*s.* 6*d.*, should prove an allurement to many. Applications to the Hon. Secretary, Mr. A. T. Jacobs.

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

Institution of Post Office Electrical Engineers.

THE members of the above Institution were delighted to have Mr. A. J. Stubbs, M.Inst.C.E., M.I.E.E., late Assistant Engineer-in-Chief, in their midst on Feb. 13 when he read a paper on "Standardisation in the Engineering Industry." Mr. Stubbs divided his paper into three parts.

(1) Standardisation of measures.
(2) Standardisation of materials.
(3) Standardisation of machines.

The unreasoning adherence to standard and unprogressive shortsightedness represented by our archaic medley of weights and measures, was deplored. Engineers work to dimensions which are correct to $\frac{1}{10000}$th part of an inch, and yet little combined effort is made to remove anomalies which separate the English manufacturers from the rest of the engineering world. So far as the purely electrical part of the industry is affected, it is fortunately a fact that there is a universally accepted system with a nomenclature that cannot be confused. The electrical engineer of to-day, however, has to deal with general engineering matters and with his entry into this realm he enters also into a heritage of confusion.

The growth of standardisation in materials was traced, and the important part that Post Office Engineers have taken in this matter was brought out. Indeed much of the pioneer work leading up to standardisation in materials was carried out by the Post Office Engineering Department.

The formation of the Engineering Standards Committee in 1901 marked an important advance. After doing much invaluable work, this Committee was incorporated in 1918 as the British Engineering Standards Association. The main Committee consists of 25 members nominated by various Engineering Institutions and Government Departments. There are 31 Sectional Committees and over 400 sub-committees and panels with 1,800 members. It is impossible to place a value upon the important work which has already been achieved by this Association in the standardisation of the sizes and qualities of materials in general use. With regard to the standardisation of machines there is not the same measure of agreement as to the advantages to be gained. Many designers who welcome standardisation of measures and materials fear that the application of similar principles to machines may result in stultification of progress. Mr. Stubbs advanced arguments to prove that such fears are groundless.

It is hoped that the attention which is now being drawn to the important subject of standardisation will result in greater progress being made and those who know how much work Mr. Stubbs has done in this connexion will be ready to cordially recognise his contribution to the nation's industrial progress.

Visit of the Institution of Municipal and County Engineers to the Museum Exchange.

The members of the Metropolitan District of this Instituton visited the Museum Exchange on Friday, Feb. 16. The party was welcomed by Messrs. J. H. Stanhope, P. T. Wood, and J. Brown, and by the Chief Supervisor, Miss C. K. Hooper. Details of the plant were explained, together with the organisation for the reduction of faults and complaints to a minimum. The members expressed keen appreciation of the arrangements made, and in the Institution's journal of Feb. 22, the visit is described as one of the most interesting ever recorded, and at the same time one of the most informative. In the "Topical Questions" column of the issue referred to, it appears that some readers would like to know—"Whether the impression left on the members of the Institution of the Municipal and County Engineers who inspected the Museum Exchange was not very favourable to the Post Office Engineers, the Chief Supervisor, and the Administration generally, and that the Organisation and Management are entitled to more credit than is usually given them."

Following the inspection of the Museum Exchange the party attended at one of the four "Inns of Court," viz., Gray's Inn, at the invitation of the Benchers. This invitation was extended to the P.O. representatives, and the visit proved very enjoyable and instructive. Gray's Inn—it may be of interest to record—was founded in the 14th Century and the present Hall dates from the 15th, the "Comedy of Errors" having been performed in it in 1594, whilst the gardens are said to have been laid out by Lord Chancellor Bacon, who died in 1626.

Threadneedle Street Branch Office.

Contractors are now getting on with the rebuilding of the Threadneedle Street Branch Post Office, that important office which may be said to be a door-step of the London Stock Exchange. The present building has for some time been inadequate to meet the needs of a very busy City post office and the work of reconstruction was commenced some years ago but held up by the war. The demolition and rebuilding is proceeding in stages which will permit of the minimum disturbance to the business of the office. In an earlier stage the telegraph power room was shifted so as to allow of the laying of the foundations for the rear part of the new building.

The rear portion of the building has just recently been vacated and handed over to the builders. This necessitated the temporary transfer to adjacent premises of the telegraph room with 40 circuits to the Provinces and pneumatic tube services to the C.T.O. and to the Stock Exchange. The removal was carried out without hitch.

A pneumatic house tube system with Roots' blower has been at the same time installed to replace a message lift and a gravity tube between the instrument and delivery rooms and counter.

It is interesting to note that the building now being reconstructed was originally the chief telegraph office of the British and Irish Magnetic Telegraph Companies and the stone front proclaims this fact.

Wireless.

A certain engineer in the L.E.D. is occasionally approached on the subject of wireless. Possibly his benign disposition suggests that he could not very forcibly object to answering questions on the little difficulties which beset the amateur. The other day one ardent experimenter raised a point which he pronounced had been causing a few restless nights of late. It was this: Does one connect the aerial to the crystal or to the thing one pokes it with?

LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

THE sixth meeting of the London Telephonists' Society was held on Friday, March 2, and brought a very successful session to a close. The programme for the evening was a varied one, commencing with a musical recital provided by members of the Museum Exchange staff. This was followed by the Competition Letters, competitors reading in turn brief accounts of interesting or amusing happenings that had arisen in connexion with their work in exchanges. The award of five prizes of 10s. each was decided by the votes of the audience and the winners were the Misses A. Davies, D. Turner, C. Leven, M. A. Tyler, and D. Wood.

Miss E. M. McAllister, Telephonist, of Regent Exchange, then read her paper on "The Personal Faculty," being followed by Miss H. M. L. Wilson, Supervisor, Holborn Exchange, on "Relief Supervising." By a curious coincidence the papers were complementary to each other, Miss McAllister emphasising the necessity for considering the personal element, and Miss Wilson showing the effects of the right personality on work that to the unimaginative might be dull and uninteresting.

The prizes for these Competition papers and the papers read at the February meeting were then presented by Mr. Valentine, whom the members were delighted to welcome at this his first staff function since his appointment as Controller. Mr. Valentine made a very happy speech, expressing his keen interest in the Society, and in all matters concerning the staff, and congratulating the retiring President, Mr. Guy Buckeridge, on the very successful season that had been held, pointing out that although the membership was slightly less than that of last Session, the average attendance had been considerably greater.

Mr. Pink followed with a short speech, proposing a vote of thanks to the Controller, at the same time expressing his own keen interest in the Society, and promising his active support in his new capacity as Assistant Controller. A speech from Mr. Horace Dive in his usual humorous vein, proposing a vote of thanks to the President for his able Chairmanship during his year of office, was heartily supported by the audience, and concluded a very enjoyable evening.

The annual election of officers and committee members was held at this meeting. Miss A. E. Cox, Supt. Female exchange staff, is the President for the 1923-24 Session.

Culled from the Exchanges.

Avenue Exchange.

AVEN SWIMMING CLUB. A whist drive was held on March 7 at Ye Mecca Café, Ludgate Hill, by the members of the above club. This was the second social evening spent by the members and their friends at Ye Mecca who judging by the sounds of merriment heard during the evening thoroughly enjoyed themselves.

Much fun was caused by the numbers of mysterious little parcels presented during the play to those scoring 1, 13, 12 or 11 tricks, each of these parcels contained a novelty of some kind.

Other prizes numbering nine were very useful and appreciable gifts especially the Gentleman's Booby which was a white enamel frying pan.

Mr. Dowling (North-East Traffic Officer) officiated as M.C., and his efforts at speeding up combined with his very jovial manner helped to increase the social atmosphere.

Prizes were kindly presented by our late colleague, Mrs. Clarke, *nee* Miss G. E. McArthur.

A few words of praise may be extended to the management of the Café whose efforts to refresh our friends during the interval were very much appreciated; also the comfortable lounge, &c., which tended to make the evening the success it undoubtedly was.

Gerrard Exchange.

Miss E. M. Alesbury, Assistant Supervisor, Class 1, has retired for marriage. Gerrard has been Miss Alesbury's official home for 17 years, and we part with her very sadly. Many beautiful gifts—tokens of affection and goodwill—were presented by her colleagues, and the operating staff. We wish her every possible happiness in the future.

Holborn Exchange.

A tea and entertainment were given by the staff to some 200 children attached to the Wesleyan Church, King's Cross, on Saturday, Feb. 10, in the hall adjoining the church. Tea came first on the programme, and in spite of a very wet afternoon the youngsters turned up in full force; and before they were even seated the place was resounding with "I want some money!" They evidently wanted something more substantial too, for the way the piles of bread and jam, cakes, buns, and doughnuts disappeared was simply marvellous. Then a "camera man" appeared, much to the small guests' delight, and some flash-light photographs were taken, after which the room was cleared, and the children settled down to the entertainment. Judging by the shouts of laughter, and squeals of delight from the audience, the ventriloquist managed very successfully to give an hour or two of great enjoyment, and the marionette show which followed also caused much amusement. After this a few members of the engineering staff, who had rendered great assistance in numerous preparations during the afternoon, gave a burlesque and sundry other items, while the audience joined in very heartily with all the popular choruses. Each child went home well-laden; with an orange and sweets in one hand, and a doll or toy in the other, it was difficult to find a way of holding a balloon. At any rate, they managed it somehow, and as the last straggler vanished through the doorway, everyone felt that the efforts of the past two or three weeks, which included the dressing of over 100 dolls in spare moments, had been amply rewarded.

The Holborn staff gave a very enjoyable concert on Wednesday, Jan. 10, at Ranger's Hall, Chenies Street, in aid of the Hospitals. The artistes consisted of members of the staff and one or two friends, and the items included two very amusing sketches which were greatly appreciated. As a result the sum of £22 was sent in response to the Controller's special appeal.

Regent Exchange.

Three weirdly attired persons were seen to enter the very prim and proper edifice which comprises the Gerrard and Regent Exchanges, about middle day of Friday, March 16. Contrary to expectations, they were not hastily ejected by the hefty toe of the benign but vigilant commissionaire; but issued peacefully some time later with highly satisfied expressions on their strangely marked countenances. The key to this mystery is probably contained in the following epistle which chanced to fall into the hands of the Philistines, who shamelessly expose the contents:—

DEAREST ARAMINTA,—I really must tell you! The most exciting thing happened to-day. We were sitting at lunch in the dining-room—Icilma, Spirella, Luvisca and I, when we were suddenly aware of a most unusual commotion at the far end of the room. We craned our necks to see the cause of it and beheld three creatures of fearsome aspect. They were attired in motley garments—striped jerseys or perhaps I should say jerkins, and black cloaks. Their heads were bound round with handkerchiefs and their faces were marked with what we deemed to be the secret sign of their demoniacal order—the letters U.C.L. We clutched our fruit jellies—for we had reached our second course—and waited for the worst. Were they Bolshevists, Sinn Feiners, Ku Klux Klan or merely a film company at work?

"If it's money they want," moaned Luvisca, "we shall be slain, for I can't pay for my lunch till I get my wages docket."

Indeed, we were all in a very impecunious condition and had pooled our sole wherewithal to help each other out until pay-time.

"Perhaps we can beg them to come back later on," said Spirella, hopefully.

For my part, I felt only too glad that I had eaten my steak pudding—it is far more romantic to be held up over a fruit jelly than a boiled suet pudding.

We saw them approach each table and come away laden with spoils, and took heart of grace, for indeed their victims seemed to laugh much and be highly amused. We decided they must be film people—in truth, one of the intruders was very like Rudolph Valentino. They approached our table. "Take my jelly, but spare, oh, spare," began Icilma beseechingly, when we were arrested by the cultured and irresistible tones of—a University College Medical Student, who was determinedly collecting for the Hospital Fund. We gave half our poor little wealth—what else could we do? You know yourself how irresistible these embryo Medicos can be when they want your money. "Then," said Icilma, who had recovered astonishingly, "tell us the history of Phineas and we'll give you some more! To whom does he belong?"

He was a tall shy (?) student and he said, with the same expression as the little maiden in "We are Seven," "Oh, he belongs to us." "By right of conquest or purchase?" asked Spirella.

"Well," he hesitated, "Catesby's wouldn't sell him, but he belongs to us, really." We parted with the other half of our lunch money.

But let me whisper, Araminta, mine, it was worth it. We'd give as much again just to see such unusual happenings in our horribly precise and virgin building. A benison on the head of him who shut his official eyes and allowed such things to be.

And, incidentally, I should advise the clan of U.C.L. to visit some other exchanges. Telephone people are notoriously soft-hearted and generous. I really must fly.—Yours,

DOROTHEA.

PERSONALIA.

BIRMINGHAM.

ON Saturday, Feb. 24, a presentation of stainless cutlery was made to Miss M. D. HALL (Writing Assistant, Contract Department) and Mr. H. B. WIGGINS (Clerical Officer, District Office). This was the last day of Miss Hall's service, who was leaving to be married. Mr. Hunter, who apologised for the unavoidable absence of Mr. Murray, Contract Manager, spoke of the valuable services that Miss Hall had rendered during the period of her service in that particular Department, and together with Mr. S. H. Silver, who, on behalf of the Contract Officers, wished to thank her for the valuable assistance that she had given them, wished Miss Hall and Mr. Wiggins a long and happy life.

PRESENTATION TO MR. R. U. TUCKER.—In recognition of the completion of 30 years' service by Mr. R. U. Tucker, Chief Clerk, a most enjoyable social gathering was held in Ridgway's Cafe on the 5th ulto. During the evening the District Manager (Mr. P. F. Currall) on behalf of the staff presented to Mr. and Mrs. Tucker a canteen of stainless cutlery. He eulogised the work and capabilities of Mr. Tucker and spoke of the excellent service that the Chief Clerk had rendered both to the ex-National Telephone Company and to the Post Office. Mr. Rowan on behalf of the Accountant-General's Audit staff also testified to the happy association with Mr. Tucker and the staff under his control for many years. The attendance consisted of representatives from all Departments, including the Surveyor (Mr. John Scott) and Mrs. Scott.

CHESTER.

MISS A. B. LAMB, Writing Assistant, was presented by the staff with a case of cutlery on her resignation from the Service on Feb. 24, on the occasion of her marriage.

PLYMOUTH.

THE Plymouth Contract, Clerical and Traffic staffs met on Feb. 21 to bid farewell to Mr. F. E. ADAMS, Contract Manager, on his transfer and promotion to Aberdeen. In the absence of the District Manager and on behalf of the whole staff Mr. McDougall, Traffic Superintendent, presented Mr. Adams with a fine leather trunk. In asking Mr. Adams to accept the gift the Traffic Superintendent paid tribute to his colleague's qualities and referred to the esteem in which he was held by the Plymouth staff. Replying, Mr. Adams said that during his two years at Plymouth the Contract Department had broken all previous records and that he hoped to be equally successful in Scotland. He expressed his evident sorrow at leaving those with whom he had been so happy. Begin a humorist of real merit he has figured prominently at social functions and devoted much of his talent to charity. Mr. Adams was accompanied to the railway station by numerous colleagues, who, to their consternation, were accidentally locked in the carriage as the train moved off. Thus it happened that Mr. Adams' departure nearly became a general exodus of Plymouth staff to the "land-o'-cakes."

ABERDEEN.

MR. A. S. BRODIE, Contract Manager, Aberdeen, was presented with a gold albert and pendant by the staff on the occasion of his transfer to Plymouth.

LONDON TRAFFIC STAFF.

Resignations on account of marriage:—

Miss E. M. ALESBURY, Assistant Supervisor, Class I, Gerrard Exchange.
Miss I. YULE, Assistant Supervisor, Class II, Park Exchange.
Miss E. MEDHURST, Telephonist on allowance, East Exchange.
Miss E. L. WARWICK, Telephonist, Trunk Exchange.
Miss A. GRIFFIN, Telephonist, Trunk Exchange.
Miss I. E. BINFIELD, Telephonist, Sydenham Exchange.
Miss D. TROUGHTON, Telephonist, Sydenham Exchange.
Miss A. M. W. PIPER, Telephonist, Hammersmith Exchange.
Miss E. M. WALLIS, Telephonist, Park Exchange.
Miss B. WITTON, Telephonist, Putney Exchange.
Miss E. L. BOWDEN, Telephonist, Holborn Exchange.
Miss A. M. STONE, Telephonist, Avenue Exchange.
Miss E. A. LENNOX, Telephonist, Holborn Exchange.
Miss O. COLE, Telephonist, Victoria Exchange.
Miss M. V. BUNKER, Telephonist, City Exchange.
Miss M. E. PORTER, Telephonist, City Exchange.
Miss O. G. MATTHEWS, Telephonist, Gerrard Exchange.
Miss K. E. B. HITCHCOCK, Telephonist, Gerrard Exchange.

THE

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THE NEW SCHOOL—AND THE OLD.

BY D. DULY, *Supervisor, Gerrard Exchange.*

COME away for a few minutes with me to our new school. Forget your exchange and see what wonders our school presents; you, young learners ejoice that you were privileged to sojourn there; and you, seniors, cast back your minds and wonder at the strides we have made in our teaching and training of learners. Forget the rough and ready training, the limitations, the play of the imagination that was then necessary, the old inanimate charts, and travel for awhile in our little wonderland, for such it is at present. Teachers and learners alike were handicapped in days gone by, more is the credit therefore to them of their achievements, but always were the teachers wanting a more ideal school in which to train their charges, with better working conditions generally. Now at last we have a new school, nearly perfect in all points as far as apparatus is concerned but rather too difficult of approach at Clerkenwell.

Arrived at Clerkenwell Exchange we interview the commissioner who hands us over to one of the teachers. She will show us round. All the school premises are on the ground floor but we use the dining-room common to the whole building.

We will look in at the lecture room. Listen enchanted to our favourite teacher. See her, tall, calm, benign, absorbed in her lecture, no wonder the girls watch and listen fascinated; we do too who know the story through and through and count ourselves privileged to train under her. There is magic in her simple delivery. Magic that we fain would copy. You who have never heard have missed a pleasure. It's a fairy tale she tells. Watch that old dummy position which stood so many years at Carter Lane, only looking, doing nothing. How in days gone by I despised it because of its lifelessness. Behold, the hand of the magician has been there and at a touch one can have any subscriber one wants, calling exchange. White lamp white with S, coin box, call office, they all file up, and to the eyes of the interested class each type is explained in turn. See how much more real is our school. Even the subscribers are not left to the imagination. A telephone is fixed each side of the dummy position. The teacher (acting subscriber) lifts the receiver. Immediately on the position the lamp glows. Then comes the demonstration of the telephonist answering, picking up junction given, connexion by "B" telephonist, distant subscriber's bell rings. Teacher answers (distant subscriber), supervisory darkens. Conversation in progress. Receiver hung up. Register and clear.

Yes, it all sounds so simple but oh, the pains expended, the thought, the positive yearning at times. Think of the number of brains we must penetrate, think how we must peptonise the food. Think of the disheartened feeling when we have "duds" to contend with, to coax; the patience, the pointing ever onward, onward.

"Other heights in other lives, God willing."

The lecture is over, come with me now to the practice room. Here we are going to test the result of our lecture or the receptive power of our pupils. We can never tell which. Others judge for us, but it is an ordeal for the teacher especially if the result falls below her standard. Then begin damaging introspections; but always fight on, fight on.

Get an idea of the whole room, oblong in shape. See the new shining apparatus, the new gleaming wood, beautiful red mahogany. I love wood, I want to stroke it, but that is forbidden. "Mind the mogany, Miss," always rings in my ears when the polisher once caught me caressing the beautiful colourful top of the information desk, one lovely seamless piece of wood.

Come nearer and see our positions, the very beauty of them ought to induce good work. I envy the first class who use them. Almost with reverence should they be touched.

Think of your own position a minute. Try and imagine all cords, speaking keys, register key top making a colour scheme. Pick up the first one, perhaps red plug, then red speaking key, red topped register key. The next blue, the next yellow and so on, and you have dimly an idea of the beauty of our positions, but add to it all the gleam of newness.

Baby positions. They have only eight pairs of plugs. We do not anticipate a rush. Look at the answering jack field, not a badly marked label or number plate, now the junction multiple, no fault to be found, all the junctions coloured proper to their areas, no broken or missing parts. Look higher at the junction multiple, admire the change number pegs, the uniformity of everything. It is ideal in the abstract, faultily faultless. When you have looked your fill at our positions, come and see our wonder desk where the teachers turn subscribers. The engineers consider it an achievement, we think Mephistopheles must have aided them. But it is more simple when explained; and here the teacher must sit and be in turn, an irate subscriber, an unreasonable subscriber, a gentle subscriber. She asks

the time, calls for police, imagines a fire, does not understand a call office, declares she has put the money in, when it still reposes on her desk, demands the Supervisor, must speak to the Controller personally, is cut off Trunks on a barred line. In fact, must act a host of parts for the benefit of her learners. Who would be a teacher ? and yet we are told teachers have a nice soft job !

The same perfection of apparatus reigns still at our "B" positions where we now boast straight and split order wires, signal junctions and even a Trunk position. What a contrast to the days when we pretended many of our connexions.

Four types of P.B.X. positions and a miniature monitor's desk completes the practice room. Roam round and ask questions about it, we shall be glad. Interest creates good feeling and promotes knowledge. There is still the study room to peep into, a spacious airy room where the telephonists con over their last lecture, answer test questions or try to master the elusive codes. We will leave them there. Now you have a picture of our new school where better results should come under better conditions.

But we loved our old school. Its very associations endeared it to us. We trained there many of us as learners and we owe it a debt: we were sad at heart to leave it, but "the old order changeth and giveth place to new" always. It is an inevitable law and we must submit. We were happy there in spite of our old apparatus which was always letting us down, for which we were always making excuses, over which the engineers never ceased grumbling. Good old veterans those three positions and that monitor's desk; they did their work nobly and it were mean of us to despise them because a newer love had taken their place.

We loved the old lecture room in spite of its drawbacks, its lifeless charts and dummy, the continual hubbub during lectures. We loved our little study room in spite of its stuffiness, and the girls loved it because they were out of sight.

We are going to newer better conditions, the new school must prove itself, as the old one did, make its own history, create its own atmosphere, and perhaps in 20 or 30 years to come someone may regret leaving it !

But above everything we shall miss being under the mystic shadow of St. Paul's, miss the chiming away of the hours, miss the occasional thrill of the clashing of bells, miss "the cross of gold that shines o'er city and river," miss the throbbing palpitating life, and be out of the history of our city. These things had become a small vital part of us. Painful regrets these, but we must take the new life as Time unswervingly beckons us on.

TRANSATLANTIC WIRELESS TELEPHONY.

ABOUT two months ago a remarkable demonstration was given of Trans-Atlantic Wireless Telephony by the Western Electric Company acting in conjunction with the American Telephone and Telegraph Company and the Radio Corporation of New York. It is well known that isolated words had previously been transmitted by wireless telephony across the Atlantic, but this was the first recorded occasion on which messages of considerable length at a pre-arranged time were transmitted from North America in such a way as to be audible and intelligible to a large audience in London. It must be recognised of course that the experiment was conducted under favourable conditions, and there are many difficulties other than scientific ones to be overcome before anything approaching a commercial service can be successfully instituted. With a view, however, to exploring the possibilities of developing wireless telephony over long distances, the Postmaster-General has appointed a Committee "to consider in the light of recent progress in wireless science the possibility from a technical standpoint of Trans-Atlantic wireless telephony of sufficient reliability for commercial use, and to advise what practical steps, if any, can at present be taken to develop this means of communication." The Committee, which has already begun to sit, is constituted as follows :—

Admiral of the Fleet Sir Henry Jackson, G.C.B., K.C.V.O., R.N. (Chairman).

Major-General Sir F. H. Sykes, G.B.E., K.C.B., C.M.G., M.P.

R. A. Dalzell, Esq., C.B.E., Director of Telegraphs and Telephones, General Post Office.

Prof. W. H. Eccles, D.Sc., F.R.S.

F. Gill, Esq., O.B.E., President of the Institution of Electrical Engineers.

E. H. Shaughnessy, Esq., O.B.E., Engineer-in-Chief's Department, General Post Office.

Major A. G. Lee, M.C., of the Engineer-in-Chief's Department, will act as Secretary.

It is understood that the Telephone Authorities in the United States are willing and anxious to co-operate in any studies aiming at making telephonic communication across the Atlantic a practical means of commercial intercourse.

"WIRELESS."*

BY W. WINKLER (*Secretary, Edinburgh Radio Society*).

I SHOULD like now to try and cover as much ground as possible in the way of introducing you roughly to "Wireless"; what it is; and how it is worked. It is rather a long subject to try and cover in a comparatively short paper. It really requires considerable time; but I will try to avoid heavy technical details as much as possible, in order that any information that I may pass on may be perceptible to as large a majority as possible.

Before attempting to describe the particular features of the various types of wireless telegraph and telephone receiving apparatus, it would be advantageous to make a brief *resumé* of the principles underlying the transmission of messages without wires.

It is acknowledged that wireless—or to be more accurate, electro-magnetic waves—travel at a speed equal to that of light, that is 186,200 miles per second through a medium which we call the ether. What exactly the ether is we are not quite sure; do not confuse it with the fluid which some of us have become acquainted with in the dentist's chair. Suffice it to say that the ether is everywhere and is in everything, whether solid, liquid, gas, or vacuum. Having discovered this extremely useful agent, it is necessary to be able to control it—to produce these waves at will and to make them fill the functions we require of them.

We will begin by considering the conditions at the point at which waves are produced, that is, the transmitting station.

If a current of electricity flows through a conductor an electro-magnetic field is produced around the conductor. This field is considered to be composed of lines of force. If the current has a high value, the field will be large, and *vice versa*. In other words, when the current is increased, the lines extend outwards from the conductor just as waves spread out from a concentric point when an object is dropped into water, only with our electrical equivalent a decrease of current in the conductor will cause a reverse action to take place and the lines of force will return to the conductor. These lines travel in a plane perpendicular to the direction of the current in the conductor. When, however, these waves occur at high frequency (above 10,000 cycles), a large percentage are thrown off and do not return. It is these that are made use of in radio transmission.

Assume now that a second conductor is placed in such a position that these radiated waves impinge upon it and that a sensitive detecting device is connected between it and earth or between its ends. It will be found that variations in current in the first conductor will set up corresponding variations in the second. This action is similar to the familiar action of an induction coil or transformer.

A transmitter consists of a radio frequency generator which energises an elevated aerial system through an inductance the opposite end of which is usually connected to earth or to counter-poise earth screen. The natural assumption from this is that waves radiated from the transmitter will affect every receiver within range.

This difficulty has been to a large extent overcome by controlling the frequency measured in waves or cycles per second of the transmitter by the means of tuning. It can well be imagined that if we have 100 impulses, both sensitive and negative, in our aerial in each second, we have a frequency of 100 cycles. Since these waves travel at 186,200 m.p.s., or 300,000,000 metres p.s., each wave of 100 cycles frequency must be 186 miles or 300,000 metres long. It is usual to work with much shorter waves and consequently higher frequencies. At the present time, general use is made of waves between 150 and 25,000 metres in length. These limits are not the ultimate practicable by any means.

The tuning of a transmitter is accomplished by varying the amount of inductance and capacity in the aerial earth circuit. It is advantageous to keep the capacity low and to add inductance where longer wave-length is required.

Morse signals are sent by interrupting the radiated energy by a suitable means, such as a Morse key; this results in groups of waves being sent out in long or short periods in the same manner as one would adopt over a telegraph line. For the transmission of speech, it is necessary, firstly, to have a continuous stream of radiated waves, and then to vary or modulate these in amplitude or height by means of the human voice. Now, it is quite natural to assume that the radiated waves lose their strength as they get farther from the transmitting station. This is, in fact, very noticeable, and the strength is, under normal conditions, inversely proportional to the square of the distance. However, in spite of this loss, receiving apparatus is now so sensitive that it is quite possible to work telegraphy over a range of 500 miles with an input power of about 5 watts.

Having, I hope, from this general outline, gathered a fair conception of what has to be intercepted at the receiving end of a wireless station, we may consider the various methods adopted for this purpose.

Perhaps it would be as well to consider the capabilities of three electrode vacuum valve or thermionic tube. This invention has made radio telephony possible at the present time and has revolutionised the operation of wireless telegraphy. Its action, as its name implies, is similar to a mechanical valve;

* Paper read before the Edinburgh Telegraph & Telephone Society.

there are two circuits through it, arranged in such a manner that a small current in one may control a larger current in the other. This action is comparable to that of a relay.

The function is as follows: Of the three electrodes, one must be kept at incandescent heat. In this state, when the surrounding atmosphere has been evacuated to a very high degree, it emits electrons somewhat profusely. Electrons are best considered to be infinitely small bodies charged with negative electricity. Naturally, these small bodies will have a very small amount of inertia and are therefore extremely suitable for our purpose in a highly sensitive relay operation at high frequencies.

The second electrode or plate is mounted in close proximity to the filament; it is generally tubular in shape and surrounds the filament. The third electrode or grid is usually of spiral or mesh form and is interposed between the plate and filament, all three being coaxial. Connexions are made to the external contacts of the valve through very carefully sealed joints in the glass or silica bulb; two are taken from the filament and one each from plate and grid respectively.

By means of the two leads from the filament, it is possible to pass a current through this and heat it to the required degree. Having done this and connected a source of direct current potential between filament and plate with the positive towards the plate and a milliampere metre in series, it will be found that a current is flowing through the valve from plate to filament. This is due to the flow of *negative* electricity from filament to plate. If the polarity of the applied E.M.F. is reversed, no current will flow. This shews that the negative electrons are attracted by the positive potential and repelled by the negative.

During this test it is necessary to connect the grid to the plate or filament. If this is not done and it is left insulated, a negative charge will accumulate on the grid which will be sufficiently strong to prevent any electrons passing through it to the plate.

If connexions are made as before and the source of variable potential is connected to grid and filament, it will be found that negative potential applied to the grid will reduce the plate current and that positive potential will tend to increase this current. The relation between grid volts and plate amperes is however not constant. If the two are plotted on a graph, the resultant curve shews a straight line which bends off sharply at either end.

When it is required to use the valve as the rectifier of alternating currents which are very weak, the grid-filament voltage should be adjusted to the bend of the curve by means of a potentiometer or other suitable means. Positive impulses will now produce correspondingly larger impulses in the plate circuit, whereas negative impulses will produce a very small reduction in the current.

If inductance coils are inserted between plate and filament and grid and filament and these two are coupled in such a way that an increase of current in the plate circuit produces a negative potential on the grid, then a state of oscillation will be set up which is due to the action of the valve in the following manner: An increase of plate current makes the grid negative. This negative potential tends to reduce the plate current; reduction of plate current makes the grid positive, which in turn increases the plate current. This sequence of operations will continue at a frequency depending upon the values of inductance and capacity in the two circuits as long as the filaments and plate batteries are kept up and the coupling between the coils is maintained. If the coils are of different values, oscillation will take place at the longer wave-lengths unless there is a preponderance of capacity in the other circuit.

If, now, the coupling between the coils is loosened until oscillation has ust ceased, then the circuits will be found to have an infinitely low resistance and any applied electrical variations of current will tend to increase in strength rather than to be damped out, as would be the case in a circuit of higher resistance. This effect, which is known as regeneration, is very largely made use of in magnifying the weak oscillations which are picked up by a receiver aerial.

From these remarks it will be appreciated that the coupling of these coils introduces what might be called a "negative resistance" to the circuit. Resistance is reduced as the coupling is tightened until zero resistance has been reached, when the valve will start oscillating.

A valve, as you will understand, provides a very suitable means of generating oscillations of high frequency, such as are required for transmission, and by inserting the secondary of a microphone transformer in the grid circuit, the plate current and consequently the oscillations can be varied or modulated in accordance with the electrical equivalent of the sound waves and the speech or other sounds will be detected at the receiver.

Receivers may be of many types; they may utilise the induced energy from their aerial system to operate the diaphragms of the telephone receivers, in which case they will be very insensitive or they may make use of the regenerative principle and by using one valve may both magnify the received signals and rectify the resultant plate current which flows through the telephones.

Before going any further, it would be as well to point out that it is necessary to convert the received high frequency pulses to low frequency, in order that they may operate the telephone diaphragms.

When it is desired to pick up very weak signals, it is usual to use one or more valves in cascade or sequence, which valves simply perform the function of magnifying the received signals before rectification; after rectification they may be still further magnified in order to add to the volume of sound.

The coupling used between high frequency amplifying valves is usually in the form of an air core high frequency transformer or tuned circuit with a condenser connecting the plate of one valve to the grid of the next. In low frequency, regular closed iron core transformers are used. The design of these is an extremely important matter, otherwise innumerable parasitic noises arise.

The tuning of a receiver is usually done by connecting a variable capacity between aerial and earth and using a convenient series of inductances which may be connected in parallel or series with this condenser. Here, again, it is all-important to keep the inductance to capacity ratio as high as possible, since the valve is a potential operated device and does not require current to operate it.

The old and now out-of-date "spark" system energised the aerial by a series of groups of waves. These groups occurring at the spark frequency produced a series of impulses which rapidly rose to maximum and more gradually died out. These signals give quite a definite clear musical note, by which each one may be recognised. When these signals are rectified, vibrations occur in the telephones, in accordance with the average current variation this reproduces the spark note exactly.

With signals of this type, *i.e.*, damped waves, rectification is sufficient to produce an audible note in the telephone. When signals are received from a valve or continuous wave transmitter, it is necessary to interrupt the received oscillations at audible frequency in order to produce a note in the receiver. This may be done by putting an interruptor in the oscillatory circuit. The more usual method, however, is to superimpose on the received oscillations another train of waves of slightly different frequency. By this means a "beat" note of a frequency equal to the difference of the two frequencies is produced. This is most easily accomplished by putting the receiver in a state of oscillation. This has the effect of also reducing the resistance of the oscillation circuit to zero and increasing signal strength, and is called "auto-heterodyning." Similarly, a separate heterodyne system may be used, consisting of an oscillating valve circuit placed near to the receiver. By using this latter method, even greater signal strength can be obtained, since the receiver can now be tuned to the exact wave-length of the received signals and a beat of any pitch can be obtained. Another advantage of this method is that the possibility of interference with other receivers is reduced to a minimum.

When using a separate heterodyne, the receiver is tuned to resonance with the transmitter, and the regenerative coupling adjusted to give maximum strength without oscillation. Tuning of the separate heterodyne will now give whatever pitch of note is desired. For the reception of telephony, the tuning is done in the same way, except that the heterodyne is switched off.

It is a very strict regulation of the Postmaster-General that no receiver capable of energising the aerial or coupled circuit may be used on broadcast wave-lengths during broadcast hours. This difficulty may be overcome and regeneration achieved by coupling the re-acting coil to an intermediate circuit, say, between the first and second valves. This system complies with regulations.

Time does not permit that I should go any more deeply into the theory or constructional details of wireless telegraph receiving apparatus, but a few remarks on the present situation as regards broadcasting would not be out of place.

There are some half-dozen stations in this country at present occupied nightly in the broadcasting of news, music, and other items of general interest to the public. They use a power of about 1½ K.W. input, and can all be heard comfortably on a good receiver, using three valves and the regulation 100 ft. aerial. From the more distant stations, the "fading" phenomenon is most noticeable, and signals which at one moment are loud and clear may fade at the next quite beyond audibility. The reason for this is a matter of careful investigation at the present day, but up to the present we have not been able to overcome it. It is quite useless to try and bring back signal strength during fading by making any alterations of the receiver adjustments. If this is carefully done at the beginning, it is best left alone and signals will return to their original strength after a short period—it may be a matter of a few seconds or perhaps one or two minutes.

Two kinds of licence are at present issued by the Postmaster-General—the Experimental licence and the Broadcast licence. Under the first, almost any type of receiver may be used, except as mentioned previously. The holder must have a certain minimum amount of knowledge of the handling of valve receivers, and comply with the conditions as laid down in the licence. The Broadcast licence may be purchased over the counter in a Post Office, but the holder may only use receiving sets and units each bearing the trade-mark of the British Broadcasting Company on which a royalty is payable to that company. He may make no alterations to the apparatus other than the addition or removal of amplifiers or other units bearing the B.B.C. mark.

Major Jayne, in moving a vote of thanks to Mr. Winkler, said:—We, as telegraphists, understand quite well the difficulties that sometimes turn up when we wish to be on our very best behaviour, and wireless sets, as far as I know, never have been "very nicely brought up." If one attempts to give a demonstration at short notice, there are one-thousand chances to one that something happens to prevent a proper demonstration, and we quite understand all the difficulties that might supervene when we really want to do well. If we attempted to give a Baudot demonstration some time to an admiring audience, we should not always be entirely successful—on some circuits.

What we have heard this evening will convince us of the possibilities of broadcasting, and will probably incite us to go in for a receiving set at shortest possible notice.

On your behalf, I want to thank Mr. Winkler very much for taking all the trouble he has done to-day to give us this demonstration, and we hope that when he comes again we shall discover the cause of this interference.

THE LONDON SCHOOL OF TELEPHONE OPERATING, CLERKENWELL.

BY A. M. B. NEWITT.
Assistant Superintendent of Traffic, London Telephone Service.

(*Continued from page* 116.)

The "B" positions which are eight in number are arranged in the ollowing order :—

Positions 2 and 4 ...	Signal junction.
„ 6	Keyless order wires, including those from trunks and monitor (from information desk in each case).
„ 8—16 ...	Keyless order wire.

These incoming junctions from trunks are provided with standard interrupt facilities. A lending junction multiple is provided over the order wire positions so that junction centre conditions can be reproduced. The lending junctions terminate as incoming lines on the signal junction positions 2 and 4, and are not available to them for outgoing traffic. The subscribers' multiple is a replica of that installed on the "A" side, but is repeated every 6 panels instead of every 9.

As already stated, the 24 "A" positions provided in the school are divided into 4 groups of six positions, each such group working under a distinct exchange name. These exchange groups are subdivided into two sections of three positions, each section working in direct and sole association with one of the eight calling monitors' desks. This arrangement places in the hands of the calling monitor at Desk No. 1 complete control of the incidence and flow of traffic passing to and from positions 1, 3 and 5. Desk No. 2 is similarly associated with positions 7, 9 and 11, and so on to Desk No. 8, which controls positions 43, 45 and 47.

The equipment on each monitor's desk controls 30 subscribers' circuits, the calling signals for which are divided over the three associated "A" positions in groups of ten lines. At the monitor's desk each subscriber's line is furnished with the following equipment :—

On the face of the Desk.

A jack and lamp for the receipt of inward calls. The lamp is fitted with a duplicate of the opal code lamp cap which appears on the "A" positions and is labelled with the multiple number.

On the Key Shelf of the Desk.

A plug and cord.

A supervisory lamp (again fitted with a duplicate of the appropriate opal code lamp cap, *i.e.* the service marking).

A calling and flashing key (described later as Key A).

A speaking and flashing key (described later as Key B).

A multiple number label reproducing the subscriber's exchange No. which, as already described, appears against the relative jack and lamp on the face of the desk.

The items appear on the key shelf in the sequence shown, the plug and cord being fitted nearest to the face of the desk.

In addition to the 30 sets of equipment as detailed above, each monitor's desk has the following items provided :—

On the Key Shelf.

(*a*) A replica of the O.W. keys as appearing on the "A" positions.

(*b*) A 2-position key to provide transmitter cut out and ringing conditions. (This key is in line with the calling and flashing keys, already referred to, and at their extreme right. Described later as Key C).

(*c*) A key to reproduce a buzz similar to that provided by the insertion of a coin in an ordinary coin box. (This key is in line with the speaking and flashing keys already referred to, and at their extreme right. It will be referred to later as Key D).

On the face of the Desk.

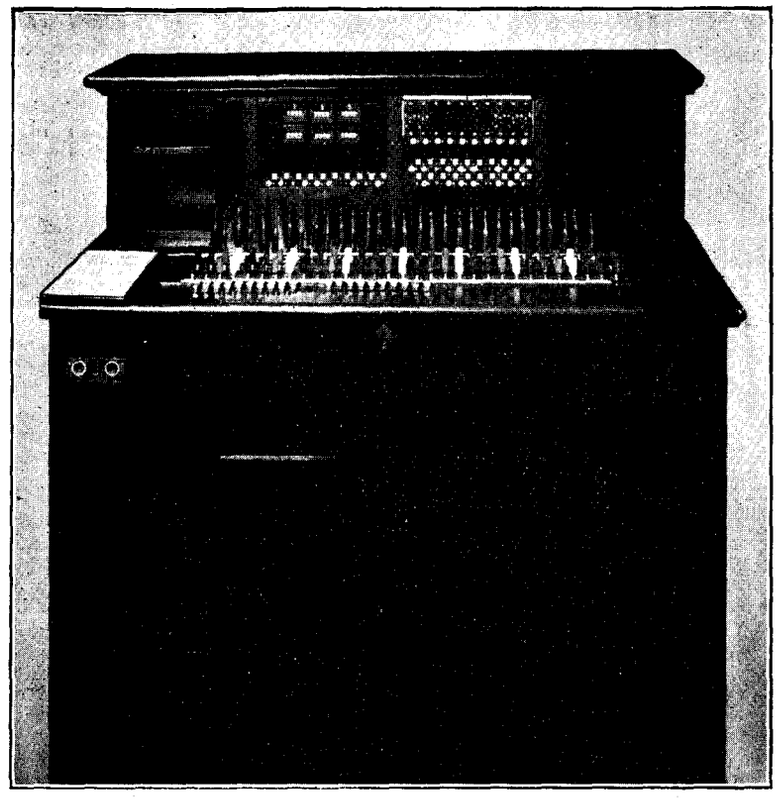
LEFT HAND PANEL.

Three sets of effective and secondary registers which are actuated by the depression of the relative keys on the associated "A" positions.

RIGHT HAND PANEL.

Three keys for "listening in" on the respective "A" positions controlled from the desk in question. A key (with associated lamp) on which terminates a both-way circuit giving communication to and from the chief supervisor's desk. This circuit is operated on what is known as the ring-down principle the ringing key (Key C), already referred to, being available for this purpose. A similar key with associated lamp is provided to give communication to and from the information desk.

In order that patrolling supervisors may keep in close touch with the calling monitors, a circuit is provided from the latters' head-sets to instrument jacks placed under the key shelves on the switchboard in the centre position of each group of three learners.



CALLING MONITOR'S DESK.

The monitor when making a call throws key A of the particular subscriber's circuit on which she desires to pass a call. This operates the relative subscriber's calling lamp on the "A" position, and at the same time lights the associated supervisory lamp on her own desk. When the learner plugs in, the calling signal at the "A" position and the supervisory lamp at the desk are darkened. It is necessary for the calling monitor to throw key B (speaking key) in addition to key A before she can pass her demand. Details of the field of numbers which are available for individual monitors are indicated later, and care has to be taken to keep within these limits for the reasons already stated. The "A" learner on receipt of a demand for a number on her own exchange plugs into the multiple jack of the required number and rings. The act of plugging in lights the key shelf supervisory lamp associated with the called number on the monitor's desk. The calling signal on the face of the desk is not operated until the learner rings. The calling monitor answers the call by inserting into the jack of the called line the plug associated with the line over which she originated her call. This operation darkens the calling signal on the face of the desk and the front supervisory lamp on the "A" position. The monitor then throws the relative key A and restores key B to normal, and the connexion is established.

The condition of the connexion is now that of two subscribers in conversation, and the calling monitor is free to proceed with other calls.

As the monitor represents both calling and called subscribers, facilities for reproducing the movements of the relative switchhooks have been provided, and to flash the *answering* supervisory on the "A" position, the monitor operates key A of the *calling* circuit. To flash on the *calling* supervisory she has first to restore key A of the *called* circuit, and then operate key B of the circuit over which she passed her original demand. In order to give a clear to the "A" learner, all relative keys are restored to normal, and the cord circuit connexion taken down. When this is done the supervisories on the calling and the called circuits continue to glow until the connexion has been taken down by the "A" learner. The learner's registration of the call is observed by noting the operation of the relative position register. This operation is accompanied by the darkening of the supervisory of the calling circuit. The operation of a junction call is precisely the same as that detailed in the foregoing, except that the call is set up *via* a junction to the "B" board. In order to actuate the buzzer on calls from coin box circuits, it is first necessary to throw the relative key "B" into the speaking position, whereafter key "D" will be operated as frequently as coins are required to be inserted.

All signal junctions and certain order wire junctions are available to the calling monitors as follows :—

Calling Monitors.	Order Wire Junctions.				Lending Junctions.	*Via* Junction Centre.
1 and 2 (Gerrard)	Avenue	1—27	Museum	1—27	Rainham	
	Battersea	1— 9	Lee Green	1— 9	01—02	East
	East	1— 7	Richmond	1— 7	Chingford	
	Hornsey	1— 7	Willesden	1— 7	01—02	East
3 and 4 (London Wall)	Avenue	1—27	Museum	1—27	Enfield	
	Chiswick	1— 7	North	1— 7	01—02	North
	Central	1—15	Paddington	1—15	Waltham Cross	
	City	1—11	Park	1—11	01—02	North
	Ealing	1— 7	Regent	1— 7		
5 and 6 (Victoria)	Avenue	1—27	Museum	1—27	Merstham	
	Brixton	1— 7	Kingston	1— 7	01	Croydon
	Croydon	1— 9	New Cross	1— 9	Reigate	
	Dalston	1— 7	Putney	1— 7	01	Croydon
	Kensington	1— 7	Wimbledon	1— 7		
7 and 8 (Clerkenwell)	Avenue	1—27	Museum	1—27	Bexley Heath	
	Bromley	1— 7	Mayfair	1— 7	01—03	Hop
	Holborn	1— 7	Sydenham	1— 7		
	Hampstead	1—12	Western	1—12	Woolwich	
	Hop	1— 9	Streatham	1— 9	01—03	Hop

GENERAL VIEW OF PRACTICE ROOM.

Signal junction calls can be passed by all calling monitors for numbers on the following exchanges :—

Burgh Heath, Dartford, Erith, East Ham, Harrow, Ilford, Loughton, Palmer's Green, Purley, Romford, Sidcup, Sutton, Tottenham, Wallington, Walthamstow.

It will be clear, therefore, that each of the 30 subscribers' exchange circuits available at the monitor's desk, may be demanded by that monitor in association with the name of the exchange embracing the "A" position which she controls, or with the name of any of the exchanges for which junctions are available on her position, as detailed above. Thus, apart from other possible calls detailed later, each monitor has a field of *effective* calls to no less than 780 different subscribers, and in the case of six of the monitors, desks this figure reaches 840 circuits.

In addition to the above possibilities, facilities for the following calls exist :—

Service lines of all types.	Pegged number circuits.
Trunk lines.	Police.
Toll lines.	Fire.
Telegram lines.	Ambulance.
Out of order circuits.	Salvage.
Engaged circuits.	Controller's Office.

The following jacks in the subscribers' multiple have been wired so that the whole series may be subject to—(1) a condition providing the "out of order" tone, or (2) a condition providing the ordinary engaged test.

3714	3733	3735	3752	3756	3771
3777	3790	3798	7801	7809	7822
7828	7843	7847	7864	7866	7885

The alternative conditions can be varied at the discretion of the chief supervisor by the throwing of a switch.

On each calling monitor's desk is provided a list of numbers pegged in the multiple, and calls for these can, of course, be made under the same conditions as in a public exchange.

A typical Calling Monitor's desk is shown in the accompanying photograph.

On the Information desk, which consists of two positions, all the service lines outgoing from the service multiple are terminated and all calls for Complaint, Enquiry, Directory Enquiry, Peg Enquiry, Filter, Chief Supervisor, Chief Inspector, Exchange Inspector, Fault Desk, Test Desk, Exchange Clerk, Testing Telephonist, &c., are dealt with thereon. The lines in the outgoing junction multiple labelled Trunks, Toll and Telegrams also terminate on this desk, together with those from the subscribers' multiple which are common to the use of all the Calling Monitor's, *i.e.*, Fire, Police, &c. A group of order wire junctions is also provided to one of the "B" positions and labelled "Trunks." Over these lines are completed the demands for Trunk numbers passed by the Calling Monitors. "Listening in" facilities to both "A" and "B" positions are provided. Both-way circuits are also provided between this desk and those of the Chief Supervisor and Calling Monitor.

A "Voice and Hearing" test circuit is also provided on this desk. One end is terminated on a jack in the face of the desk and the other in a concentric instrument plug on the dummy adjacent to the last "A" position, *i.e.*, the position most remote from the information desk.

Tests of the facility with which learners are able to hear and speak on the telephone are carried out over this circuit.

The officers staffing the information desk are also responsible for the training of private branch exchange telephonists and circuits for this purpose are provided between the desk and the private branch exchange boards. The operation of these circuits will be described later when the apparatus provided for this purpose is being dealt with.

The key shelf equipment of the desk is of the ordinary standard type with 8-cord circuits.

Only the most experienced officers can be placed at this desk because they have to act in turn for the Police, Fire, Ambulance and a host of other authorities, and in the capacity of the officers on whose lines they thus answer. They must, therefore, be thoroughly acquainted with the operating procedure on all such lines.

The chief supervisor's desk is a standard one-position desk, and is equipped with two exchange lines connected to the Clerkenwell Exchange, listening in lines to the "A" and "B" positions, and both-way lines to the calling monitors' and information desks. The instruction circuit is also terminated on this position in order that the chief supervisor may be able to give any general instructions to the learners.

For the training of P.B.X. telephonists, the following apparatus has been provided in the practice switchroom :—

One cordless switchboard $\frac{3+7}{10}$, one floor pattern double cord switchboard $\frac{3+10}{25}$ and another $\frac{10+30}{65}$. Two exchange lines and four extensions on each of these boards are wired to the information desk, the remaining indicators being left unwired. The exchange lines are wired for auto. calling on the desk and ringdown circuits on the P.B.X. boards. The extensions are wired for auto. calling on the switchboards and ringdown circuits on the desk. All the circuits are wired to give the proper supervisory conditions when in use.

With this apparatus it is possible to simulate the following calls :—

(*a*) A call from an extension on the P.B.X. to a subscriber on the same or a distant exchange.

(*b*) A call from a subscriber on an exchange to an extension on the P.B.X.

(*c*) A call from one extension on the P.B.X. to another.

From the foregoing notes it will be seen that the equipment of the school permits of the passing of practically every type of call which the learner is likely to encounter when she passes into a working exchange.

REVIEW.

"Printing Telegraph Systems and Mechanisms." By H. H. Harrison, A.M.I.E.E., M.I., Railway Signal Engineers. Longmans, Green & Co. 8vo. 21s. net.

That this volume would prove to be well worthy to appear as one of Messrs. Longmans' series of *Manuals of Telegraph and Telephone Engineering*, edited by Sir William Slingo, was a natural anticipation to be associated with the author's name. There is, indeed, no vestige of a disappointment of that anticipation as the last of the four hundred odd pages is turned over and the last of the six hundred diagrams is studied.

About six or seven years ago Mr. Harrison read a paper before the Institute of Electrical Engineers on "The Principles of Modern Printing Telegraphs." Small, comparatively, as was that contribution

from the very necessities of the case, even so Mr. Harrison's work was unanimously accepted as a classic upon the subject.

The volume before us very plainly indicates that the author himself by no means accepted that verdict as the final word, and had no desire to rest upon his laurels. With the true instinct of an earnest enthusiast and a lover of his craft he was evidently convinced that the world history of printing telegraphs was a subject far too wide and far too important to be satisfactorily dealt with at a single sitting even of the most distinguished scientific society. Telegraph engineers and administrators all over the world should be grateful to Mr. Harrison for the painstaking manner in which he has set forth the evolution of printing telegraphs as we see the science to-day. The history before us is not the mere recital of dates and names. The method adopted is chronological, certainly, but with this is combined a separate study of every principle, function, organ, or mechanical device which in any way has contributed to the conversion of electrical signals into the printed word.

He reminds us that the principle of the five-unit code was used by Bacon in his cryptograph, 1605, and that Whitehouse in 1853-4, and Burnett in 1860 also used it. It may be news to some that the latter also invented the cadence signal and the start-stop system. He pays a generous tri ute to the work of the French engineers, Baudot and Picard, for all the thought and ingenuity they have contributed to printing telegraph problems. Mr. Harrison even goes so far as to say t at—"Scarcely any designer to-day can avoid embodying some detail which did not originate with Baudot. Every printing telegraph inventor using sliding notched permutation bars or discs has adopted a device of Baudot's." Nevertheless the author appears to have passed over no name which has added its quota directly or indirectly to the science. Pollock and Booth of the British Post Office, Donald Murray, Creed and Gell as private inventors, La Cour and Rayleigh of an older school who gave us the phonic wheel synchronous motor, Ehrhardt who gave letter storage by means of condensers, Olsen who suggested the quadruplex working of Professor Hughes' well-known instrument by means of the division of line time, plus the use of the duplex balance, Banzati who applied the principle so that quadruplex Hughes was actually worked between Vienna and Budapest during the war, Siemens and Halske who have developed the idea of Rouvier (1858) in their Pendel system, and have so adapted its signal-storage functions that high and low capacity printing telegraph systems have been produced the units of which are interchangeable, and last but by no means least the American inventors who have contributed very successfully to the printing era of telegraph systems. In this connexion the engineers of the Western Electric come in for well-merited eulogy. Rotary repeaters, though attributable to Baudot, have reached a high state of development in the United States of America, and the W.E. engineers have utilised the idea to the full. To use Mr. Harrison's own words, they have added "a valuable contribution in the means they have given us for interlinking stop-start apparatus with one or more channels of a quadruple-duplex circuit. Such a scheme involves signal storage between the two systems while the cycles of operation of the stop-start system must be controlled by the quadruple distributor. . . . The start-stop printing telegraph is forging ahead in America."

The *resumé*, which heads each of the seven chapters into which the book is divided, proves very useful. Take Chapter II on Mechanisms, for example. Here one will find enumerated and explained every possible aid to reaching almost any specific item of mechanism associated with printing telegraphs with the smallest expenditure of time. Pawls, escapements, yielding drives, clutches, cams, cranks, gearing, governors, viscous fly-wheels, governors, &c., &c., each again sub divided into their various types and modifications.

Mr. Harrison does not often permit himself to be dogmatic but there are one or two *obiter dicta* which one cannot refrain from quoting. On Creed's inventions, he writes, "but for Creed refinements Wheatstone would long ago have become obsolete in this country," and pays the following well-earned tribute to Murray's insight who, he says, "was the first to clearly lay down the conditions to be fulfilled in providing automatic control for stop-start transmitters."

Regarding telegraph printers:—"Experience has proved that printers, to be successful, must be mechanical in their operation, the operations being effected by cams on shafts driven by motors. . . . It is the principle of the sewing machine and the experience of 50 years has proved that the nearer the printer approaches to sewing machine operation the better. In the ideal printer electro-magnets act as *triggers* controlling the power supplied by rotating cams. This principle finds its justification in the Hughes and Baudot printers each with over half a century's record for reliability and low cost of maintenance."

As a third example the volume closes with this paragraph:—

> "It is perhaps too bold a statement to say that printing telegraphs have reached finality, but we can, at least, say that the fundamentals are clearly established, and most of the possibilities have been explored."

Mr. Harrison, however, shows very clearly in which direction to look for future developments in the realms of telegraphy. The possibilities of increased outputs from submarine cables do not escape him, but he sees in the thermionic valve and the finer selectivities possible, thanks to the vast improvements in radio technique, visions of high-frequency multiplex methods now being rapidly exploited by organisations such as the American Telephone and Telegraph Company, "Telegraphy will have to learn lessons from telephony in filtration, series parallel resonance, &c."

Telegraph printing systems of one description or another will undoubtedly be called in to get the most out of high-frequency methods as also out of wireless telegraphy. To those radio engineers whose studies and experience have not yet carried them beyond the use of Morse with wireless apparatus and who have never yet explored the possibilities of printing telegraphy in connexion with the five-unit code this volume should prove not only a vocational necessity but an interesting and absorbing book.

To those also who read aright, these pages will gradually reveal the high possibilities of the Communication art, wonderful unfoldings of potentialities as yet only half understood, along the lines of delicate vibrations, refined tunings, the music of electrical movement, the harmonics of Mercadier's system more fully developed.

Restricted as to space it is impossible to do justice to a book of this type in a mere column or two. It needs to be read carefully from cover to cover for the thoroughness of the author's work to be fully appreciated, and thereafter it can be taken down from the bookshelf as a standard work of reference with the full confidence that the information therein will prove reliable and the manner of exposition clear and simple.

Mr. Harrison's apology for any typographical errors was scarcely necessary. They are very few and with the exception of a reference on page 319, to "Fig. 388" instead of to "Fig. 318" are sufficiently obvious to pass without comment and will no doubt be corrected in what it is hopefully anticipated will be, *future editions*.

J. J. T.

BROADCASTING LICENCES.

COMMITTEE TO BE SET UP.

SIR W. JOYNSON-HICKS in reply to a motion by Lieut.-Col. Moore-Brabazon in the House of Commons on April 19 raising the question of wireless broadcasting, said: The position is that there are two licences, and two licences only, which the Postmaster-General can issue. This is under an agreement made by my predecessor with the British Broadcasting Company providing that they should be licensed for broadcasting throughout the country. I am not at all certain that this does give the Broadcasting Company a monopoly of the licence. I am not sure it is not open to me to grant a licence to somebody else. I only mention that as a warning. Under the agreement which was made by my predecessor I can only grant broadcast receiving licences under the proviso that the holders of these licences must use a particular form of instrument marked "B.B.C." It is also open to me to grant experimenters' licences in regard to which there is no clogging provisions. Both are issued at 10*s.*, of which 5*s.* is given to the Broadcasting

Company to keep up the concerts. I am not sure the House fully realised what was being done and whether it was in accordance with public policy that the Government should collect a compulsory tax and give half of it to the Broadcasting Company. It was a result of numerous negotiations between the Broadcasting Company and the Postmaster-General. The agreement is binding upon myself, and it is perfectly clear I cannot issue any other licences at all to enable the home-constructor to construct his machine without the assent of the Broadcasting Company.

Negotiations have taken place between them and myself, and at first they offered to allow me to issue a licence to the home constructor without the clog that it should be of British Broadcasting manufacture if I would make the licence 20*s*., and give them 15*s*. of it. That I declined at once. I said I was perfectly willing to grant this licence at 10*s*., of which half would go to the Broadcasting Company provided only that the parts used by the holder of the licence should be made in this country.

The point in dispute between us is not a question of protection against foreign manufactures, but that the particular manufacturers who have formed the British Broadcasting Company claim the right to prevent any other manufacturer in Great Britain or elsewhere manufacturing broadcasting materials in this country. I have told them quite definitely that I cannot be a party to that. Under the agreement as it stands I am bound in regard to all broadcasting sets as a whole; they must be marked by the B.B.C. mark, and that agreement is final so far as I am concerned. There have already been 87,561 broadcast licences issued.

In addition, 35,385 experimental licences have been issued, and there are to-day waiting issue 33,000 applications. These have been held up since January by my predecessor and by myself, because of the legitimate opposition of the B.B.C. I have, therefore, taken the opinion of the law officers of the Crown on this matter, and they have advised me to-day that before I can issue an experimental licence I must be satisfied that the object of the licence-holder is to experiment in wireless telegraphy. But if I am satisfied—and I am in the opinion of the law officers to be the judge—I cannot only issue experimental licences, but I am bound to. I have no option in the matter. That being the case, I propose to send these 33,000 applications to some of the expert members of my staff to-morrow morning and require them to make a thorough investigation and advise me as to which are honestly intended to be experimental in wireless telegraphy. They will be submitted to me, and experimental licences will be issued. With regard to the other side of the question, I am exceedingly sorry that there should be this dispute between the Postmaster-General and the British Broadcasting Company, but I am prepared to make one further effort at peace, because there are in my view an enormous number of people—probably nearly half a million—who are prepared to take licences if they can get the licences they want. The British Broadcasting Company tell me there are 200,000 persons who are said to be working without licences because they cannot get the licences they want. I want to give them a licence at a charge of 10*s*., and to give 5*s*. of that to the British Broadcasting Company to enable them to improve their programmes. I therefore propose at once to set up the strongest committee I can get in order to investigate the whole position of broadcasting, not merely the question of licences, but the desirability of existing contract—a question that has arisen on the broadcasting concerts. I shall ask three or four members of this House, if I can get them, to serve, and two or three expert members of my staff, a member of the British Radio Society—a great scientific body which deals with wireless—and I think it would be only fair to ask the British Broadcasting Company themselves to suggest somebody to act on the Committee. I believe by that means we shall be able to solve one of the most difficult problems which has ever come before me, and to which, I assure the House, I have devoted days and almost nights in trying to find a solution, fair on the one side to the Broadcasting Company, and without inflicting a monopoly on the manufacturers of this country.

WEATHER FORECASTS FOR TELEPHONE SUBSCRIBERS.

THE Post Office has arranged to distribute each afternoon weather forecasts furnished by the Meteorological Department of the Air Ministry to telephone exchanges throughout Great Britain, and any telephone subscriber or person using a Call Office will thus be able to obtain the forecast of the weather conditions during the following day in his particular district, Great Britain being divided for the purpose into 40 districts. The arrangements will come into operation on May 1.

The facilities are primarily intended for the benefit of farmers and other residents in rural districts, but they will be available for all telephone subscribers. The information will be obtainable between 5 p.m. and midnight every day including Sundays.

The charge will be the same as for an ordinary local call in the case of subscribers at the normal tariff, and the ordinary Call Office fee in the case of Call Offices. Subscribers on rural party-lines will receive the information free of change.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE following statistics show the progress made in providing telephone service during the months of February and March.

The net growth in the number of telephone stations in February was 8,551, making the total number of telephones working at the end of the month 1,042,048, of which 374,264 were in London and 667,784 in the Provincial districts.

Residence rate connexions were increased during February by 2,158, bringing the total up to 152,555. Of this total 55,904 are connected with London exchanges and 96,651 with Provincial exchanges.

Four hundred and twenty public call offices in street kiosks are now in existence in the Provincial districts, 10 having been erected during February and 19 in March.

One hundred and eighty-five new rural party subscribers were added during February, and 202 during March, making the total number 5,916. 31 new rural exchanges were authorised in February and 43 in March. Of the 304 rural exchanges authorised since June last, 85 are now working, 25 having been opened in February and 25 in March.

Further progress has been made with the development of the local exchange system. Among the more important new exchanges recently opened are the following:—

Harwich.
Hull (Toll).
Luton.
Warrington and
Windsor.

The following important exchanges have been extended:—

London: Kensington.
Provinces: Higher Broughton.

The main underground system has been extended by the completion and bringing into use of new cables as follows:—

St. Albans—Luton.
Weybridge—Byfleet, and
Weybridge—Chertsey.

During the month of March 52 new overhead trunk circuits were completed and brought into use, and 81 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

The following additional Baudot circuits have been brought into use, displacing Morse working between the offices concerned:—

(1) London—Dundee, quadruple duplex.

(2) London—Ipswich—Yarmouth, quadruple duplex.

(3) Leeds—Cardiff—Swansea, quadruple duplex.

"Teletype" printing telegraph apparatus has been installed on the Edinburgh—Leith and Newcastle—Sunderland routes. Duplex conditions have been established and satisfactory results are being obtained. These additions increase the number of Post Office telegraph circuits equipped with this form of "start-stop" printing telegraphs to four, the two earlier installations being C.T.O.—Croydon and C.T.O.—Borough High Street B.O.

HOW THE TELEPHONE WORKS.

By A. CROTCH.

VIII.

SIEMENS' AUTOMATIC.

THIS system, like the A.T.M. Co.'s, is based on the Strowger principle; in the use of the spindle or shaft switch, capable of ten vertical and ten rotary movements. It differs, however, from the other company's arrangements in some very important particulars.

In p ace of the previous line switch with its 25 contacts (per row) the present system has two line switches, each with 10 contacts (per row): then one, two, or more selectors and the final connector. In more formal terms these are pre-selectors 1 and 2, intermediate (1, 2 or more) selectors and final selector. We shall keep to the more distinctive terms for simplicity's sake and shall confine ourselves to a single selector. We thus have line switch No. 1, line switch No. 2, selector and connector. The function of the first, on the subscriber lifting his receiver, is to hunt for a disengaged second line switch: the function of the latter to find a free selector and of the selector to find a free connector. The movements of the two line switches from step to step, and the rotary motion of the selector, are due to impulses sent from a central source at a pre-determined rate. When a busy contact is found, the driving magnet circuit is closed and the next impulse drives the wipers to the succeeding contact and so on. Further, the selectors and connectors are furnished with three banks, one, the private or local bank, and the other two for the A and B line banks. (The arrangement is not quite so simple as would appear, but this statement is sufficiently correct for our purpose.) The line connexions are thus the A and B wires and the local or C wire.

As already stated the first line switch has ten contacts as compared with the A.T.M. Co.'s 25. There are, however, actually eleven fitted, one serving as a zero. They form a third of a circle in their disposition and the wipers are three-armed so that in one revolution of the wiper shaft the contacts are run through three times. There are three of these sets serving for the Z, B and C wires, and a fourth, D, consisting of two segments only: one of a similar breadth to all the others and serving as the zero, and the second equivalent in length to the space occupied by the other ten. This will be apparent from the diagrams. One of these switches is permanently fixed and forms part of each subscriber's connexions at the exchange. The diagram is given in Fig. 27.

The second line switch is very similar to the first except that it has but three sets of contacts, A, B and C and no zero position.

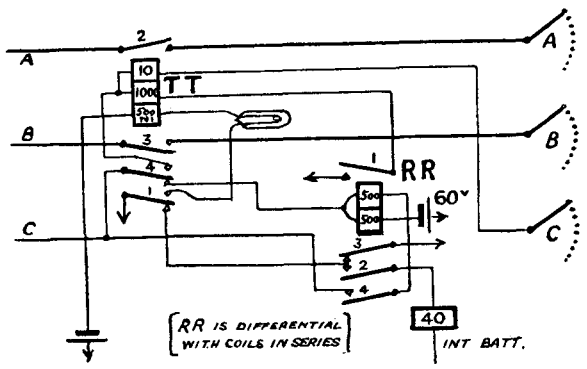


FIG. 27.—DIAGRAM OF 1ST LINE SWITCH.

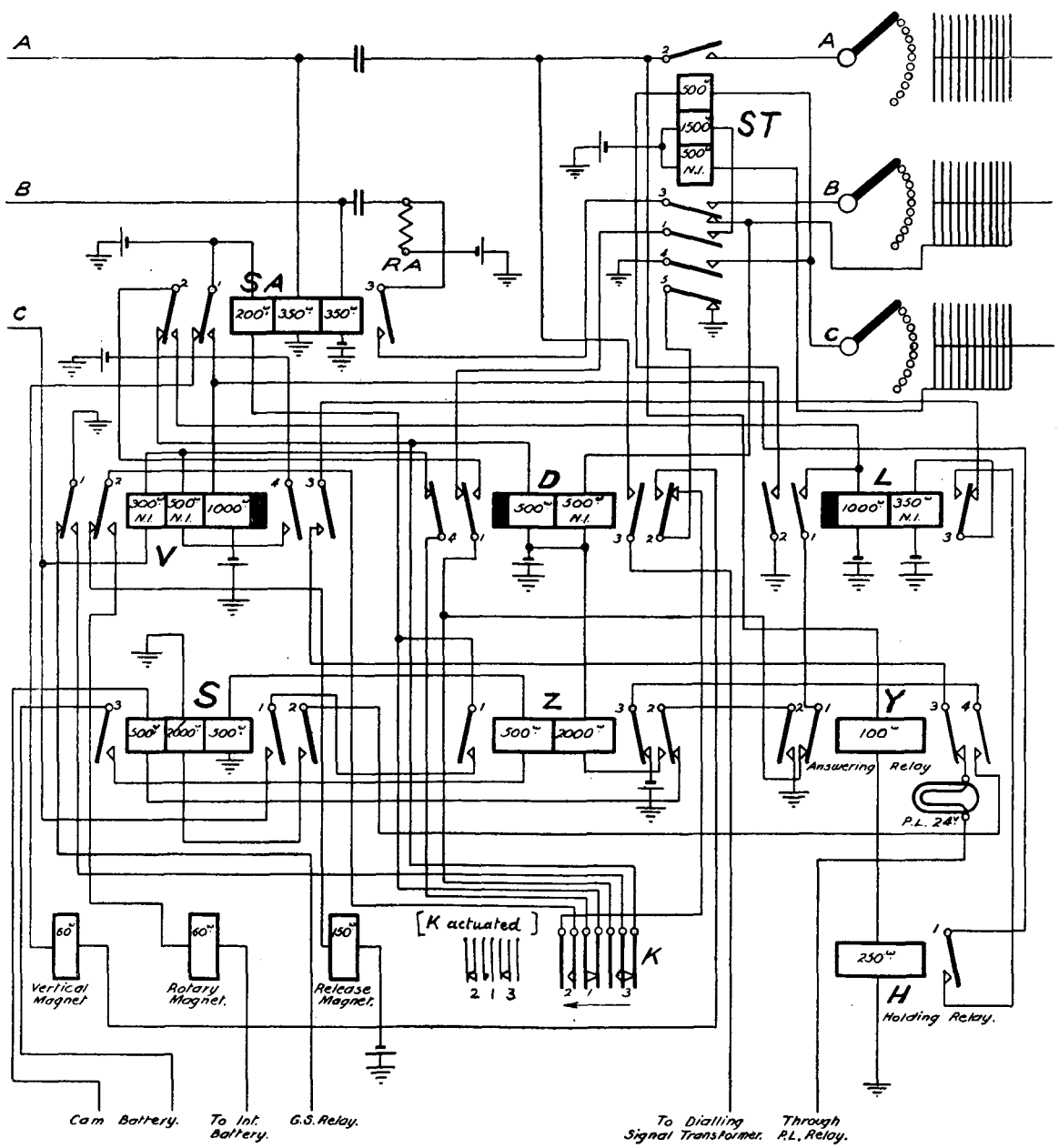


FIG. 29.—DIAGRAM OF SELECTOR.

These switches are not in a fixed position but are open, like the selectors and connectors, to be engaged by the first calling subscriber (Fig. 28).

The selector has the usual vertical, rotary and release magnets and eight relays, the whole connected as in Fig. 29. The main control of the circuit is situate in the (first) selector. All the impulses are sent from it, being repeated to the intermediate ones and to the connector. The feeding of the loop through all these to the wanted subscriber is done from here. The only work left for the connector to do is to ring up the wanted subscriber or to give the busy tone to the caller in case the required subscriber is busy.

We spoke of the usual ten horizontal rows of ten contacts each: there are actually eleven in each row on the selector. When the wipers have searched through the whole ten without finding a disengaged connector, they move on to the eleventh, and from there give the busy tone. It will be remembered that this was effected in the A.T.M. Co.'s system by means of a cam on the switch shaft.

In the diagrams, many relays have two and even three windings. Where these are marked N1 (non-inductive) it indicates that the winding is simply a resistance coil, having no effect whatever on the core. It is wound there simply for convenience and to save space.

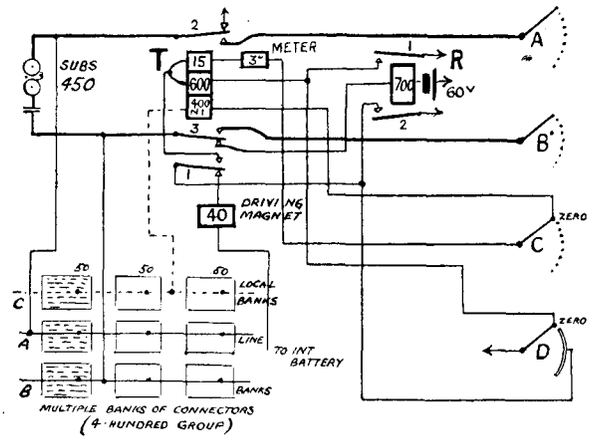


FIG. 28.—DIAGRAM OF 2ND LINE SWITCH.

The connector has seven relays in addition to the vertical, rotary and release magnets and these are connected as shown in Fig. 30. Obviously the rotary magnet in this case is not propelled by the impulses from the central source as in the case of the line switches and rotary magnet of the selector, but by the units impulses from the dial.

(To be continued.)

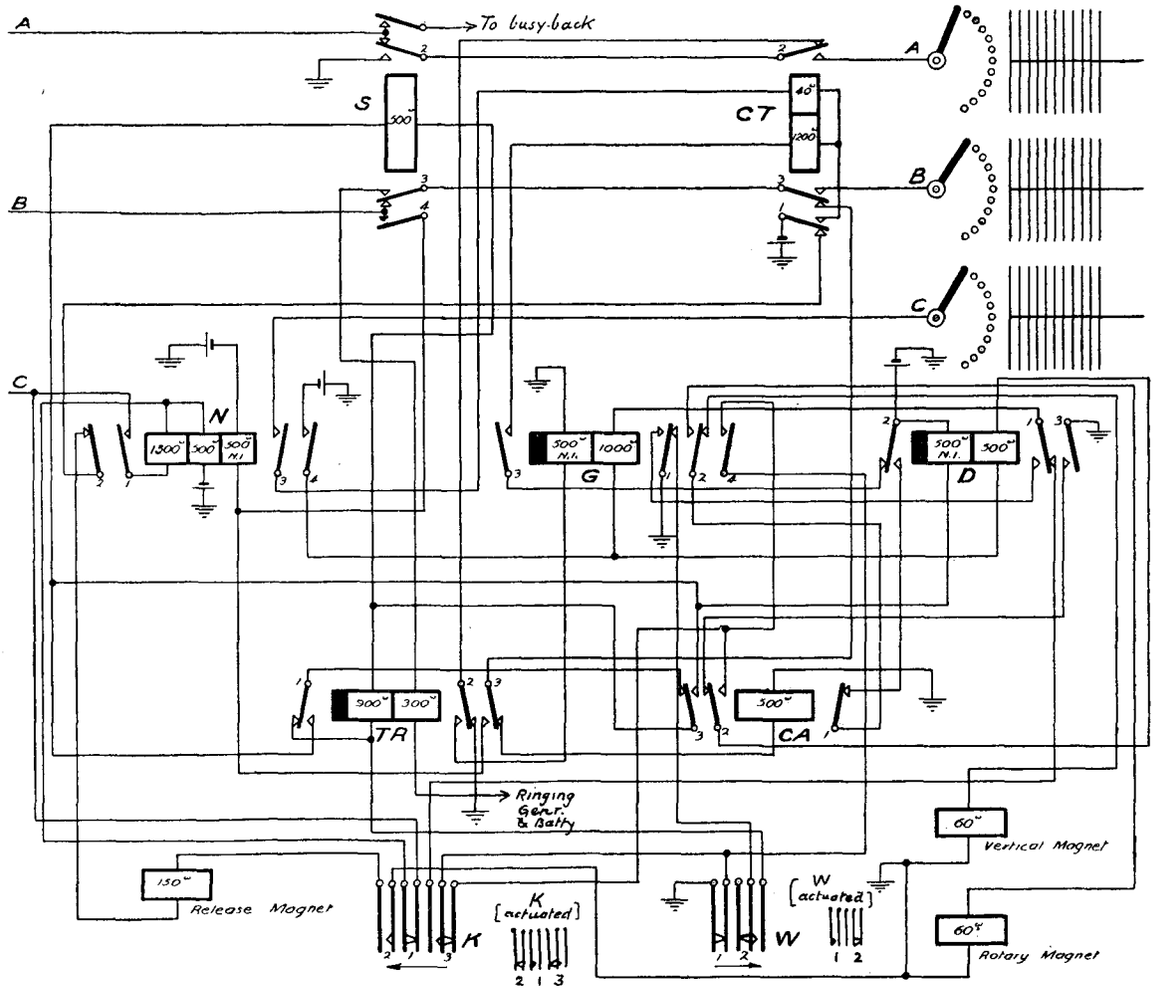


FIG. 30.—DIAGRAM OF CONNECTOR.

The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. MAY, 1923. No. 98.

USELESS CONVERSATION.

A PERENNIAL problem, one of the most delicate to be met with in telephone practice, has lately received fresh attention from the Press owing to the ban which the New England Telephone Company is said to have put on "useless conversations" lasting more than five minutes. What after all is a useless conversation? Are "business" conversations invariably important, and are all social conversations necessarily frivolous? There is little doubt as to the answer, and the controversy is as old as the spread of the telephone habit from commercial to private circles. The Company alleges that women are the chief offenders in the matter of protracted conversations, and the *Westminster Gazette* has collected some interesting views from literary and official Englishwomen on the subject. The *Manchester Guardian*, however, queries whether business men after talking business for a couple of minutes may not hold the line interminably while they brag of their golfing achievements. "Male conversation," it says truly, "may seem even more useless and devastating to a woman than female conversation to a man."

We are not, however, concerned to hold the balance nicely between man's and woman's sin. We believe that the root of the whole trouble will be found in a more widespread and serious vice than the love of talking—namely, in that form of egotism which shows itself in a bland disregard for the rights and needs of others, and in a reckless indifference to the consequences of satisfying one's own all important wants and whims. The egotist is to be found everywhere leavening the whole social system with his unsocial ideas. He is the fruitful cause of all the repressive rules, regulations, restrictions, prohibitions and deprivations and most of the high costs from which we suffer. His abuse of privileges causes their withdrawal, his over-indulgence necessitates the limitation of many freedoms, his greed in using that which is gratis involves the imposition of a charge, or his insistence on having more than his share of a common good involves the raising of its price to others He will cancel arrangements and contracts to suit his own convenience until the contractor is forced to demand a deposit from other clients or, when it is to his advantage, learns in his turn to break faith with the trustworthy part of the public.

Such a person will keep possession of a telephone cabinet regardless of a queue outside whose affairs may be more urgent than his, and will not come forth until he or she has exchanged the uttermost word of trivial banter. Each for himself and the devil take the hindmost. Or he will bid a servant ring up a client and keep him waiting on the line until he conceives that he has the leisure to speak. Meantime two telephones and often a junction line are unprofitably engaged, and when the line at last is profitably engaged, its use is profitable only to our friend. His loquacity wastes the other man's time and deprives the general body of subscribers of the use of a line. But the egotist is incapable of realising this and he would regard any attempt to disconnect him before he had finished his conversation as arbitrary and unjust. He cannot conceive of the Administration as enforcing a rule for the general good and not specifically for his own.

Theoretically, a local conversation is limited in this country to six minutes, but the rule is only applied under pressure of circumstances. It is obviously not so much the uselessness of a telephone conversation that matters as its inordinate length. If a man (or woman) pays for a call, he is entitled to speak on what subject he pleases. The Administration cannot possibly determine the relative importance of a business or social call, but they can and ought to determine what is a reasonable length of time for a person to occupy the line for a single payment. What is wanted is a change of heart in the unreasonable minority rather than a change of practice. If this could be achieved no arbitrary rule would ever need to be enforced.

HIC ET UBIQUE.

THE following reductions in the telephone rates will take effect on July 1 :—

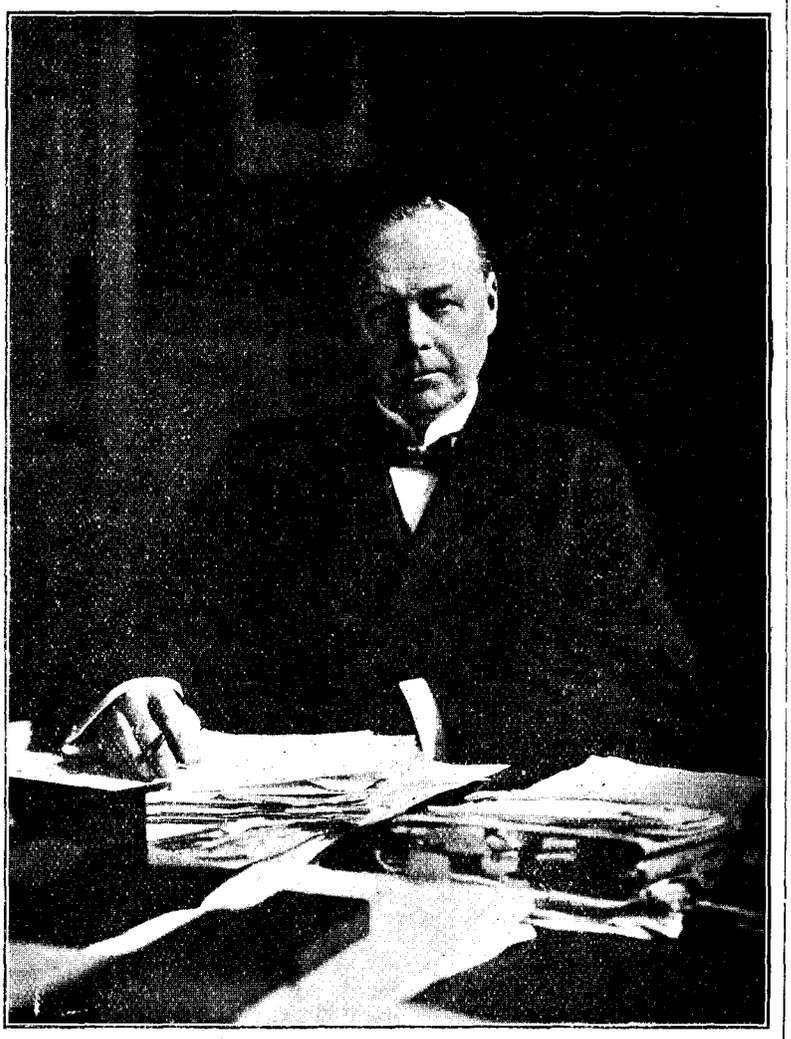
The installation rental will be reduced by 10*s.* per annum except in the case of exchanges with less than 15 subscribers to which the special £8 rate applies. Rural party (farmers') lines will be £4 in all cases.

Extension instruments with inter-communication facilities will cost 36*s.* instead of 45*s.*, and without inter-communication 24*s.* instead of 30*s.*

The minimum call office fee will be 2*d.* instead of 3*d.*

Certain reductions will also be made in short-distance trunk calls for distances between 7½ and 20 miles.

At present the free radius from the exchange covered by the annual installation rental, and beyond which extra mileage at the rate of £8 per mile per annum is chargeable, is 1 mile in the



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THE RIGHT HON. SIR WM. JOYNSON-HICKS, BART., M.P.
H.M. POSTMASTER-GENERAL.

Provinces. As from July 1 the free radius will be increased to 1½ miles. This will relieve subscribers situated between 1 mile and 1½ miles from the exchange of the whole of the present "extra mileage" charges and subscribers situated more than 1½ miles from the exchange of ½ mile extra mileage charge, or £4 per annum.

THE American Telephone & Telegraph Company's report for 1922 shows an enormous increase in telephone stations on that company's system for the past year; 600,658 stations were added, making a total of 9,514,813, or including the stations of other systems connected with the Bell Company 14,050,565. The average daily number of ordinary telephone calls during the year was 38,354,000.

THE Public Service Commission has issued an order fixing the rates to be charged in New York City as from March 1. The Company intend to give them a trial to determine whether they will produce the requisite revenue, and, if they do not, go to the courts for suitable revision. They are complex in the extreme. The City is divided into twelve zones in which there are business and residential rates, individual and party line message rates, and in some suburban districts even residence flat rates. The most important zones are Nos. I and II, comprising Manhattan and The Bronx. In these the business rate is 4 dollars a month including 75 calls; the residence rate is 3.50 dollars including 66 calls. Additional calls cost 5 cents each for the first 125 per month, 4½ cents for the next 100, 4 cents. for the next 100, 3½ cents. for the next 100, and 3 cents. each for all others.

The following table will give a clearer idea of the effect of these rates per annum and a comparison with the new British rates:

BUSINESS HOUSES.

Calls per annum.	*New York.* £ *s.* *d.*	*London.* £ *s.* *d.*
250	9 18 0	9 6 0
500	9 18 0	10 12 1
900	9 18 0	12 13 9
2,400	25 7 0	20 7 11
6,000	55 1 4	38 4 2

RESIDENCES.

250	8 13 3	7 16 0
500	8 13 3	9 2 1
792	8 13 3	10 12 6
2,400	25 4 11	18 17 11
6,000	54 18 11	36 14 2

A LETTER from a subscriber in the G.P.O., Jerusalem, writes:

"It may interest you to know that the JOURNAL, which I pass on, is already eagerly looked forward to by the supervisors and operating staff (a cosmopolitan collection, including Russians, Bulgarians, Greeks, Persians, and Spaniards of varied religions and creeds)."

The steady growth of our circulation abroad, both within and without the Empire, is one of the most satisfactory features of our brief history.

THE Annual Balance Sheet of the Guernsey States Telephone Dept. shows a nett profit for the year 1922 of £418 19*s.* 11*d.* The number of telephones line increased from 2,857 to 3,060. The number of calls increased by 95,769.

THE GREAT SLUMP IN PRICES: ITS CAUSES, ITS COURSE AND ITS LIMITS.

BY G. F. MANSBRIDGE, M.I.E.E., M.S.Ing.Civils de F.

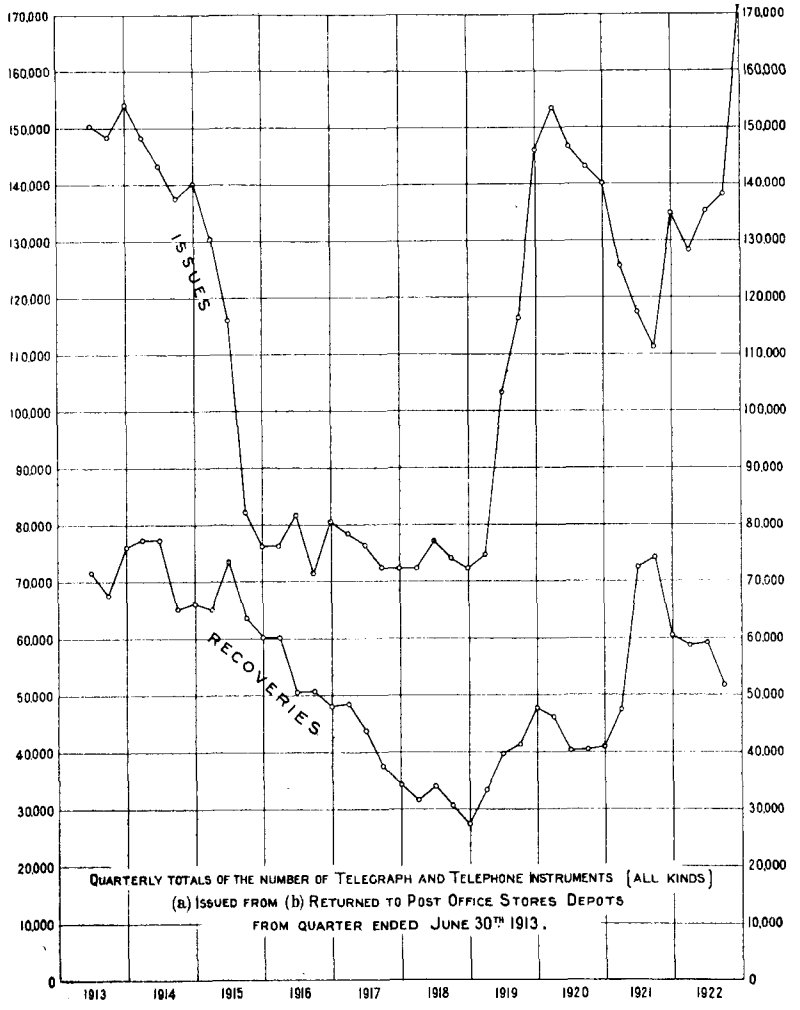
(*Continued from page* 125.)

EFFECT OF SLUMP ON POST OFFICE APPARATUS COSTS.

So far as the business of manufacturing telegraph and telephone apparatus was concerned, the effect of the slump was at first toned down by the fact that much work was in arrear owing to the war. But the upward revision of telephone charges on and from April 1, 1921 (which involved the disappearance of the "unlimited-user" rates), superimposed on the slackness of trade, resulted in a general overhaul of the telephone facilities in business offices; no doubt a substantial reduction in the number of Edwin-Angelina conversations occurred when one or the other had to pay for the privilege. The effect is plainly reflected in Graph No. 4 showing the issues and receipt of apparatus at the Stores Department depots.

The reduction in the rate of demand, coupled with the increased stocks rendered available by the large recoveries—most of which needed comparatively little repair in the Post Office factories to make them equal to new—soon made itself felt in the outside telephone factories with consequent and cumulative reductions in the prices quoted as competition became more and more keen to secure the small amount of new business, our commitments

being naturally restricted pending the attainment of the lower price-level then becoming visible on the economic horizon.



GRAPH IV.

Mr. Allen showed the percentage increases in price in many important Post Office stores up to the beginning of 1920. I append his table brought up to date.

TABLE V.

Item.	Average price January 1914, taken as basis.	Average price January 1920.	Price at Jan. 1, 1923.
Copper, electrolytic ...	100	185	107
Lead, English	100	240	140
Spelter	100	270	181
Tin	100	220	106
Iron (Cleveland) ...	100	345	180
„ (Scotch Pig) ...	100	370	180
Poles, Creosoted ...	100	310	160
Insulators (Porcelain) ...	100	280	125
Spindles G.I.	100	300	125
Copper Line Wire ...	100	175	109
G.I. Stay Wire ...	100	260	150
Stoneware Ducts ...	100	290	130
Joint Boxes, C.I. ...	100	275	160
Bricks	100	350	220
Lead Covered P.C. cables—			
Main	100	210	140
Distribution ...	100	200	135
Telephones No. 2 ...	100	225	120
Bell Receivers	100	250	130
Bell Sets...	100	260	140
Protector H.C. & F. 2/2	100	210	140
Branch Exchange Switchboards	100	200	187
Cords (Telephone) ...	100	350	123
Plugs „	100	210	133
Arithmetical Average ...	100	260	144

Manufacturers say that some of these reduced prices are merely temporary: to keep plant going, that remains to be seen: at any rate a large part of the inflation has disappeared, though we have still a long way to go before we reach the economic level in certain branches of trade.

WAGE BASES AND THE RE-ADJUSTMENT OF PRICE LEVELS.

In the comparatively stable pre-war times the rates of wages as between (*a*) one trade and another, (*b*) one degree of skill and another in the same trade, and (*c*) one set of nationals and another, were determined primarily by the interaction of ordinary economic laws. If one trade secured rates of wages which raised the level of remuneration in that trade above the level of equilibrium for the industries of the country as a whole, labour tended, sooner or later, to flow into that trade at a rate above the normal, thereby producing a superfluity of labour in that trade, and consequently, a reduction of wages and a return to equilibrium. The actual period of adjustment might be a matter of years, being dependent largely on the fluidity of labour. Various causes, however, *e.g.*, the shortage of houses, have reduced this fluidity, so that the movement of labour towards the point of highest reward has been restricted. This equilibrium-producing element being absent, it became possible for certain trades to arrange rates of wages, &c., not in accordance with, *i.e.*, above, the general level.

In certain industries, particularly the coal and iron trades, the rates of wages are based on a sliding scale so that they fluctuate in accordance with the selling price of the product; this *prima facie* is an equitable arrangement; it has several merits, by reason of its simplicity it is "understanded of the people," and it carries an indication of mutual interest—an asset of great psychological value—and its natural corollary would be the attraction of larger supplies of labour to the trade, and the production of a greater output, at precisely those times when the market price of the product was high. Unfortunately, experience shows that, in ordinary conditions and in trades of this kind, an increased rate of remuneration for a definite amount of work is too often accompanied by reduced effort, in other words, that as the rate paid per unit of output increases, the output per man per week decreases, and *vice versa*. 1919 afforded many examples.

In certain other industries the rate of pay is adjusted by a somewhat similar sliding scale, the basis in this instance being related, actually or nominally, to the cost of living. This also, at first blush, seems a reasonable and equitable arrangement. As between one set of employers and employed it may be equitable, but it has a fundamental fault, particularly when applied to manufacturing industries, in that it fails to take account of the economic aspect. In a Free Trade country it is almost as essential for the home trade, as it is certainly imperative for the export trade, that wages be related to the world-price of the goods manufactured rather than to the cost-of-living in the producing country.

From the point of view that the cost of foodstuffs is the ultimate basis of the cost of practically all commodities, it is true that there is a relation between the cost of living and the cost of commodities, but the relation is too roundabout, and the time-lag between the two bases is too great to warrant the cost of living being regarded as a satisfactory basis for regulating the wage-level in industries which have to meet world competition in foreign markets (and, in lesser degree, in home markets) for such industries, ability-to-pay is apt to force itself in front of ability-to-live; no wage basis can hold good if it makes the product too expensive to be sold, efficient production being assumed.

In the case of public utilities or the like, where export trade or foreign competition is not a factor, the cost-of-living may be the simplest basis to take and the one which functions with the least friction, but that does not make it a sound economic basis. By taking it, one arrives at the position that the wage level of one large group of workers may, not infrequently, be out of equilibrium with that of other large groups in the same country, because one wage-level is based on the market price of foodstuffs, &c., and the other on the market price of commodities, and the fluctuations in the price of these two fundamentals are by no means concurrent, vide graph No. 2. Owing to this difference in the wage basis and to the fact that the price level for commodities rises above that for food when trade is good and falls below it when trade is bad, the wage-level in Industries will tend to rise above that in Utilities when trade is flourishing, and to fall below it when trade is slack.

This fact is one of the most vital in the problem of re-adjusting wage-levels and prices to the altered conditions which the world has to face. Clearly a satisfactory settlement cannot be effected unless even-handed justice is done to all sections of the community.

If one member of a structure is too strong in relation to the other members, the structure as a whole can be strengthened by weakening the disproportionate member; if one were to strengthen the middle section of a correctly proportioned fishing rod, the rod as a whole would be weaker for the strengthening of its part, because an undue strain would have to be carried by the sections not strengthened. Similarly with our economic fabric; each member of the community must bear his appropriate share of strain if maximum efficiency and minimum friction are to be attained. The inference is obvious, but the full recognition of the fact that the nation and the world have a community of interest, sometimes needs to be hammered home by painful and wasteful processes. If each member of the community before looking to others to make a sacrifice for the common good would ask himself whether he is willing to bear his share we should be appreciably nearer a settlement of the vital question of the equitable readjustment of price levels to post-war conditions.

TABLE VI.

"NOMINAL" AND "REAL" WAGES (WITH INDEX NUMBERS) IN VARIOUS INDUSTRIES IN THE UNITED KINGDOM 1914, 1919, 1920, 1921, and 1922.

Industries.	Amount.					Index Numbers "Nominal."					Index Numbers "Real."				
	1914.	1919.	1920.	1921.	Dec. 31, 1922.	1914.	1919.	1920.	1921.	Dec. 31, 1922.	1914.	1919.	1920.	1921.	Dec. 13, 1922.
	s. d.	s. d.	s. d.	s. d.	s. d.										
COAL MINING (average weekly earnings), all Districts	36 2	68 9*a*	86 11*e*	73 3*g*	50 8*f*	100	190	240	202	140	100	86	95	96	78
ENGINEERING & SHIPBUILDING (per week)— Fitters, Turners, & Rivetters (averaged) ...	38 4	75 10*b*	81 5*c*	71 3	51 3	100	198	213	186	134	100	97	93	97	75
BUILDING (per week)— Bricklayers, Carpenters & Painters (averaged)	38 11	82 10*c*	100 2	87 4	71 4	100	213	258	225	183	100	84	97	117	103
LABOURERS—															
Building	26 11	70 3*c*	87 3	68 4	53 6	100	261	324	254	199	100	119	124	128	112
Engineering	22 10	58 3*b*	63 11*c*	55 10	40 5	100	255	280	245	177	100	121	122	128	99
Shipbuilding	22 10	58 0*b*	63 7*c*	55 8	30 1	100	254	278	244	131	100	121	121	127	74
RAILWAYS (per week)—															
Platelayers (London)	24 0	—	74 0	62 0	54 0	100	—	308	258	225	100	—	116	134	127
" (Industrial Districts)	20 0	—	71 6	59 6	51 6	100	—	357	297	258	100	—	135	155	145
" (Rural Districts)	18 0	—	71 6	59 6	49 0	100	—	397	331	272	100	—	150	172	153
Drivers	30 0	—	88 0	76 0	81 0*	100	—	293	253	270*	100	—	111	132	152*
Firemen	18 0	—	70 0	58 0	64 6*	100	—	389	322	358*	100	—	147	168	201*
Passenger Guards	21 0	—	72 0	60 0	58 6*	100	—	343	286	279*	100	—	129	149	157*
CIVIL SERVICE—Clerks with pre-war salary of—															
15*s.* per week	15 0	—	38 3	—	27 9	100	—	255	—	186	100	—	96	—	105
60*s.* " "	60 0	—	132 1	—	99 7	100	—	220	—	166	100	—	83	—	93
£226 per annum	£226	—	£459 3*s.*	—	£354	100	—	203	—	157	100	—	77	—	88
£500 " "	£500	—	£880	—	£709	100	—	176	—	142	100	—	66	—	80
£1,000 " "	£1,000	—	£1,649	—	£1,248	100	—	165	—	125	100	—	61	—	70
	s. d.	s. d.	s. d.	s. d.	s. d.										
AGRICULTURE (per week)	16 10	36 6*d*	46 0*f*	36 0	28 6	100	217	273	—	170	100	104	102	111	96
Cost of Living Index Numbers											100	225 Dec.	265 Jan. 1, '21	192 Jan. 1, '22	178 Jan. 1, '23

a. November 1918. *c.* February. *e.* June *g.* September.
b. April. *d.* May. *f.* August. *Mean of minimum and maximum rates.

For particulars of souces and for exact dates, &c., see pages 29 to 32 "Wage Changes in various countries 1914-1921," International Labour Office.
Figures for 1922 from Board of Trade Statistics.

PAYMENT BY RELATIVE RESULTS.

There is pretty general agreement that Payment by Results is sound procedure; but the formula needs to be expanded; it should read Payment by Relative Results. There can be no doubt that having regard to relative skill the wage-level of certain sections of the community to-day is not in proper relation to that of other sections; this is due partly to the differing bases for the wage-levels and partly to the differing states of trade in the respective industries. Such anomalies are clearly objectionable and when they exceed reasonable limits they give rise to discontent and thereby tend to reduce overall efficiency.

Good work is being done by the League of Nations in the endeavour to obtain proper Relativity of Wages between Sections of a nation, and also between Nation and Nation. Under date July 1922 the League has published a comprehensive Survey of the Changes in the Rates of Wages since 1914 in Europe and America; the following data relating to the U.K. condensed from that publication will probably be of interest. (*Vide* Table VI.)

PRICE LEVELS AND THE STANDARD OF LIVING IN THEIR RELATION TO INDIVIDUAL EFFICIENCY.

Assuming proper relativity to have been attained between sections and between nations can the world afford to maintain the present standard of living?

The sustained rise in the price level of commodities, from 1895 to 1914 was concurrent with the improved standard of living which has been a feature of the social progress of the last few decades. For these two features to co-exist permanently it is essential that they be accompanied by increased efficiency of production, *i.e.*, by greater output per man-hour, or as it may be better described, by *cheaper* output. The world demands, and rightly, that if it be possible, the higher standard of living already attained for most of the community shall be maintained and made universal. But this higher standard of living does not drop from the skies, it has to be paid for somehow; it can be paid for without additional burdens to anyone if, *and only if*, it is concurrent with a higher standard of producing. This need not necessarily involve longer hours of work, at any rate in most industries in this country; a higher standard of efficiency—a cheapening of production—would effect the desired result. Such higher standard of production is, I believe, well within the world's capacity. But even so, the higher standard of living must be available for the community as a whole, not for particular classes only, and it cannot be attained merely by increasing wages. If increased wages were given to certain classes only, the burden of paying for them would be borne by the rest of the community, and if given proportionately to every member of the community, the effect would obviously be to increase correspondingly the cost of all commodities, and therefore, to neutralise the increase in wages. On the other hand, the man who makes one telegraph or telephone line carry two, four or six communications simultaneously instead of only one, who gives us one candle-power for ½ watt instead of for 3½ watts, or one horse-power-hour for 1½ lbs. of coal instead of for 3½ lbs., that man takes a practical step towards raising the standard of living for the whole community without increasing the burden borne by any member, assuming always that the cost of the improvement is not out of proportion to the results obtained.

May I take the case of Henry Ford? in the sense in which I am speaking he has been a benefactor to the human race. He early recognised the crying need for quicker and cheaper inter-communication—especially in America with its widespread population and relatively scanty railroad lines—and at his factory he concentrated on three essentials, first, a very large output of a simple and reliable vehicle standardised for cheap production; secondly, improved organisation to give yet greater output at a still lower overall cost; thirdly, close and continuous scrutiny of every detail of production so as to obtain the desired result with the maximum of economy, and, consequently, a further cheapening of the product without any sacrifice of efficiency; following all the time the sound economic principle that, in his customers' interests as well as his own, it was better to sell a million "Fords" at a profit of ten dollars each than a hundred thousand at fifty dollars. In the result, Fords are sold so cheaply, that they, in their turn help considerably to cheapen transport, and therefore to reduce the cost of many other articles; and yet Ford has always paid very high wages, *e.g.*, not less than £1 a day (pre-war) to his labourers, and corresponding rates to other workmen, of whom he now employs some 100,000. The sale price of a Ford in the U.S. to-day is between £60 and £70, and more than half the total U.S. output consists of Fords.

The world to-day needs Henry Fords—preferably minus eccentricities—in all spheres of industry, men who will show how without increase of effort we can obtain greater output per man-hour and therefore cheaper commodities. This country has its share of such men but there is room for more.

Consider also the romance of the production of artificial silk. This twentieth century industry is now soundly established and many millions sterling have been invested in it, but only the fringe of its possibilities has been touched up to the present.

The development of the rustless steel and iron industry affords another illustration, while the commercial and domestic use of aluminium and its alloys is already commonplace; and yet each of these three things represents a real step towards the much-sought-after higher standard of living, giving us as they do better service without additional cost, or equal service at lower ultimate cost.

We as a community enjoy to-day longer life than in the past. We live in conditions of improved hygiene and more rapid and more efficient transport. Our houses, our streets, our factories are better lighted and better found generally; the general average of education is much higher; all this should tend towards increased output per man-hour and consequent cheapening of products. Whether the increased output fully offsets the reduced number of hours' work and the higher wages per hour, depends upon the extent of the increase in general efficiency. I believe that there is scope for a great increase of output without additional effort if the Masters and the Men of to-day and of to-morrow take advantage of the opportunities which they have, and which their forefathers did not have in such ample measure, of economy of effort and of material by increased technical knowledge of their work. Good work has been turned out in the past, but the basis of that good work has too often been rule-of-thumb, the wasteful and costly method of trial-and-error. Much effort and much material may be saved and a better product obtained if the work to be done be planned with knowledge and carried out with understanding.

In the Post Office—and especially on the Telegraph and Telephone side—official encouragement has been given for nearly fifty years past to technical study by the staff, who have amply returned the cost to the Post Office: "some an hundredfold, some sixtyfold, some thirtyfold." In our Factories and Depots every lad entering since 1915, has been drafted into technical and general classes for eight hours a week, and the resultant increase in technical efficiency helps to account for the fact that to-day our factory staff are giving a greater output per man-hour—greater output, not merely greater earnings—than in 1914. The better understanding, and the closer and more cordial relations between "Official" and "Staff" Sides also play a vital part in the increased efficiency represented by greater output per man-hour.

Judicious expenditure on Research is yet another paying proposition and those who have seen the Post Office Research Station at Dollis Hill, controlled by the Engineer-in-Chief, will be aware that the Post Office is alive to the immense potentialities of research for the attainment of increased efficiency in our art.

In the manufacturing industries one of the beneficent results of the war-period was the increased recognition by business men of the imperative need for knowing beyond a peradventure the cost separately of each of the various articles manufactured. Many old-established, successful, dividend-paying businesses were run on rule-of-thumb costings of a hopelessly inadequate character.

In illustration I quote the very frank remarks of the chairman of a large and influential company well-known in electrical circles all over the world, when addressing, in December last, a meeting of the shareholders; he said, "On the all-important question of costing, prior to the war, costing at . . . . . was primitive and inefficient, and lacked the connecting links with the yearly balance sheet which would enable the Sales Manager to carry on his side of the business profitably, the technical section to produce the goods profitably, and the buyer to know in what direction to study his markets."

In every section of our national life a higher standard of efficiency, *i.e.*, a greater return, or greater yield, for the same cost, is therefore necessary if as a whole we are to enjoy a higher standard of living.

COMMODITY PRICES RELATED TO PRODUCTION EFFICIENCY.

The year 1922 witnessed many substantial reductions in price, but they were largely the result of the abnormal trade depression and were therefore in part artificial and not necessarily permanent. For a real and lasting reduction in Commodity prices, we have to look not only to the higher standard of individual efficiency of which I have spoken, but to a fundamental cheapening of the cost of production by the use of methods, processes or plant which yield a greater return than has heretofore been obtained for the same total cost. In the past the replacement of hand labour by machinery produced this result, and the question arises whether we have reached, or even approached, the limit of progress in this direction. In some respects, and in the more highly developed and organised countries perhaps we have, but there remain vast areas, *e.g.*, China, India, South America, Russia, Africa—where the process in only beginning, and even in Europe and North America much opportunity remains for development in the larger sense.

The "Age of Machinery," which did so much—ultimately—to improve the standard of living for the community, began in the supersession of human labour by simple machinery carrying out practically the same operations as those previously performed by hand. Modern machinery and modern methods tend more and more to a higher degree of automaticity, but apart from this, I believe that we are at the threshold of an age in which we shall be enabled to realise economies of far-reaching extent and importance by the aid of machinery or plant functioning on lines fundamentally different from those governing the old machinery.

We are still a long way from solving the problem of releasing and utilising the inconceivably huge potentialities locked up in atomic energy—nevertheless year by year we are in increasing measure bringing under control, and subordinating to our use, the inherent properties of matter which for so long lay latent or unrevealed, but which pure science discloses and applied science places at our disposal. Tennyson's words are apposite:—

"The fair new forms that float about the threshold of an age
Like truths of Science waiting to be caught."

In our own industry the thermionic valve—to give only one illustration—is effecting an economic revolution, and similar progress is taking place in other industries. The farmer—sometimes reputed the most conservative of men—has often sought the aid of the chemist, the bacteriologist and the entomologist; he now turns to the physicist and the engineer, for the electric fixation of atmospheric nitrogen has become an industry of vital importance (quite apart from its military aspect) in the manufacture of fertilizers. Its effect in increased production of food-stuffs has scarcely been felt so far, but it bids fair to be profound. By its aid France reckons to be self-supporting in regard to grain by 1925.

The annual world production of wheat is about one hundred million tons, worth at present world-prices nearly a thousand millions sterling. In the United Kingdom and in other European countries where artificial fertilisers are largely employed, the yield of wheat per acre exceeds 30 bushels, whereas in the vast wheat lands of Russia, Canada, U.S.A., India and the Argentine, the yield per acre averages less than half as much; cheap fertilisers would greatly increase the yield per acre and therefore reduce the overall cost per bushel. Canada in 1922 had a bumper crop of wheat but many of her farmers were very hard hit because the cost of production was practically equal to the return obtained from the product. Canada has the ample supplies of water-power necessary for the cheap production of fertilisers and large developments may be expected in this direction

I have taken as an example the cereal in which we are most interested, but the same argument applies in greater or lesser degree to most of the others, as well as to cotton, flax, and textiles in general, and if these be cheapened they in turn will react on wool.

A substantial reduction in the world price of food would of course go a long way towards cheapening commodities in general.

The employment of electrostatic electricity in stimulating the growth of crops is also making some headway, and our increasing knowledge of helpfu and harmful bacterial action in respect of fertility indicates other lines of development which may substantially help in reducing the cost of foodstuffs. In lesser degree the artificial manufacture of "farmyard" manure (*i.e.*, manure containing humus as distinct from chemical fertilisers) from the by-product, straw, is now becoming economically practicable and should help to make good the shortage brought about by the replacement of horse-drawn transport by motors.

The enormous sums spent on physico-chemical research in connexion with the more efficient recovery of metals from ore have already yielded handsome returns, particularly of late years, in the treatment of the complex lead, zinc, silver ores, the refuse dumps, or tailings, of one generation having become the ore reserves of the next, a procedure by no means confined to the inanimate world. But each success of science leads on to others and there are indications that within the next decade processes based largely on the cryptic properties of colloidal matter will make it possible to treat, at a profit, the ores of base metal (and perhaps of gold) which at present are of too low a grade to pay for treatment. This should bring down the cost of the non-ferrous metal which enter so largely into commerce and our daily life. As regards the precious metals, the recovery of gold had been brought to such a fine art before the war that a profit could be made on ore containing only a quarter of an ounce of gold to the ton—one part of gold in 100,000 parts of ore—notwithstanding that the ore had to be raised from nearly a mile below the surface. But the present methods of extraction, efficient though they be, still leave behind a little residue of gold, say 1 part in 1,000,000, and if by colloidal or other treatment the percentage of extraction be increased, or the cost on the present basis decreased, a large tonnage of ore would thereby pass over from the unpayable to the payable category.

As to silver, 80 per cent. of the world's output is obtained from the base metal ores concurrently with the recovery of those metals, so that silver will share in the developments affecting the base metals.

The importance of cheap silver in its relation to our large purchases from the East is obvious, and the economic competition between "the White Man with the Yellow Money and the Yellow Man with the White Money" will have its influence in stimulating world efficiency and thereby reducing price levels. But so long as silver remains the basis of the currency of the East, its cheapness cuts both ways, for while we with our yellow money are thereby enabled to purchase at a low cost the natural products of the East, and of China with its myriad population in particular, cheap silver hits those myriads by reducing their purchasing power for our products. The white races are not the only ones to seek, and in part to obtain, a higher standard of living; China does the same, and in regard to world economics, China will, I think, be a factor to be reckoned with more and more as stability returns to the Republic.

As to iron, that great fundamental, of which the world-supply per unit of population has so greatly decreased since 1914, it would seem that so far as this country is concerned, little further reduction in cost can be anticipated pending some relief in the charges for transport and for local rates, the pit price of coal being nearly at rock bottom.

Arising from the almost prohibitive cost to which coal soared a few years ago, the continental nations in particular, and this country in lesser degree, have attacked with renewed energy the problem of the better utilisation of the forces of nature.

A small part of the enormous amount of energy running to waste in the form of water-power in France, Italy, Switzerland and Scandinavia has already

been brought into use, and extensions are being carried out or planned all over the world: that at Risdon, Tasmania, has quite recently begun to give results of first class importance in the production on a large scale of electrolytic zinc of a higher degree of purity, with less labour and at a lower cost than by the older processes; incidentally this plant produces as a by-product, metallic cadmium which promises to be of much use for alloying with copper for telephone line wire.

Some of the projected water power extensions are on the lines of an ordinary hydro-electric power station, others, as in the case of the Severn Barrage scheme or of the projected Grand Canal between Bale and Strasbourg, as a hydro-electric system working as the complement of, and dependent economically upon, an improved transport system to which is debited a large part—perhaps the bulk—of the enormous capital cost.

On this point a *caveat* may be useful: the layman is apt to assume that water-power necessarily connotes very cheap electrical energy; it may be a surprise to such to learn that, before the war, electric energy was generated and supplied in the North of England from coal-fired steam plant more cheaply than from the hydro-electric plant at Niagara. The explanation lies in the relatively high capital costs of the civil engineering work necessary to make the water-power available; the same conditions apply in many cases to windmills; it is often cheaper to instal, run and maintain a gas- or oil-engine than to instal and maintain a windmill, although the "fuel" in the latter case is free and in the former has to be purchased.

The Water Power Resources Committee* estimate that of the 200 million horse-power available in the world from hydraulic sources some 250,000 horse-power is economically available in Great Britain, equivalent to the energy obtainable from some three million tons of coal per annum.

The development of water-power in this country would not only help to reduce unemployment, but would tend to a better distribution of the population, inasmuch as the power is available chiefly in remote districts; until recently this remoteness was an obstacle rendering much of the power, unavailable at an economic price, but the ubiquitous motor-vehicle promises to come to the rescue by cheapening the transport of labour and material.

At sea, the supersession of coal by oil, either as fuel under the boilers or in internal combustion engines, proceeds apace, and its economical success is beyond question.

Its growth since 1914 may be gauged from the following data:

On Lloyd's Register Book	Vessels fitted for burning Oil Fuel. Thousands of tons (gross).
July 1914	1,310
„ 1919	5,336
„ 1920	9,359
„ 1921	12,796
„ 1922	14,464

Coal has thus to meet an attack on two fronts, and it seems pretty clear that the price of coal *delivered to the British consumer* will have to fall a good deal further before it reaches its true economic level, and this notwithstanding that even at present prices some of the British mines are being run at a loss. Freight and distribution charges bulk much too largely in the delivered price, and substantial reductions under these headings are imperative. In the United States, coal-cutting by machine is largely in vogue, but for the thinner seams prevalent in this country such machines have made little progress; possibly they may provide an alternative to shutting down.

Two other sources of energy have lately been tapped, and though they are not likely to have any effect on the price of coal, they are of interest as indicating the universal tendency to the employment of substitutes when the price of the standard article is unduly increased: I refer to (*a*) the 10,000 horse-power electric generating station at Volterra, Northern Italy, which derives its energy directly from the internal (plutonic) heat of the earth, and (*b*) the experimental plant running in Egypt which derives its energy directly from the heat of the sun's rays.

If then it prove possible to effect a reduction in the cost of energy, whether derived from coal or otherwise, and concomitant savings in all that should naturally flow from such reduction, and if we can substantially reduce the cost of fertilisers, while developing the use of the more highly-productive modern pedigree wheats, it needs only an increased output per man-hour (whether that be obtained by improved machinery or by increased individual efficiency) to effect such a reduction in the cost of food and of commodities as shall bring them down to practically pre-war level, while maintaining unimpaired the present standard of living.

That prices in general will in time be brought below pre-war level, may perhaps be regarded as the dream of a visionary; but, for all that, there are, I believe, great possibilities in this direction, at any rate with many items.

For most commodities, however, it seems likely that many years must pass before the sum of all the economies due to cheapened processes of manufacture and to increased production per man-hour suffices to set off in their entirety the additional costs arising out of the higher standard of living—now practically universal among the white races—and the shortened working week, quite apart from increases in cost due to higher taxation, higher rates and other cognate results of the war period.

Nevertheless, as soon as the fact becomes fully realised that a higher standard of living can be had only by earning it, I believe that the tremendous driving force behind the world-desire for that higher standard will prove irresistible.

* Final Report of Water Power Resources Committee, Board of Trade, 1921.

FREIGHT AND TRANSPORT CHARGES.

One of the serious additional burdens placed on commodities by the boom period was the heavy impost of freight charges both by sea and land. Owing to the great recovery in tonnage and to quicker working, sea freights have now been substantially reduced. The present world tonnage (gross) as shown in the 1922-23 edition of Lloyds' Register is 61,342,954, the comparable tonnage for 1913-14 being 43,079,177. The extent of the reductions in world-freights since 1920 may be gathered from the following typical examples:—

FREIGHT PER TON.

Material. Voyage.	January 1920.	January 1921.	January 1922.	January 1923.
	s. d.	*s. d.*	*s. d.*	*s. d.*
GRAIN.—U.S. (Range) to U.K. ...	47 0	30 0	18 6	16 6
„ R. Plate to U.K. ...	145 0	45 0	32 6	27 6
COAL.—Virginia to R. Plate ...	$14	$5	$4	$3¾
	s. d.	*s. d.*	*s. d.*	*s d.*
„ S. Wales to R. Plate ...	40 0	22 6	14 0	12 0
IRON ORE.—Bilbao to Middlesbro'	27 0	15 0	7 0	8 0
NITRATE.—Chili to U.K. ...	200 0	60 0	30 0	37 6
„ Bombay to U.K. ...	97 6	50 0	22 6	28 0
„ Australia to U.K. ...	105 0	75 0	47 6	43 9

Railway rates are following downwards, but far too slowly, for having regard to the fact that a finished article, before reaching the consumer may in its various stages of manufacture have to be rail-borne over and over again, the cumulative effect of heavy railway charges may seriously increase the price and greatly restrict business.

As regards this country some economies are to be anticipated from the recent grouping of the railways, but a much more potent influence tending towards effecting the essential reductions in freight is to be found in the development of competitive road (and in less measure sea) transport.

It is stated that in the U.S. the total passenger mileage by motor vehicles is already twice that of the railways.

Corporations, no less than individuals, are apt to take the path of least resistance, *i.e.*, to pass the burden on to the consumer and the inefficiency into which our railways lapsed in the post-armistice period before the Government guarantee terminated, provided an object lesson in the effects of the removal of one of the principal incentives to efficiency, viz., the need to earn dividends. The spur of necessity will do much towards expediting the electrification of our railways, but the economies resulting from the process can be attained only gradually, having regard to the enormous magnitude of the work involved.

When considering the subject of competition the effect of Trust, Combines and Rings at once arises; here, as usual, there are two sides to the question. A well-managed Trust, having large financial resources, efficient manufacturing plant and a widespread commercial organisation, may render a definite service to the nation by producing and selling commodities (or by selling services) at prices so low as to offer little incentive to others to enter the business as competitors; the London Omnibus Service may be cited. The tendency in the future will be, I believe, for the number of such socially-advantageous trusts to grow. Some of the existing Trusts are, however, of a less broadminded type, but it is probable that most of them have learned or are learning that their limits of unfettered operation are narrower than in the past. But be that as it may, Trusts are a factor in world-economics with which we have to reckon, and the way in which they may be hammered into shape for the greatest good of the greatest number is a large problem. A possible solution is the "fifty-fifty" basis, *i.e.*, where one-half of the total manufacturing capacity of a trade is affiliated to a combine, selling their goods at a uniform price, the other half remaining on independent lines competing with each other and with the combine. Properly run such an arrangement should give the consumer something which, if not the best of both worlds, would be at any rate reasonable protection against paying excessive prices. Moreover, it should help to reduce fluctuations in price; stability in price, as an asset to trade is second only to cheapness. A noteworthy illustration may be quoted: the selling prices fixed in March, 1919, by the United States Steel Corporation, one of the oldest and largest trusts in the world, remained unaltered throughout the remainder of 1919 and the year 1920, notwithstanding that the competitors of the trust, the independent companies, were doing a large trade at appreciably higher prices.

The attainment of a greater measure of stability in price was one of the objects of the International Trade Conferences which before the war promised to be of much value to the world and which will no doubt be extended in the future as the nations return to sanity. The good work of the International Cotton Conferences was an outstanding example.

WAR DEBTS.

The gigantic debts which have been piled up by the belligerent nations, and the enormous losses involved by the disorganisation of economic life in Russia, Central Europe, and the East will remain as a handicap on trade for years, but, so soon as the machinery of world-economics once more runs with only the normal amount of friction, the effect of the debts and losses will begin to decrease, and the improvements in the machinery of production—improvements which have been, and will continue to be, stimulated by high labour costs—will take effect.

The colossal magnitude of our war debt needs no emphasis from me, but I would urge that we do not permit ourselves to be mesmerised by its mere magnitude, the true measure of its importance is surely the proportion which it bears to our total income: expressed in this way it no longer appears such a back-breaking burden. It is reasonable to regard the state of economic

exhaustion reached by Europe at the end of 1918 as on a par with that at the end of the Napoleonic Wars, and to assume that the similarity in the extent of the financial exhaustion in the two instances is an illustration of like causes producing like results: be that as it may, the fact remains that our present war Debt bears almost precisely the same relation to our pre-war Income as did our Debt after the Napoleonic Wars to our national income at their commencement.

The relative figures* are as follows:—

	£ millions.		£ millions.
National Income at commencement of Napoleonic Wars 1792	250	National Debt at end of Napoleonic Wars 1816 ...	846
National Income, 1913 ...	2,300	National Debt, 1920 ...	7,876
Increase over period	9.2 times.	Increase over period	9.3 times.

Putting it another way round the debt is in both cases approximately 3.4 times the yearly income.

It may be urged that the Napoleonic Wars were not so all-embracing economically as was the World War, but on the other hand our powers of recuperation are surely far greater to-day than they were a century ago.

Fortunately, only one-eighth of this debt is owing abroad, but the interest and sinking fund on even this portion will call for an annual payment twice as great as the whole telegraph and telephone revenue of the British Post Office as it stands to-day. Any reduction in the price level of commodities will of course increase the virtual magnitude of the debt, inasmuch as the bulk of it must eventually be paid in commodities.

Ultimate Level of Prices.

And now, what are the ultimate limits to the great slump? or, preferably, what is to be the new level of stability in world prices; and when is that stability to be attained?

Under present conditions neither question permits of a real answer, but a closer estimate can be made in regard to the level than in regard to the date.

As to the new level general opinion seems to favour $1\frac{1}{2}$ times pre-war, but no cogent reasons are as a rule forthcoming as to why $1\frac{1}{2}$ should be chosen in preference to any other multiplier. In my opinion $1\frac{1}{2}$ is much too high. The lowest estimate I have seen is that of Mr. A. H. Gibson, who, writing in the *Bradford Chamber of Commerce Journal* for December 1920, gave $1\frac{1}{4}$ times pre-war as his forecast, but even this figure, I think, is too high.

To fix our ideas let us hark back to pre-war times. World prices were then approximately stable; the index figure representing the price of general commodities did not change by more than a small percentage over a whole year.

In those days what determined the level at which prices in general were stabilised? Clearly it was the arrival at equilibrium between the opposing economic forces at work, that is to say, world-prices and world-consumption were forced to find such a relative adjustment that their product, world expenditure, did not exceed world-income. The world cannot, for any length of time, pay for what it does not earn, hence its total spendings must be determined by its total earnings. But a rise in the world-price-level of commodities tends to have a greater effect on total spendings than on total earnings, because the whole population spends, whereas only part of the population earns; to restore the balance, consumption falls.

To take an example, stripped of refinements, one may say that a rise of 50 per cent. in the general wage level adds 50 per cent. to the earnings of the part, but puts up by 50 per cent. the price of commodities to the whole; hence the earners can buy no more and the non-earners can purchase only 100/150ths of their previous consumption.

This reduced consumption, even though it be of a small minority only produces in the long run a reduction in cost, for it is as true in economics as in physics that large masses respond ultimately, though slowly, to the repeated impact of very small masses; I therefore regard the small non-earning part of the population as providing the controlling influence which limits the extent of a permanent increase in prices.

The actual procedure is of course complex and may occupy considerable time, but as the reduced consumption hits both employer and employed, it becomes to the interest of both to reduce the cost of production.

Accepting then, that it is the non-earning or fixed-income class which, with others of a cognate character abroad, acts as the inconspicuous governor controlling the big machine, the question arises within what limits does the governor control? What upward tolerance can be allowed to price-movements before such control becomes effective? The record of price movements in the past gives us some guidance, for although the economic conditions of to-day differ greatly from those of a century ago, the period which affords the nearest parallel, fundamental principles remain unaltered.

The economic data gleaned from the history of remote and recent decades suggest that a permanent (sudden) increase of 20 per cent. in world price levels is quite the maximum which could be tolerated, *i.e.*, without passing the limits at which the governing force would begin to make its influence appreciably felt.

On this basis, and having regard to the fact that, had it not been for the war, a reduction in the index number for commodities would soon have been due, 1914 having been well above the normal, I come to the conclusion that, subject to the machinery of world economics being restarted within the next 2 or 3 years the level of commodity prices should within a few years of such restarting—say by 1930—settle down at a new normal which should be not more than—probably less than—20 per cent. above the level of 1914. This may sound unduly optimistic; critics may urge that the wish has been father to the thought; I think not. May I add a reminder that the word "normal" is derived from *norma*, a carpenter's square, implying that for a normal to be stable and permanent it must be set "four-square to all the winds that blow"; we may be a long time in arriving at the normal now forecast, but I can see no real stability until we attain it.

The present partial revival in trade will no doubt result in some increase in price levels, but the drop will be resumed after a while; there may, indeed, be several such revivals but the general tendency will, I am convinced, be downwards. The level of commodity prices in this country being about 160 (1914=100) the attainment of 120 involves only a 25 per cent. drop from present levels; expressed in this way it perhaps appears more possible of early realisation; 120 on 1914 basis would be equivalent to about 133 on 1900 basis, Graph No. 2.

Return to Gold Coinage.

I began this paper with a reference to psychology and I would end on the same note. Notwithstanding the chaotic economic conditions elsewhere we are now in a position to visualise the return of the pound sterling to its gold parity. Its recovery from the depths of depression has been helped enormously by the confidence felt throughout the world in the financial soundness and stability of this country, as well as by increased recognition—tardy but growing—of the fact that under modern conditions the world is an economic whole in which no country can live to itself.

In that near future when, as we hope, we shall again be able to buy $4.86\frac{2}{3}$ dollars for a one pound note, the question will arise whether we shall once more see in circulation the gold coins which before the war were more in evidence in the daily life of the people of this country than was the case in any country in the world. Assuming parity to have been reached and adequate gold reserves to have been accumulated, I hope that gold circulation will recommence, for I believe that the use of gold coinage subtly encourages personal economy by the sense of inherent value which the noble metal so well conveys but which the paper lacks. There are those who believe that apart from the loss of potential bank credit thereby resulting, it is an economic crime to permit so valuable a metal to suffer the waste inevitable from its daily use as currency; in 1914 gold coin to the value of £78,000,000* was in circulation in this country, and the annual loss due to wear was less than £30,000 per annum†. Such loss is admittedly waste but, in the limit, is it not one of the wastes which it pays us deliberately to incur? Is it not on a par with our peace-time procedure of sending our warships all over the world, burning fuel and consuming all kinds of stores—an uneconomical procedure which we call Showing the Flag? So long as the procedure is kept within limits, is the process ultimately uneconomical? I think not. I believe the use of gold coinage to be one of the means helping us to maintain our national self-respect and our prestige among the nations of the world. In pre-war days the freedom of its use was one of the things specially noticed by the stranger within our gates, and the English sovereign was the current coin of the realm in at least one foreign country, owing no allegiance to us.

Hence, even if the objection of the economic text-book were valid, I would waive it, turning in preference to the Great Text Book where I read:

"There is that scattereth, and yet increaseth; and there is that withholdeth more than is meet, but it tendeth to poverty."

* "British Finance," Kirkcaldy.

TELEGRAPHIC MEMORABILIA.

On June 11, 1908, M. Alfredo Pereira, President of the International Telegraph Conference, held that year in Lisbon, immediately prior to bringing the Conference to a close placed a proposal before the members which had for its object the celebration of the fiftieth anniversary of the Telegraph Union which was founded in Paris on May 17, 1865. Special commemorative ceremonies and rejoicings were to be held in Paris and a suitable monument was to be erected in Berne in the year 1915. Alas for human programs, the year 1915 witnessed grimmer scenes, but with that hope which is the support of nations as of families it is refreshing to relate that, although it has not yet been possible to carry out the first part of the program, the second portion became an accomplished fact and a beautifully sculptured commemorative monument was unveiled on December 16 last, which fittingly commemorates the birth of the oldest International Union in existence. The ceremony was performed in the presence of the Swiss Federal Council, the diplomatic and other representatives of the signatory nations of the Telegraph Union, the president and vice-president of the Swiss Federal Chambers and the Swiss Cantonal and Communal authorities.

The French Ambassador, His Excellence M. Allizé, opened the proceedings and delivered the inaugural address.

The monument is the work of M. Romagnoli, a native of Bologna, Italy, whose design was chosen from among over one hundred competitors. The central figure with extended arms represents the Telegraph Union in its endeavour to unite all peoples and all races. The monument is erected in the Helvetiaplatz, immediately in front of the History Museum, the gates of which latter, it will be recalled by visitors to Berne, are guarded by the figures of two bears. The artist to a certain extent was restricted in his design as it was necessary that the monument should in no way hide the view of the museum or dwarf its appearance.

* *Hansard*, Dec. 6, 1915.

† Annual Reports of Royal Mint

There has recently appeared in the pages of *Les Annales des Postes Télégraphes et Téléphones* the monthly semi-official of the French Post Office, a most interesting and well-balanced article on *Les Réseaux Radioélectriques Au Point de Vue Commercial*, written by Monsieur Veaux, an engineer attached to the French Administration. It is an article which does not attempt to hide the weaknesses of French communications but at the same time, evidently as the result of a patient study of the difficulties, points the way out of those difficulties and emphasises the danger of delay.

To those of us who have noted the flood of criticism of our own press which has discovered energy, initiative, resource and enterprise in every administration but our own in the particular direction of wireless, it is something in the nature of an eye-opener to read that :—"The signals from the W/T of Lyons do not reach America with any regularity. Requests for repetitions are numerous and during the 'atmospheric' season the signals are quite unreadable."

One's mind naturally turns to the high-power station of Croix d'Hins (Bordeaux), but here again the courageous critic goes on to say :—

"Croix d'Hins was constructed to meet Trans-Atlantic needs and fulfils the necessary requirements up to a point, but is attended by certain inconveniences, for example, it is too far away from Paris to meet the requirements of a Central Radio station for the whole of France. Further, even this station is not sufficiently powerful to meet the needs of commercial traffic with South America, Japan or China." In another portion of the same article the writer gives the following interesting items regarding this same station, and to avoid all possibilities of error or exaggeration in translation, this last criticism is given in the original :—"La station de Croix d'Hins emet quelques télégrammes à des heures régulières à destination de Shanghai, Saigon et Madagascar ; d'ailleurs elle répète plusieurs fois le même télégramme. Les accusés de réception *qui arrivent par câbles* mettent 24 heures lorsqu'il s'agit de Madagascar, 3 ou 4 jours lorsqu'ils arrivent d'Indo-Chine, 6 ou 7 jours lorsqu'ils viennent de Chine."

It is not because M. Veaux has any lack of faith in the present or future possibilities of wireless communications. He maintains that an intensive wireless service for long distances should be possible at rates considerably cheaper than those at present charged for submarine cable transmission over similar distances. Indeed, in his ardour and strong desire to awaken the interest of his countrymen he points to the steps taken by Germany to increase the power of Nauen and to the situation of England which, rich in cables to her colonies, has by no means so great a need for high-power ventures as is the case with France dependant as is the latter upon a network of foreign-owned cables to the East.

M. Veaux's plans for France are catagoried in the following degree of importance :—

(1) Long-distance international communications ;
(2) European international ;
(3) Inter-colonial ;
(4) Local ;

and advocates for the first-named at least a power of 1,000 k.w.

Following upon this straightforward, plain-speaking article by Mr. Veaux comes another important document by M. Paul Laffont, Under-Secretary of State for the French Posts and Telegraphs, entitled *Plan de Réorganisation des Postes et Télégraphes*, published at the library of Technical Instruction, 3 Rue Thenard, Paris. Under the heading of Telegraphs, Telephones are also included, in fact, the latter looms very large in the eighty odd pages. This also is a very candid document and will no doubt be read very carefully by our friends of the Telephone department as it has also been perused by those responsible for Anglo-Continental telegraph communication. These two bold efforts respectively by MM. Veaux and Laffont completely disarm all criticism of the present French administration and our sincerest sympathy goes out to the present-day officials who have entered into so undesirable a legacy of former years. It is sad reading, and although doubtless a large part of the deterioration of plant and material to which both reports bear witness is due to the effect of the war, much is undoubtedly due to pre-war influences of false economy rather forcefully described by one of the writers as "Malthusian economy."

The reorganisation plan for both Telegraphs and Telephones is anticipated to cover a period of no less than ten years for its completion, and involves an expenditure of no less a sum than something well over two thousand million francs ; of this about 1,720,000,000 francs are proposed to be set apart for electrical equipment including lines, telegraph and telephone apparatus, secondary batteries, &c., and about three hundred million francs upon new buildings.

The plans include an extended use of type-writer perforating keyboards on heavy circuits, to which with some foresight has been added the extra cost of mechanical maintenance, and in addition to the renewal of some thousands of miles of line, the replacement of hundreds of miles of both telegraph and telephone overhead and open wires by underground and aerial cables. The plans as outlined involve a scheme for increased de-centralisation of the complete French *réseau*, and a radical departure in the shape of recourse to private enterprise for the exploitation of both wireless and some of the longer submarine cables. In the case of the latter this has already been done, even the ex-German cable to America has been handed over, because according to M. Laffont a government administrative department cannot meet private competition, in the direction of canvassing, for example. Thus the policy is apparently to let private competitors fight one another for the traffic, to eventually create a "combine" and monopoly.

As has been stated these documents are extremely candid and there is no denying the courage which must have moved M. M. Laffont's pen, or the complete practical knowledge which must have inspired him when he wrote :—"*Il est indispensable de creer des voies nouvelles et des fils de secours avec la Grande Bretagne, l'Italie, la Suisse . . .*" &c., or on the same page, number twenty-eight, where he states :—"*La mesure la plus urgente à réaliser est la refection en fil de cuivre des conducteurs télégraphiques anciennement construits en fil de fer et qui, par suite de leur oxydation, ne presentent plus une conductibilite suffisante pour pouvoir être exploités d'une maniére sûre et régulière.*"

May M. Laffont be spared to see the full realisation of these magnificent plans of reconstruction which will enable France to raise her head as one of the first among the excellent of telegraph nations !

The death of David Drenham cast quite a gloom over the C.T.O. by its unexpected suddenness, and the sympathy for his bereaved was of the sincerest type. A personality of no mean ability, whose happy figure owing to his long and constant association with Post Office benevolent and kindred activities will be greatly missed by our provincial friends from many a forthcoming conference. He had his share of life's shadows but whatever they happened to be his geniality never failed to beam through the clouds.

The Charity Football Match between Bart's Hospital and the C.T.O. at Highbury was an unqualified success, both from a sporting and financial point of view. A well-played clean game which resulted in a draw left the hospital a happy winner of a substantial money prize could not but prove satisfactory. One of the most pleasing features was the kick-off by Lord Daryngton, whose real affection for the Post Office and its activities has now almost become a household word among us. By the bye, Bart's Blotters at three pence each are good sellers and the hospital once more takes all the prize-money !

The amateur electrician has been having quite a front seat in the public press lately in connexion with wireless sets, and surely he deserves it. At the moment of writing the question of the conditions of his license is *sub judice* and one refrains from expressing an opinion except that on general grounds the home-made wireless set is generally put together by enterprising young men with a keen interest in their craft. All, therefore, that one would like to say on this score is that from this younger generation one may expect to find a fruitful source of inventive genius and development regarding radio possibilities. It is sincerely hoped that the powers-that-be will do everything that is reasonably just in preventing the damping-down of this very permissible wave of scientific enthusiasm.

The Summer Meeting of the Post Office (London) Golfing Society will be held on the 8th inst. at Ashford, Middlesex, when the Secretary hopes that a goodly number will be able to tear themselves away from official calls in order to enter the competitions. This will in many cases necessitate the burning of midnight oil to make good the time spent in the open air, but, as someone whispers over my shoulder, "It will be worth it !"

Anglo-foreign wireless is now commencing to contribute its own quota of curiosities in the way of verbal expression of telegraphic phenomena which is perhaps but confirmation of the fact that this particular section of our craft is reaching its "settling-down" period. A continental station recently complained of the "note" of the English station in the following terms :—"Sir, your note is like a barking dog." A day or two later the same station likened it to a "buzzing gnat" and the latest Stop News description, as we go to press, is "Your note sounds as a pig !"

The April number of the *Post Office E. E. Journal* in its new cover is a particularly interesting issue. The Imperial Cable, *via* Harbour Grace, by W. A. J. Mylius, gives a concise description of the Newfoundland Repeater Station in the colony of "Fish and Fog," while Mr. A. C. Booth gives an interesting three pages on Picture Telegraphy which the Cable Room staff, will now be able to associate with some "mysterious" Siemens' slip run over the London-Berlin circuit some short time ago, and similar perforated specimens which were passed over the Imperial Cable to Halifax about the same date.

An amusing specimen of Touch Typing on a Keyboard Perforator being the "humorous attempt of a learner trying to operate a keyboard perforator in the strictly orthodox manner," reproduced from the *Zodiac*, is excellent, although George R. Sims gave a similar example of his personal first attempts with a typewriter something like 20 years ago.

"The Telephone lay-out of the London County Hall," and the "Depredations by Wood-Boring Beetles," form a distinct variety of choice in reading, the latter under the more or less appropriate heading of "Construction." The article on the Conversion of the Stonehaven 30 k.w. Spark Set to a C.W. Valve set will tempt some of our younger wireless enthusiasts to purchase the April number for this article alone—or probably to borrow the writer's copy !

Letters and Writing.—It is the greatest invention Man has ever made, this of marking down the unseen thought that is in him by written characters. It is a kind of second speech almost as miraculous as the first.—CARLYLE.

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

Telephones D. III.

THE issue of the Army type telephone D. III for use in tapping out circuits will stir many memories both pleasant and painful in the minds of men who served with "Signals" in the late war. Dunstable, Fenny Stratford, Biggleswade, and (breathe it gently) Haynes Park will be recalled, the mud of Flanders, the sands of Palestine and Mesopotamia—all these and many other places have been tramped by Post Office men carrying the D. III. Visions arise of a dug-out thirty feet below ground dripping with wet and illuminated (sic) by a candle stuck in a bottle ; a spot in a desert with the

telegraphist sitting on the sands clothed in a topee and spine pad; a room in a sheikh's palace, commandeered for use as a telegraph office; a shanty made of a tarpaulin stretched between two trees; in what type of place has the D. III not been fitted by P.O. men?

Thoughts will arise also of the stealthy journey by night, the orders given in whispers, the anathemas when the buzzer refused to buzz, and dawn was rapidly approaching while the job was not yet completed. Memories will arise too of the chum who killed six Germans with his D. III. Every self-respecting sapper in Signals had a chum who achieved this, to say nothing of his own personal achievements.

The men who went abroad will not be alone in experiencing these inward stirrings. They will be shared by those who went through a strenuous campaign in Hyde Park, with a chest protector wrapped around the left arm. There were times when they were over a quarter-of-a-mile away from the nearest teashop and if by means of the reliable D. III they had not been able to summon immediate help, they may have been surrounded by a German baker.

If only half as much good work is done under peace conditions in the Post Office as is recounted of work done under active service conditions, there will be a remarkable increase in output when our old friend the D. III is again placed in the hands of the ex-R.E.'s and V.T.C.'s.

Telephone Meters and Coin Boxes.

A paper by Messrs. W. Cruickshank, A.M.I.E.E., and F. McClarence, A.M.I.E.E., was read on March 13 at a meeting of the Institution of Post Office Electrical Engineers. The methods adopted by various utility administrations for measuring consumption by individual users were described, and compared with those used in the telephone services. The conditions differ inasmuch as the telephone subscriber has the sole use of a channel direct to the public exchange, whereas, in all the other utility services, use is made of a common main to which the subscribers' service is connected. The use of individual channels allows a meter to be fitted at either end. The concentration of the meters at the exchange end where skilled attention is always available for testing and repairs ensures that the meters are watched regularly and kept in thorough repair.

Reference was made to the findings of the Public Service Commission of New York, which conducted a very thorough investigation in 1915 into the methods of recording calls adopted by the New York Telephone Co., which are identical with those in use in Great Britain.

The evidence showed that the errors in registration were considerably less than 1% and that it is quite probable that they were principally due to causes in the control of the complainant rather than to mistakes on the part of the Company's employees.

A number of slides were exhibited shewing the apparatus and circuits in use on manual systems, and emphasis was placed upon the special devices to ensure accuracy. Special safeguards to prevent registering except on the completion of a thorough connexion were illustrated and described.

The methods employed for registering calls on automatic telephone systems were described in some detail.

An interesting section of the paper was that devoted to coin collecting boxes. Much ingenuity has been devoted to the perfection of instruments which are positive in action, fool-proof and not too complicated in design. With regard to the latter point it is probable that apparatus which would be regarded as simple by the telephone engineer would be regarded as exceedingly complex by many people. Certainly, some of the mechanism exhibited was beautiful in workmanship and looked intricate to the uninitiated.

The various means which have been adopted to enable the telephonists to return fees for calls which did not mature or to ensure that bent coins should not foul the mechanism, were clearly explained. Boxes in which the machine has been adapted to receive coins of varied value were described. After hearing a description of the elaborate devices that were necessary in order to circumvent fraudulent persons such as those who initiate with the voice the sound of a buzzer and those who try to operate the machines with a coin and a thread, one felt rather despondent about the growth of national morality while admiring the ingenuity of the designers.

The authors did not describe the device which has been patented in America for locking the door of the call office cabinet until the caller had deposited the correct fee in the coin box.

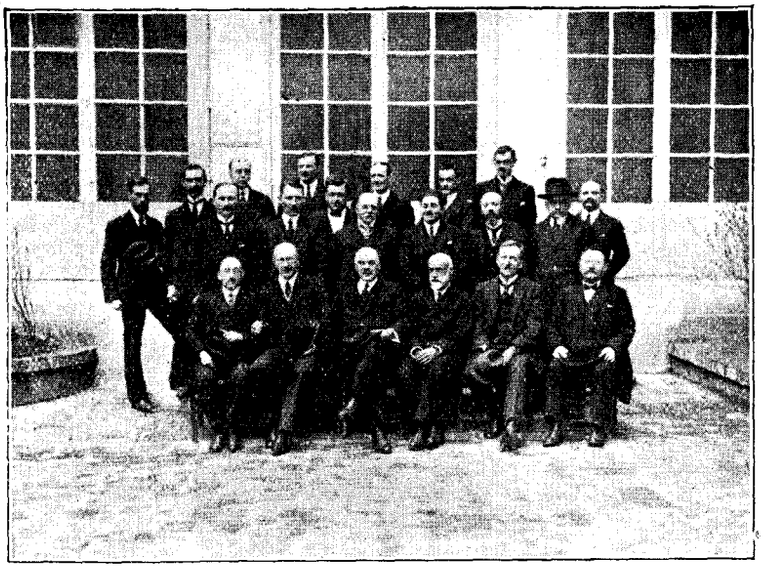
In the discussion which followed, one speaker complained that there were too many types. He stated that on one occasion he stood for a long period with a receiver to his ear before noticing the instruction to press a button. The notice and button are very conspicuous. The occasion is believed to have been the night of the Engineering Department's dinner.

Was there some uncertainty as to which of the many buttons seen was the real one?

"Denman" Chess Club.

This season's final meeting of the Club will be held on Wednesday, April 18, at 4.30 p.m. in the Refreshment Room, Denman Street, when the President, Mr. R. McIlroy, will distribute prizes. The distribution will be followed by a Lightning Tournament open to all members and their friends. Membership of the Club is open to all officers in the London Engineering District, and any information *re* the Club will be furnished willingly by the Hon. Secretary.

The matches of the Club are confined to Section III of the Civil Service and Municipal Chess League, and, judging from the results to date, there is every possibility of the Club maintaining its high position in the League.



Back Row.—A SECRETARY; MONS. LEDUC (France); SENOR CABRERA (Spain); MONS. MOECKLI (Switzerland); MR. HART (Great Britain); SENOR MIGUEL (Spain); MR. TRAYFOOT (Great Britain); A SECRETARY.
Second Row.—MONS. BOCQUET, MONS. FOSSION (Belgium); MONS. FORRER (Switzerland); MR. HILL (Great Britain); MONS. VALENSI (France); SIGNOR MARCHESI (Italy); MONS. FRANCOIS (France).
Front Row.—PROF. DI PIRRO (Italy); MAJOR PURVES (Great Britain); MONS. DENNERY (France); SENOR NIETO (Spain); MONS. MURI (Switzerland); MONS. DETHIOUX (Belgium).

LONG-DISTANCE TELEPHONY IN EUROPE.

A TECHNICAL committee, which sat in Paris from March 12 to 20 for the purpose of studying the subject of international telephony in Europe, has concluded its preliminary work.

The countries represented were: France, Italy, Great Britain, Belgium, Spain and Switzerland. The representatives of Great Britain were Major T. F. Purves, Engineer-in-Chief to the General Post Office; Mr. J. G. Hill, Mr. A. B. Hart and Mr. H. G. Trayfoot.

The committee's deliberations were conducted in an atmosphere of cordiality, and unanimity was achieved on all the technical questions reviewed.

The committee emphasises the need for complete uniformity in the equipment and operating practice of an international system in all the countries concerned, in view of the high degree of specialised development which is now an outstanding feature of the telephone business. The preliminary committee consequently agreed that the appointment of a permanent committee was advisable, representing all the countries of Europe, and charged with the duty of maintaining continuous co-operation. It contemplates the setting up of a small permanent secretariat which would act on behalf of the committee and would also form a centre for the international exchange of technical information bearing on the subject of long-distance telephony. The committee has formulated and agreed upon the main characteristics to be observed in the construction, upkeep and development of international telephone circuits.

The collaboration arising from the meetings of the committee has resulted in the drawing up of a programme of communication, to be provided by means of new aerial lines and underground cables during the years 1923 and 1924. The committee has also undertaken the preparation of extended schemes based on estimated telephone requirements during the next ten years.

As a basis for the determination of the quality of transmission to be provided on an international system of trunk telephone lines, the Preliminary Committee agreed to adopt standard specifications for:

(1) Sub-station apparatus, that is to say, the subscriber's *transmitter, receiver and induction coil*, and

(2) An international transmission unit of reference.

In both cases these specifications will conform with present practice in Great Britain.

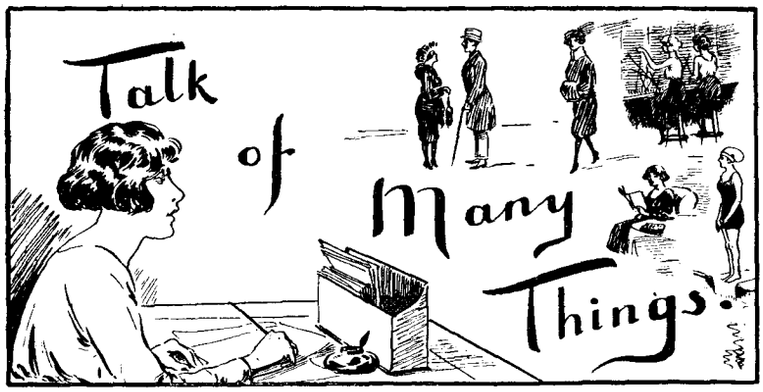
The unit of reference has been agreed as the equivalent of one mile of standard cable, having an attentuation constant of 0.106 at a frequency of 800 cycles per second.

The quality of speech transmission to be provided for international services in general is to be not inferior to the audibility obtained in a circuit consisting of two standard telephones separated by 32 miles of international standard cable. In special cases, for example, those where the volume of traffic will not justify the provision of expensive high-grade lines, a tolerance of not more than 6 miles of standard cable will be admitted.

The desirability of establishing a network of underground cables for international services was agreed, but having in view the present state of the art, it was decided to regard 1,000 miles as the limiting distance for telephone lines wholly in cables. In cases where the greater distances are involved, aerial lines will be provided at the outset.

Telephone repeaters with thermionic valves will be used both on aerial lines and on cables, and it was agreed that repeaters should be so designed as to give a constant amplification factor over the whole range of frequencies compared within the limits of the speech band. Where distortion connecting devices are necessary, they will be provided as independent units.

The various administrations represented at the Conference have agreed to undertake special study of the regulations required to protect long-distance telephone communication from disturbance by electrical power transmission systems.



WE are receiving letters and contributions from America and from Holland—which is indeed gratifying; but London appears to have "gone dry" in this direction. We often hear of intending contributors who write an article for our column, and *nearly* post it. Such hesitation never yet filled a column—nor even a waste paper basket. Please note that all contributions should be received on or before the 14th of the month for inclusion in the following month's issue.

The photographs reproduced were sent by a colleague in Holland, Mr. Wys, Senior Officer, Telegraph Office, 'S-Hertogenbosch. We welcome him to our column with much pleasure. Mr. Wys feels a little diffident about his English (which is excellent) and on being asked for an article, said "Impressions by a male in Numberland and in a foreign language! You could as well ask a London Telephonist for an article about Tutankh Amen's private view of deceased wife's sister's bill discussion in Luxor clubs." He

TRUNK EXCHANE, S'HERTOGENBOSCH (MAGNETO MULTIPLE) 80 LINES 18 TELEPHONISTS IN BUSY HOURS (9—12).

TELEPHONE OFFICE AND TRUNK EXCHANGE, S'HERTOGENBOSCH.

has, however, promised to send an original contribution later on; and in the meantime has sent the following verses taken from *Punch* (February 1907):—

"THE SHAH HAS GREAT INTEREST IN TELEPHONE DEVELOPMENT."—*Reuter's.*

Though Allah has set me to rule alone
With power supreme on the Peacock throne;
Though headsmen, grim as grim can be
Will chop off your head at a wink from me,
Though thumbs-screws, racks, and dungeons dark
Await the wretch I may chance to mark;
Though boiling oil at the torture door
Is always ready from ten to four—
To steps like these I seldom fly,
A highly benevolent tyrant I.

"Are you there?" cries a voice, and I seem to see
The lily-white damsel who calls to me,
"Are you there, dear Shah? I want your aid
For a very unhappy and love-lorn maid.
I love Haroun, and I rather guess
From the curious manner of his address
From the way he fidgets and stares at the ceiling
That Haroun reciprocates the feeling.
But when I try, as a maiden may,
To bring him to book he grows "distrait"
And flushes and blushes and runs away.
So I want you to hint to Haroun, your Highness,
There's really no need for such terrible shyness."
I readily promise my help, and soon
She switches me on to the youth Haroun.
I 'phone him some fatherly kind advice,
The matter is settled in half a trice,
And I sleep with a glow of satisfaction
At having performed such a nice good action.

And if some wag with a taste for fun
As he lurches home at half-past one,
Should ring me up from my bed to shout
"Well, Shah, is your mother aware you're out?"
Am I angry? No! Rejoiced my folk
Possess such an excellent sense of a joke,
I greet the wag with a loud "Ha, Ha!
I am such a humorous kind of Shah!

Which reminds us of a paragraph in the *Contract Journal*, in which "some wag with a taste for fun," says:—

"Automatic telephone exchanges would, of course, extinguish the telephone young lady with her illiterate "Oh" for "Nought" and "double two' for 'twenty-two.'"

The following reply has not yet appeared in *Punch*:—

Though in the exchange I work all day,
They limit my powers of what to say.
And so a subscriber's cares seem doubled
On hearing "I'm sorry you have been ter-rrubled."
I'd *love* to employ a phrase less terse,
A sonnet or two, or some good, blank verse?
And as for "Nought" and "Twenty-two!"
Oh, how it would thrill me to call them through!
To give wrong numbers I *always* try;
A most illiterate person I.

So when some wag has a taste in spite,
Am I angry? Yes! It would serve him right
If Allah listened to his behests,
And numbers were given as he suggests.
And if at the end of a long day's toil,
I could only annex some boiling oil,
He wouldn't wait long for *my* reply—
A highly vindictive person I!

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

THE BIRMINGHAM POST OFFICE POSTAL, TELEGRAPH, AND TELEPHONE SOCIETY.

INAUGURAL MEETING.

(*An impression.*)

"And bright
The lamps shone o'er fair women and brave men."

These words kept repeating themselves insistently in my internal consciousness, as if some external cerebral apparatus were sending out its Herzian waves in order to actuate such cerebral cells as were tuned for their reception!

The occasion was important!

The newly-formed Birmingham Post Office Postal, Telegraph, and Telephone Society was holding its inaugural meeting in the University Medical Theatre at Edmund Street, Birmingham. The chair was occupied by the Postmaster-General, Mr. Neville Chamberlain, M.P., himself a Birmingham man, the brother of a former Postmaster-General, and the son of a great Birmingham citizen, who was one of the Empire's most distinguished statesmen. The opening lecture was to be delivered by Mr. John Lee, M.A., M.Com., the Controller of the Central Telegraph Office, London, whose fame, not only as a cogent writer and witty speaker, but also as a charming personality, and humane and sympathetic man, had preceded him.

The Postmaster-Surveyor, Mr. John Scott, whose efforts for the welfare of his subordinates are incessant and untiring, supported the Postmaster-General, and all the Survey Officials, Departmental Heads, Postmasters of the district, telephone officials and a large representation of the staff were present. The proceedings were in charge of the popular and genial Secretary, Mr. Chris. Thompson, and were satisfactory in every way.

The Postmaster-General opened the meeting by expressing his pride in being the administrative head of two hundred thousand postal officers. He said that he took the warmest interest in everything that was connected with the welfare of the staff, and the efficiency of the service ; and added that he had already become imbued with a strong feeling of *esprit-de-corps*. He was intently watchful in order that the high reputation that the service already enjoyed should be not only maintained, but also enhanced, during his term of office. In a few well-chosen words, he called upon Mr. Lee. His remarks were loudly and enthusiastically cheered.

Mr. Lee then gave his address. With wealth of diction, and graceful turn of phrase, he dwelt upon the problems which were being propounded by swiftly fleeting Time, to the administrators of the telegraph and telephone services. Interspersed with more serious matters were delicious tit-bits of by-play on the life in a certain Surrey town " which is in the van of civilisation " ; dissertations on the domestic and social habits of the inhabitants ; and information as to the methods by which he availed himself of the intelligence and experience of his fishmonger, who was a most erudite and recondite admirer of the beauties of the Elizabethan drama. He described the niceties of etiquette in the community in the " Van of Civilization," and explained how these affected the use of the telephone. He dilated upon the uncertainties of some as yet unexplained and unplaced phenomena which were tentatively called "The performances of the Tottenham Hotspurs." Like a certain justice who enquired " Who *is* Charlie Chaplin ? " and " What *is* a camisole ? " Mr. Lee, with a twinkle in his eye, asked " Who is or what are the Tottenham Hotspurs ? " He dwelt on the trials of a Controller who had to make arrangements beforehand to cope with the Press work consequent on the quite uncertain results of the collision of these Hotspurs with other unknown bodies. If these denizens of Tottenham won a match, the result in press work could hardly be the same as if they lost—if they could lose.

He spoke feelingly of the various causes that made, and are making, for the decadence of the telegraph as opposed to the telephone system, and threw out as a suggestion that development of the commingling of these services by the receipt and delivery of telegrams by telephone, would act as a solvent for the difficulties of both.

On the conclusion of the lecture, the audience applauded the lecturer enthusiastically and continuously for a considerable period.

A hearty vote of thanks to the lecturer was proposed by Mr. T. Plummer, M.I.M.E., which was seconded by Mr. Chris. Thompson in a racy and humorous speech.

Mr. John Scott, M.B.E., Postmaster-Surveyor of Birmingham, proposed a vote of thanks to the Chairman in well chosen and suitable terms. Mr. Scott stated that the Chairman's excellences were well known to them, and they were happy and honoured in having him—a Birmingham man and the head of their great Department—as their Chairman at their inaugural meeting. He invited all those present to join the Society.

The vote of thanks was seconded by Miss Gossage, and carried with acclamation.

CENTRAL TELEGRAPH OFFICE.

INTER-DIVISIONAL FOOTBALL FINAL.

ADMITTEDLY, I am not an adept at describing a football match, but the Final Inter-Divisional contest between the A Division and T.S.F. was so remarkable that it calls for notice in these columns. They are old rivals. They have won through the Divisional contest, and their final meeting was the cause of considerable excitement amongst us all. It was an eager game and called, by the experts, I understand, a very fast game. I should, myself, have called it a very hard game, for the teams were equally matched and a very alert referee just succeeded in keeping the keenness within legitimate bounds. Both goalkeepers succeeded in repelling many shots, and I should say myself (as an amateur) that the characteristic of the game was a very large number of corners which had to be " conceded," a word which was especially correct on something like a dozen occasions. However, in the end the A Division won, and they bore the cup and the shield with them. The trophies were brought into the A Division on Saturday morning with something of the feature of a Roman triumph. Thus the long contest has ended and if one says that the A Division won their victory it is equally true that T.S.F. made them pay the full price of winning it. It is not the place to mention the philosophy of sport, but there is a philosophy in a long contest which takes the whole winter in which pride of being the Inter-Divisional Champion is all the greater by reason of the wholesome respect for the rivals.

J. L.

LONDON TELEPHONE SERVICE NOTES.

A Presentation.

A VERY interesting ceremony took place in the Carter Lane Refreshment Room on March 23, when Mr. J. F. Edmonds was presented by the staff of the London Telephone Service with a gold hunter watch and a travelling bag.

After an excellent concert, every item of which received an encore, Mr. Valentine, who was in the chair, referred to the enormous amount of work Mr. Edmonds had done for the Telephone Service, and said that, although he had gone from us to a higher sphere, his keen interest in all that affected the service would not wane, and he could always be relied upon to do his utmost to further the interests of the service.

Mr. Edmonds, in replying, said that he had come there with mixed feelings, and felt rather as if he were singing his swan song, although he was afraid he could not express it, and the song would remain in his heart. He referred to his pleasant relationship with the present Controller, and said that not once in the long years that they had spent together had they had " words." He also thanked many of the staff by name for their help and good fellowship during his years of office. An informal dance brought the evening to a close, full enjoyment of which was tempered by a keen sense of loss for our late Assistant Controller.

Langham Choral Society.

On Wednesday, April 11, the Choral Society concluded its third season with a performance of Elgar's " Dream of Gerontius " at the Queen's Hall. This beautiful work was a severe test which the choir passed very creditably. From the musical and social points of view the Society have had a most enjoyable season but, as was the case last year, the financial results are not very happy. Despite the difficulties in the past those in charge of its affairs intend to keep pegging away until the silver lining, which it is said every cloud possesses, comes into view ; may it be next season.

Lotus Swimming Club.

The office club commenced its second season on April 18 at the baths at Great Smith Street, Westminster. The club was started by the men last year in an attempt to keep pace with the ladies. It possesses two trophies to be competed for annually and with a healthy membership great things are looked for.

For Bowls Players.

In connexion with the newly formed Civil Service Sports Association a meeting was held at New Bridge Street House, E.C., on April 6, at which it was decided to form a Bowling Club to include those branches of the Post Office that have not formed a separate club of their own and to be known as the G.P.O. North Bowling Club. Separate clubs have already been formed by the C.T.O. and L.P.S.

Representatives of the A.G.D., L.T.S., Engineer-in-Chief's Office and the Metropolitan Engineers attended, and it was evident that sufficient members would be forthcoming. Sir Henry Bunbury has kindly consented to act as President of the Club.

The annual subscription is 2*s.* 6*d.* and the intention is to play inter-departmental matches in which all members would participate. The matches will be played on various Club greens and later on may be played on the Civil Service Sports Ground at Eltham.

Any bowlers who are interested are invited to communicate with the Hon. Secretary, Mr. R. Dixon, New Bridge Street House, E.C.

Further Education Scheme.

Readers of these notes will be interested to hear that a regular contributor, Miss Dorothy Turner, has found further outlet for her unbounded energy as Editress of the *Cresset*, the journal of the City and Holloway Literary Institutes. The *Cresset* is run by the students, many of whom are in the L.T.S.

Culled from the Exchanges.

Gerrard Exchange.

With 4½ years passed since the Armistice it is often difficult to realise that there are still many wounded in hospital and it will perhaps surprise many to know that nearly 500 men are still under treatment at the Queen Mary Hospital, Sidcup, so justly famous for its wonderful methods with facial and head injuries. This hospital has for some years been the special care of the Gerrard staff and something like £400 has been collected to provide entertainments for the patients.

On Saturday, March 24, the writer was privileged to take part in one of the periodical festivities, and the excellence of the arrangements were an eloquent proof of the hard work and careful thought which the Committee must have given to their organisation.

Proceedings commenced with tea in the wards, trolleys laden with good things, not omitting a packet of cigarettes for each man, being taken round to those patients still confined to the wards. About half the men in the hospital were well enough to be at football or sports in the grounds and for these tea was laid in the dining hall. They came in with good appetites and the sandwiches, cakes, jellies, &c., soon disappeared. Tables were then cleared and before long 60 tables were ready for a whist drive, while the recreation hall was prepared for a dance, and the orchestra arrived. The whist drive needed very tactful management as most of the "ladies" were "gentlemen" and were only distinguished by the colour of their scoring cards and much friendly argument arose as players changed tables, but the M.C. was equal to the occasion and with the assistance of several stewards from the hospital, everything worked smoothly and in due course the winners of the eight beautiful prizes were announced. Whist players then trooped to the recreation hall where dancing was in full swing, and everyone was obviously having a good time, though many of the men were too handicapped by disablement to dance, and there were not nearly enough girls to go round. Matron kindly gave away the whist prizes in the interval while ices and lemonade were handed round—and of course cigarettes. Festivities continued till 9.45 when the party broke up, the visitors promising to come again in the summer. Anyone who has seen the enjoyment given to the patients, many so terribly disfigured, must feel how well worth while is the interest and work that is given on their behalf by the Committee supported by the Gerrard staff, and must hope that it will be possible to carry on the work so long as the need continues.

The Committee will always be pleased to receive subscriptions from anyone interested in this excellent work.

W. M. E.

Dalston.

A very successful bazaar was held in aid of the Metropolitan Hospital on March 10 by the Dalston Exchange staff.

The proceeds amounted to £97 15*s.* 9*d.* and this sum was handed to the Secretary of the hospital.

Notice.

The compiler of these notes will be glad to have notices and accounts of staff gatherings and sporting events not later than the 12th of each month.

AUTOMATIC TELEPHONES SYSTEM AT DAIREN (DALNY), MANCHURIA.

THE official opening on April 1 of a new Strowger Automatic Telephone Exchange at Dairen, Manchuria, marks the second stage in an era of Automatic Telephone development in the Far East, the important railway centre of Harbin being already equipped with a Strowger Automatic Telephone system which was cut into service in 1921 and serves 3,000 subscribers.

The new Dairen installation at present serves 5,200 subscribers and like that previously installed at Harbin was manufactured and installed by a British firm, Automatic Telephone Manufacturing Co., Ltd., Liverpool, who secured both contracts in the face of foreign competition. This firm has now supplied some sixteen Public and Private Automatic Exchanges to the Far East including a 400-line equipment to the G.P.O., Tokyo.

It will be remembered that this firm recently secured the contract for 11,000 automatic lines for Bombay and this equipment is now being installed.

PERSONALIA.

LONDON TELEPHONE STAFF.

Resignations on account of marriage :—

Miss M. J. JENKINSON, Telephonist, of the Superintendent's Office, F.E.S.
Miss F. M. VAUGHAN, Telephonist, of the Woolwich Exchange.
Miss A. A. E. MANNING, Telephonist, of the Park Exchange.
Miss F. F. KENNEDY, Telephonist, of the New Cross Exchange.
Miss V. B. NEWMAN, Telephonist, of the New Cross Exchange.
Miss E. A. ARMSTRONG, Telephonist, of the Hornsey Exchange.
Miss P. M. UTTIN, Telephonist, of the Finchley Exchange.
Miss D. G. FRANKLIN, Telephonist, of the Museum Exchange.

NOTTINGHAM.

MR. JAMES SNEATH has had to relinquish the office of Chief Clerk, which had been held for 36 years. He was then within reach of retiring age and had served long and well, through the vicissitudes which beset the pioneers of telephony. It was most unfortunate that he should not have been able, by continuing in the service for a few short months, to crown such a long period of responsible office by retiring through the operation of the age limit.

In the year 1887 he accompanied a local director and they acquired premises at a modest rental of 7*s.* per week to house the then telephone staff of the Nottingham District. No more eloquent testimony is needed of the growth of telephony than this. At any rate, Mr. Sneath carries with him in his retirement something which every controlling officer, we imagine, values, viz., in a marked degree the affection and good wishes of the telephone men of all grades. Nearly every branch of the Service in Nottingham has contributed to the farewell token which took the appropriate form of an easy chair replete with every device to rest the weary, at the end of a strenuous career.

Mr. M. B. OLDBURY, Assistant Traffic Superintendent, who died with tragic suddeness on the morning of Monday, March 5. He was carrying on, apparently in his usual health, on the previous Saturday. Mr. Oldbury was a very keen telephone man and had been associated with the Nottingham District in various capacities for years. His death revealed the sad fact that he must have lived through a lifetime of very great suffering, without giving any sign. We think we can safely say that the telephone world is very much the poorer through the loss of such a promising officer at the early age of 43.

LEICESTER.

MR. D. ROSS, Superintendent Telegraphs, Leicester, has been appointed Postmaster of Newmarket.

PLYMOUTH.

MISS H. D. PYATT, Supervising Telephonist, St. Austell, resigned on March 26 owing to her approaching marriage. She was the recipient of a silver-plated tea service which the Postmaster (Mr. E. Miles) presented on behalf of her colleagues.

GLOUCESTER.

A LARGE and representative gathering of the telephone staff assembled in the District Manager's room on April 7 to bid farewell to Mr. G. EDWARD, Traffic Superintendent, upon his departure to take up a similar appointment at Reading. Mr. J. H. Storrie (District Manager) presided, and before presenting Mr. Edward with a silver tea service and spirit kettle, as a token of the esteem in which he was held by all members of the staff, and as an earnest for his future progress, eulogised his ability and the valuable work he had performed during his 10½ years in Gloucester.

In replying, Mr. Edward expressed his appreciation of the gift, and of the spirit in which it was given, a spirit which made him glad to remember the harmonious relationship existing between all exchanges and offices in the district, and which he trusted would long continue. He thanked all those who had so loyally assisted him and would count himself fortunate if he could depend upon the same co-operation and goodwill in his new district.

Mr. Freeling (Postmaster of Gloucester) commented upon the ability and zeal of Mr. Edward, and expressed on behalf of the Postmasters of the district the general regret at his departure.

ABERDEEN.

Miss FLORENCE BOOTH, shorthand writer and typist during the past ten years in the Sectional Engineer's Office of the Aberdeen Post Office, was presented on April 13 with a beautiful case of silver fish knives and forks on the occasion of her approaching marriage.

THE

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, Fleet Street, London, E.C.4.

CAN WE INCREASE OUR TELEGRAPH TRAFFIC?

MAJOR JAYNE, Controller (Telegraphs), Edinburgh, lectured on the above subject on March 15 last to a large audience at Glasgow under the Chairmanship—in the unavoidable absence of Mr. Forsythe, Postmaster-Surveyor—of Mr. Inglis, Chief Superintendent, Telegraphs.

Major Jayne said he was well aware that in this paper he had produced no patent method of increasing telegraph traffic—his sole idea had been to open up the subject for discussion. He dealt mainly with the necessity for the increase of telegraph traffic, because, in his opinion, one aspect of the work of the Post Office was quite sufficient to undertake in one evening.

If the majority of telegraph men were asked how telegraph traffic could be increased, they would probably reply "Lower the tariff." A study of telegraph finance did not point so clearly to this simple solution. Such a measure might result in increased traffic but bring no grist to the mill. He thought the first object to be attained was increased traffic, accompanied by increased revenue.

Many experts stated that, with the extended use of telephones, the decline of the telegraphs was inevitable. Probably the more correct theory was that the telegraphs could not hope to expand to the same extent as telephones, but they should develop in a certain ratio with the growth of the telephones.

It might be said that if the telegraph traffic went down and working costs were reduced side by side with the collapse, the financial aspect was safe. That was perhaps a good argument, and he had not the least doubt that everything would be done that could be done by telegraph officials all over the country to save the financial situation. In dealing with a public service, it had to be recognised, however, that there were certain services to be rendered to the State that required to be carried out, loss or no loss. It was from that point of view that he thought that now if more traffic could be obtained it would be remunerative.

Major Jayne asked the audience to consider for a moment what would happen if telegraph traffic declined 25 per cent. from its present level. The telegraph service would have to be kept as a going concern because it was a public service and even with the reduction of 25 per cent. a vast amount of traffic would still require to be dealt with. All over the country, however, there would be—indeed there were now—many large telegraph rooms only partially utilised and where, owing to their situation as regards light, ventilation, &c., it would be practically impossible to put the unoccupied space to better use. The vacant spaces of telegraph rooms situated in the centre of large cities and towns represented a huge amount of State money in site values, and if they were not put to remunerative use this would mean their lying idle, and worse than idle, for money had to be spent to maintain them.

Similarly, lines and plant. To maintain public communication there was a minimum of lines and plant beyond which the telegraph service could not go. Here again there would be capital and maintenance charges to a large extent unremunerative because they would not be working at their full capacity, and, he added, were not even now carrying full loads. It was fairly safe to assume that, at the present time, there was a margin in respect of sites, plant, and lines which if it could be filled would bring money to the Post Office, and this gave considerable strength to the argument that traffic ought not to be allowed to go lower if it could be avoided.

It was that margin, to most telegraph men it might almost be called an "aching void," that he wanted to fill up with paying traffic. He did not want to fill up half-loaded main line circuits carrying 180 messages an hour at 1*s.* each with full loads of 360 messages an hour at 6*d.* each.

Touching upon the tariff aspect quite briefly there was a grave doubt whether the public would at the present time send many more messages at 6*d.* than they did now for 1*s.* They had got out of the habit of sending telegrams to some extent, probably owing to certain restrictions during and since the war, just as in the same way many people got into the habit of making their clothes last longer during the war and then continued it. The first step should be, perhaps, to get their returns right and as soon as possible try a reduction of tariff.

There was probably a case for a reduction in the price of telegrams to 9*d.*, say between 2 and 5 p.m., on the same principle that Trunk Telephone charges were reduced. It might help them in other ways, such as in filling up lightly loaded circuits in the afternoons and thus diverting traffic from the evenings.

The immediate remedy lay, he thought, in getting the public to use the telegraphs more—not in a competitive spirit with the telephones, in certain directions it could not hope to do that, but in conjunction with them. As a measure for fostering the trade of the country, the public could be educated to appreciate what an asset the telegraph service was if intelligently used, particularly if used jointly with the telephones. He would like to ask traders to deal with all their more important correspondence by telegraph

nstead of by letter for three months and watch the result. How many business men and private persons knew that by ringing up "Telegrams" from their own house they could communicate with their correspondents by telegraph all over the world. If business people knew that the telegraph service was so accessible after they got home from their office, or during the day when for various reasons they were confined to the house, they would use the telegraph-telephone or "phono-gram" service more freely. If they knew little of the phonogram service, they knew less of say the Night Telegraph Letter Service. The public unquestionably thought of the cost of telegrams, and often in the evenings, for example, fretted and fumed because they had lost the last post. It was not known that by ringing up "telegrams" an important message would be written down at a telegraph office, sent over the wires, and delivered in a distant city with the early morning letters—the cost of this Night Telegraph Letter being 1*s.* for 36 words.

Major Jayne quoted the result of a very mild attempt at bringing that service under the notice of the public—it had merely been done to discover whether publicity would achieve a direct result. The local newspapers were asked to publish a brief description of the Night Telegraph Letter Service and a fairly prominent notice was placed at the public counter.

The effect was shown in a comparison between January and February 1922 and the same months 1923.

	1922.				1923.			
	Received by Telephone.	Forwarded.	Received.	Total.	Received by Telephone.	Forwarded.	Received.	Total.
Jan.	2	4	3	9	6	16	7	29
Feb.	—	10	8	18	12	26	3	41

The increase achieved by the very small amount of publicity was for a service of this description quite surprising. An examination of the text of the Night-Letters indicated that the majority were in connexion with business matters, and that the senders had utilised the service in preference to the ordinary post. The increase in the number received by telephone was interesting, and there again a field for remunerative returns was suggested. But to make that service of real practical value to the users it must not be confined to towns which had very late or all-night telegraph facilities; it must be thrown open to all places in Great Britain and the north of Ireland. It would thus be of definite service to the trade of the country.

Major Jayne then enumerated the services which also provided fields for development:—Telephone Express Delivery, Express Services, Messages for Abroad for inclusion in outgoing mails from the port of departure; Meteorological telegrams, Enquiries for information regarding positions of ships, &c.

As one means of advertising, he would suggest the publication of a small leaflet the size of a pocket diary in every town giving telegraph facilities and local postal information.

The possibilities of telephone call offices for the purpose of collecting telegraph traffic did not appear to be fully realised. There were many town sub-offices all over the country with nothing very much outside the office to indicate that telephone and telegraph facilities were available within. Such offices were usually telephone-telegram offices and a splendid opportunity for getting traffic was lost through not having a strikingly attractive sign outside such as "Telephone and Telegraph Office." Similarly there were scattered profusely over most towns such notices as "You may telephone from here" or "Telephone." Many of these notices sadly needed purging with hyssop. The owners were usually tradesmen anxious to push their own wares by encouraging people to use the telephone, and it should be easy to make arrangements with them to let the public send telegrams. Then the notice should read "You may telephone and telegraph from here."

Advertising telephonic and telegraphic wares did not seem to be undignified for a State Service. It was not as though it were anxious for the public to spend money on something that was unproductive. A familiar quotation might be re-written "Good communications encourage trade."

Many large stores and restaurants were anxious to have their own Post Office. Encourage them in this and let them send telegrams for the public over the telephone—or if the traffic were sufficiently heavy instal a Teletype—they could be charged for the telegrams in the usual way. It was probably in the direction mentioned in this paragraph that most scope for development lay. Major Jayne asked them to consider the possibilities in the way of collecting traffic that the telephone subscribers in every restaurant, shop, or office, offered. All that was required was permission to local officials to exploit on the lines suggested.

An extremely interesting and helpful discussion followed.

Mr. MILLAR thought that the suggestion to reduce the tariff between 2 and 5 would have the effect of getting traffic at 2 o'clock which normally would be received between 12 and 2, and traffic usually received after 5 o'clock in the evening would reach telegraph offices before that hour.

The speaker in reply thought that it would be a very good thing for the staff if traffic could be diverted from the evening to the afternoon. The principal cause of late duties was the large bulk of traffic to be dealt with between 5 and 7 p.m.

Miss DOUGLAS welcomed the opportunity for open discussion, and assumed therefore that the lecture did not represent Major Jayne's final ideas on the subject. She could not agree that the telegraph service was doomed to become a sort of handmaiden to the telephone service, nor that the former would be improved, financially or otherwise, by booming the Night Telegraph Letter Service and she condemned the telegraph delivery system, which increased the delivery time out of all proportion to the transmission time.

With regard to reconstruction, she considered that a vast amount of money had been expended on numerous telegraph systems throughout the kingdom which to-day are largely superseded by the Baudot. Vast sums must have been swallowed up in manipulative and technical training in connexion with these systems. Business acumen suggested that the scientific and technical staff should be placed in a position to experiment fully with the various systems and that no system should be installed unless and until it had proved to be of real lasting value. What was needed to-day was the selection of not more than one or two systems, so that the very maximum efficiency could be attained in the shortest time. The best advertisement which any business or service could have was its own efficiency.

Major Jayne thought that a certain amount of interdependence between the Telegraph and Telephone Services was inevitable and the important thing therefore was to use the telephone which was being installed in people's houses and offices in greater number every year as the agent of the telegraphs. He was not greatly in favour of the Night Telegraph Letter Service especially at the present tariff which could easily be made 1*s.* for 24 words, but it was an existing service and he had used that as an example. Like the majority of telegraph officials, Miss Douglas had the idea that under the old system of delivering telegrams a messenger was waiting for every individual telegram, and having got it rushed off with it to the addressee. Such a practice from fairly busy hours onwards during the day had not been in force for 30 years. During those years there had been a batch system but a most unscientific one. He agreed that the laboratory should, as a rule, be the place to ensure scientific progress and that the telegraph systems in use should be reduced to as small a number as possible.

Mr. MCINTOSH thought that Night Telegraph Letters was an unproductive service, and call office fees and private telegraph office commission would be a detriment to any development in those directions.

The lecturer said that he did not contemplate the maintenance of call office fees and seeing that many firms desired private telegraph offices, he thought they might have them without being paid commission.

Mr. HIGHET thought that in order to increase traffic it was first necessary to restore the confidence of the public in the telegraph service, and that would not be done until we gave a first-class service in accuracy and speed. In addition, the public compared our Baudot slip copies of telegrams with typewritten copies supplied by Cable Companies, very much to the former's disadvantage. The most common complaints are bad paper, bad pencils and delay in answering letters.

Mr. HOWIESON said there was considerable dissatisfaction amongst the subscribers that a local fee was charged for an outward phonogram and several had stopped telephoning their telegrams on that account. He thought that coin boxes at call offices was one very excellent way of attracting telegraph traffic.

THE POST OFFICE TOTAL ABSTINENCE SOCIETY.

THIS Society held its annual meeting in Gresham College on May 10, and one of the most satisfactory features was the announcement by the out-going president, Mr. T. A Prout, that the Postmaster-General had consented to become the president of the Society. This is the first time that a Postmaster-General has occupied the presidency, and the Society's active workers are naturally much gratified by this fact.

Sir William Joynson-Hicks, in accepting, wrote saying, "This is an honour which I much value. I am quite sure, from a very long experience of over forty years, that total abstinence is good for a man morally, mentally, and physically." It is a curious coincidence that at the previous annual meeting of the Society Sir William Joynson-Hicks not only presided, but also gave a very gratifying address that highly pleased all who heard him. This was many months before he became our political chief.

This year's meeting also experienced the pleasure of hearing a lecture on Wireless Telephony given by Mr. A. O.Gibbon, of the Engineer-in-Chief's Department. This was accompanied by a series of demonstrations, the audience being enabled to "listen in" by means of an installation of up-to-date apparatus. Mr. Gibbon was very ably assisted by Mr. F. O. Read, who had devoted some time in preparation.

Mr. Harold Toy, Mr. W. B. Poultney also gave appreciable contributions to the musical section, and Mr. J. F. Darby proved himself a good illusionist as a magical entertainer.

Anyone interested in the work of total abstinence and who would be willing to help in the cause should communicate with Mr. H. B. Winder, the Hon. Secretary, P.O.T.A.S., Central Telegraph Office, E.C.

The Society is reviving their magazine *The Post Office Temperance Pioneer*, and a very strenuous effort will be made to develop it.

HOW THE TELEPHONE WORKS.

BY A. CROTCH.

IX.

SIEMENS' AUTOMATIC. *(Continued.)*

[NOTE.—It is regretted that the titles of Figs. 27 and 28 were transposed by the printer. The figure marked 28 on p. 141 should be Fig. 27 Diagram of 1st line switch, and the figure marked 27 (p. 140) should be Fig. 28 Diagram of 2nd line switch.]

We now come to the circuit and assume that subscriber No. 450 requires No. 365. He lifts his receiver.

1st Line Switch. The battery on line relay R (Fig. 27) now finds a circuit round the loop and energises R. The contacts close, No. 2 putting earth on the driving magnet circuit. It will be remembered that all the wipers are off normal. At the first impulse the wipers are propelled off the zero contact on to the first active one. This disconnects the lead between C zero contact and the multiple and leaves it open or disconnected, which condition marks the subscriber engaged.

Regarding C; if the second line switch on whose contact C rests is engaged, that contact will be disconnected and the driving magnet will propel the wipers to the next. If the second line switch on this contact is disengaged, the free pole of an earthed battery will be connected to the contact and on C reaching it, the first line switch will receive a current which will pass through C wiper, meter, 15w. and 1,600w. coils of the testing relay T to earth at R1. T pulls up and its contacts disconnect the line relay and re-arrange the path for the current from the second line switch. This current now passes through 15w. coil of T direct to earth at wiper D. The closing of T2 and T3 puts the subscriber through to the second line switch. The circuit up to the present stage is shown in Fig. 31.

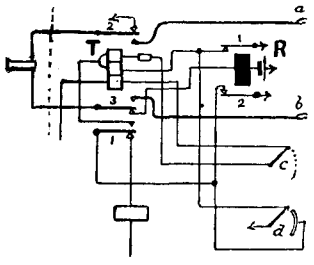

FIG. 31.—SUBSCRIBER THROUGH TO HIS 1ST LINE SWITCH.

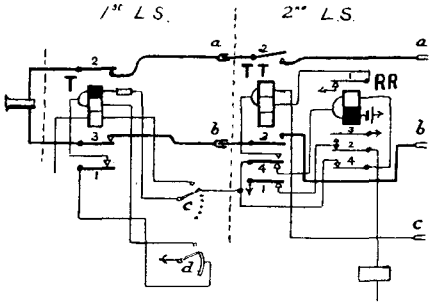

FIG. 32.—SUBSCRIBER THROUGH TO 2ND LINE SWITCH.

2nd Line Switch. The current received on the first switch passes through one coil of relay RR so that the latter is energised in series with T. This joins up the testing relay circuit. This switch has no zero position but remains on the last position in which it was used. If the selector to which its C wiper is now connected is engaged, its contact will be disconnected, and TT will be unaffected. The driving magnet circuit, however, was also completed by energising of RR and the first impulse propels the wipers to the next contact. If this selector is disengaged C wiper will receive a current from that contact which will traverse the 10w. and 1,000w. coils of TT, getting earth at RR1. TT pulls up: and this cuts off the 1,000w. coil, the current passing from C wiper, 10w. coil and then to 15w. coil of T to earth at D. The battery on RR now finds a path through the upper coil and thence to common earth *via* T and D. In passing through both coils of RR the current acts differentially and releases its contacts. TT being energised puts the subscriber's line through to selector *via* the feeding relay A on the latter. The circuit is now as indicated in Fig. 32.

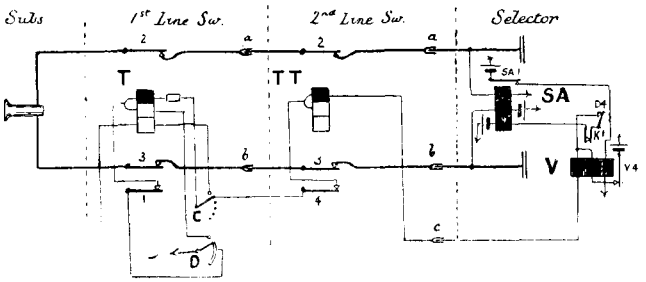

FIG. 33.—SUBSCRIBER THROUGH TO SELECTOR.

Selector. As soon as 2nd line switch C wiper touches C contact of disengaged selector, current flows from battery on latter, through 200w. coil of SA relay, K1, D4, 300w. NI coil of V to C wiper of line switch, C wire, 10w. coil of TT relay, C wire, 15w. coil of T, to earth at D, actuating SA, TT and T (Fig. 33).

SA relay pulls up:

Supplies current to calling subscriber's loop.
SA_1 actuates V.

V energised:

V1 actuates D; *via* D battery, D 500w. coil, K3, V1, E.
V3 lights PL lamp; *via* L battery, 350w. NI coil, L3, V3, Y3, lamp, E.
V4 puts its battery in parallel with that through SA 200w. coil to C wire; that through SA will be disconnected when shaft-springs actuated.

D energised:

D2 prepares circuit for vertical magnet.
D3 gives dialling tone to A line.

1st digit. (3) SA releases for 1st impulse: V hangs on:

SA1 actuates vertical magnet through D2 and ST5.
Shaft-springs K actuated.

SA re-engaged:

D deprived of current; hangs on:
SA2 actuates L by L battery, 1,000w. coil, SA2, D1, K3, V1, E. L locked *via* L1, Y1, K3, V1, E. This prepares circuit of ST 500w. through C wiper and L2.

SA releases for 2nd impulse: V hangs on:

SA1 actuates vertical magnet, as before.
D re-energised *via* SA2, D1, K3, V1, E.

and so on for further impulses. At end,

SA re-engaged:

D deprived of current, hangs on but finally releases.
L remains locked, as before.

Wipers now on desired (3rd) level; circuit of rotary magnet now ready *via* V2, K2, D2, ST5, E. Circuit of ST's 500w. coil to earth at L2 ready to be energised by current from disengaged connector, when one reached.

Impulses of current now pass through rotary magnet, stepping wipers round until a disengaged connector

reached. Current from latter then enters C wiper and actuates relay ST by its 500w. coil.

ST energised :

ST2 and ST3 put A and B wipers through to connector.

ST1 substitutes 1,500w. coil for 500w. coil, by way of its own battery, 1,500w. coil, ST1, D1, K3, V1, earth.

ST5 cuts circuit of driving magnet so as to cut off impulses from rotary magnet.

ST4 earths selector end of C wire to connector.

L remains energised and locked until wanted subscriber replies, when Y actuated and breaks L's circuit at Y1.

Subscriber now through to disengaged connector. Current passes from battery on latter's X relay, through its coils to C wire and earth at selector ST4.

(To be continued.)

DEPOSITS.

BY CLERICAL OFFICER (Rochdale).

SUFFICIENT time has now elapsed since the Rates Revision and altered method of rendering accounts to enable us to take a comparative survey of the manner in which, generally, the alterations have been received by subscribers. The difficulties encountered, even in the most perfectly organised district office, in transferring every subscriber to a new tariff, involving, in addition, a revolution in the method of accounting, are only just passing away. Normal conditions now prevail, or nearly so.

In the early months of 1921, every subscriber was required to pay annually in advance a yearly subscription for the hire of the telephone apparatus. In addition, the great bulk of subscribers paid in advance a sum approximating to the value of local call fees likely to be incurred in the ensuing year. This amount was calculated on the basis of local call fees actually used in the previous year. Further, a deposit to cover all credit trunk and telegram facilities allowed monthly was also paid.

There was still a minority of subscribers enjoying a flat rate service, and variations in tariffs for apparatus abounded throughout the system. With one sweep everything had to be changed, *e.g.*:

Notice to cease in accordance with the terms of the agreement had to be served on every subscriber.

New installation rates were introduced.

New Call fee charges—trunk and local—were introduced.

Accounts were rendered quarterly for the first time, and nearly all old accounting methods scrapped, with only three months in which to accomplish the task.

Well, of course, things scarcely shaped themselves in the manner it was originally intended they should, but that is another story, and will be an interesting one whenever it is told. Suffice for this occasion to describe briefly what took place so far as the subscriber is concerned. Let us consider what effect these changes have had on subscribers. It is not an easy matter to focus the attention of a large community of people like telephone subscribers on systems and procedure, and much of the literature enclosed with accounts is ignored, or so quickly scanned that it is almost immediately forgotten. Thus, we found that the first result of the despatch of accounts was an avalanche of correspondence and telephone enquiries, the latter probably heavier than at any previous period in the history of the telephone service, and this may be accounted for by the extended local fee area which, in many cases, carried the district office much nearer to the subscriber.

Undoubtedly, quarterly accounts are subject to closer examination by subscribers than accounts rendered under the old yearly system, and this naturally means additional work in accounting offices in the form of correspondence and telephone enquiries. It is manifest that the new tariffs, coupled with the changed accounting procedure, must result in closer supervision of the accounts rendered to subscribers than hitherto, for the following reasons :—

1. Abolition of the flat rate.
2. Elimination of a guaranteed minimum number of calls per annum, *i.e.*, 300 calls for residence lines, 500 calls for business lines and 3,000 calls for private branch exchange installations.

Certainly, the former flat rate subscribers have had difficulty in regulating the calling rate to conform to the new conditions of payment according to user, but advantage has been taken in many cases of the monthly advice of the number of calls used, which is available to all subscribers agreeing to pay a small annual fee. It is, however, the relatively small user, viz. :—a subscriber who before the revision paid £1 for 300 originating calls, or £2 allowing 500 originating calls, who displays by far the greatest interest in his telephone charges.

The new rates having disposed of a guaranteed minimum in respect of local calls, the small-user subscribers have been keen to recover some of the additional installation charge payable under the new tariffs by a closer supervision of their calling rate, and this naturally results in more questioned accounts.

Nevertheless, there is ample evidence that the method of collecting telephone rent and fees quarterly instead of annually is looked upon more favourably now by subscribers than appeared likely to be the case in the early days of the change. In a few cases, and those mostly at private residences, where the telephone is mainly used for domestic purposes, the renter asks to be allowed to pay a sum approximating to a year's rent and fees in advance. There is no difficulty in meeting the wishes of these people. Their quarterly accounts are rendered along with the rest, showing the appropriate credit at the close of each period up to which the account is prepared.

Attempts have been made on the part of subscribers to establish a system of recording calls to check with the department's quarterly accounts. Whilst this is often useful and satisfactory so far as trunk calls are concerned, it is clear that the additional work entailed at the subscribers' end (especially where numerous persons have access to the telephone) has failed to produce reliable records.

There is no doubt that subscribers have, during the past 12 or 18 months, been subject to a distinctive educational process which the introduction of new conditions in telephone accounting has demanded, and in spite of criticisms from many quarters, the system of compiling accounts is now more clearly understood and appreciated.

Indications are not lacking that a more reasonable attitude exists on the part of subscribers to the telephone administration's method of compiling records, and their reliability is less frequently questioned. In spite of this, the problem of persuading some subscribers that no effort is spared to ensure accuracy is extremely difficult. These subscribers are usually theorists who have always been convinced that the entire system is wrong, but by the practical mind it is realised that the presence of this type of subscriber cannot be entirely eliminated.

Those who have studied the psychological development of telephone users will not permit any measure of success which they know has been achieved to interfere with the vigilance that is always necessary if confidence in the department's call fee records is to be maintained.

Deposits are payable in respect of services for which accounts are rendered quarterly in arrear and have created some disturbance in the minds of many subscribers.

A condition of the telephone service is that a deposit approximating to two months' credit fees, local and trunk, should be held by way of security, with a minimum payment of £1 10*s*.

It will be admitted that a demand to place on deposit a sum of money which may be 30*s*. or £30, according to the value of call fees used quarterly, is not, on the face of it, one to be met without comment. To be told that the telephone service is, like the postal and telegraphs, a prepaid service, does not carry the subscribers' mental vision beyond the purchase of a few stamps at a Post Office counter.

A comparison of payments under the old limited rate and under the new arrangements, covering a normal rental period of one year, shows that the present deposit system is a distinct improvement, in favour of the subscriber, on the old method.

	New Arrangement. Quarterly basis.		*Old Arrangement. Yearly basis.*	
	Quarterly value of local originating calls.	Quarterly value of trunk call fees.	Yearly value of local originating calls, approximated.	Yearly value of trunk call fees.
	£3	£3	£12	£12
Deposit payable, *i.e.*, two-thirds of £6		£4		
Deposit payable, *i.e.*, approximate value of one year's local calls and one month's trunk calls				£13

The difference in call value under the old and new traiffs has been ignored. All that is required for the purpose of illustration is to show how the new method if rendering accounts has favoured subscribers so far as pre-payments are concerned.

Application for additional deposits to bring the amount up to the minimum required (two-thirds of the quarterly value of local and trunk call fees) is often necessary where the traffic for the current quarter shows an increase as compared with previous quarterly statements. These requisitions for additional deposits are frequently the prelude to much criticism and correspondence, and not many accounts are passed by subscribers without a reference being made as to meaning of the request for an additional deposit.

The deposit question, however, needs careful handling, and will always tend to create misunderstanding unless care is taken at all times to disabuse the subscriber's mind of many of the false ideas obtained through extraneous sources, which encourage opinion confirming their own particular prejudices. A deposit governed by a fluctuating figure will persistently assert itself in one form or another, and from the subscribers' point of view this aspect of the new tariffs, is probably the most unsettling feature of the change.

TELEGRAPHIC MEMORABILIA.

ACCORDING to the *National Electric Light Association Bulletin* of America Major-General Squiers, of the United States Signal Corps, is organising a company to broadcast over high-pressure service wires of electric light and power companies. Concerts, addresses, and bed-time stories will be neatly delivered, if his plans are realised, through a special instrument and paid for on a meter like the gas bill.

The *Electrical Review* informs us that at the Petrograd factory of the Weak current Electric Trust, the production of railway signalling equipment has been considerably increased. This factory produces 95 per cent. of the country's demand. The factory is engaged in preparing electric signaling on the Alexandrovsky, Kursk, Southern, Ryaz-Ural, and other railways. The management of this factory is studying systems of electric railway signalling with the intention of using and combining the best systems.

The same authority gathers from a review of Joseph Roussel's book on "Comment Recevoir la Téléphonie sans Fil" that the French equivalent for a listener-in is *sans-filiste*. If this be so the term is by no means so happy a result as is usually to be expected from the poetic inventive genius of our friends across the Channel.

The wireless telegraph stations at Mukden, Harbin, Changchun, and Tsitsihar have been installed and operation has been successfully commenced.

Although somewhat belated the following excerpt from the Fifty-sixth Ordinary General Meeting of the Indo-European Telegraph Company should prove of considerable interest to readers of this column as showing the extreme difficulties which have to be surmounted before certain portions of Europe can make any pretensions to a return to the normal standards of telegraph communication.

"The wire has been restored between Warsaw and Teheran, and has been earning revenue for us by carrying in a very satisfactory manner Continental International traffic of a most varied kind, thus indicating the gap which the interruption of our route has left in the telegraph facilities of the world.

The re-opening of this wire, a simple matter as it may appear, has been accomplished only by the most wholehearted and indefatigable efforts on the part of all concerned. The portion of our route traversing Poland has had to be entirely rebuilt with three wires, for a distance of 370 miles and repaired for a further distance of 180 miles. The construction and repair accomplished under the direction of our chief engineer, Mr. A. L. Cook, show work of a very high order, the result having been highly appraised by an expert outside the company.

The difficulties in connexion with this work have been enormous. You will, perhaps, realise the difficulty even of obtaining the necessary oak poles, 30,000 in number, taking Poland and South Russia into consideration. These have to be cut in the forests, which can only be done in the winter, and they have to be transported each to its place in the line; every pole weighs half a ton.

Then the remaining material—namely, wire and insulators, not to speak of all the minor items—has had to be purchased hundreds of miles away from its ultimate location and transported across various frontiers, with the attendant difficulties and delays, amongst many others, of export and import licences. It must also be borne in mind that, owing to climatic conditions in Poland and South Russia, little work on the line can be done during the winter season.

We have been greatly assisted in our work by the Polish and Soviet Governments, but in addition to this an immense amount of co-ordination between our offices so far apart as Moscow, Warsaw, Odessa, Teheran, and London has been required to bring about the result obtained, and the directors feel that great praise is due to their representatives and chiefs of stations abroad, to their chief engineer and staff, and to the management and staff in London. Even so, the work in Poland is not yet quite complete, certain sections in Poland and Russia having had to be bridged by the loan of Government wires, but there is no doubt that this summer the entire work will be completed.

In the Ukraine circumstances have been more favourable. Only short sections have had to be entirely rebuilt; thorough repair has been sufficient for the remainder.

East of Odessa again, for the most part, only repair has been necessary, and the company's lines are in a fit condition to carry any traffic required.

All our stations in Poland, the Ukraine, and the Caucasus have had to be re-staffed and in many cases re-equipped, and it is only fair to the staff to say that conditions of living are very difficult; they have, however, faced these conditions manfully, and the directors would be glad to feel that their behaviour is appreciated by the shareholders to the same extent as by the directors."

The C.T.O. has lost two distinctive personalities by the retirement upon reaching the age-limit of Messrs. Bloomfield and Kellett on the respective dates of May 5 and 16. Both, it is a pleasure to record, leave the office in excellent health and both with the heartiest good wishes of a host of friends in all ranks. Both also, it is gathered, intend to spend the days (many, many, we hope) of their retirement at a considerable distance from the metropolis, the former intends to flit to Suffolk and the latter to Sussex. Of friend Bloomfield it may be written with assurance that his many activities, mental and physical, will leave him with but few spare moments, and it is even prophesied of him that before long his new home is likely to become an intellectual centre of the Woodbridge district, with neoteric views on the coming Utopias well in the foreground, and very positive opinions on certain survivals of the feudal system.

Of "Jack" Kellett it may be said tht his conversational powers, his ready—but always kindly—repartee is certain to ensure his welcome entrance into the social circles of Ruraliana, ye village inne, ye cosy corner and all the attending impedimenta!

It was a happy omen that as Mr. Blomfield left the telegraph gallery for the last time, hardly had the encouraging cheers of the staff died away than a gladsome peal rang out from one of the ancient City churches near-by.

The installation of Teletype apparatus between Edinburgh and Leith, and Sunderland and Newcastle-on-Tyne will be watched with keen interest by all interested in the development of type-printing machine telegraphy. Reports so far are very favourable, and with the excellent coaching which the offices concerned have received from the most competent of representatives from the C.T.O. manipulative and engineering branches there should be no difficulty in maintaining an A1 service. There is, however, still an undercurrent, not very well defined but nevertheless extant among not a few that machine telegraphy can take care of itself. To such it may perhaps be whispered that a little periodic MAINTENANCE by competent mechanics in the place of waiting until something breaks down is by far the more satisfactory policy. It is indeed, truly "economical."

The subject of machine telegraphy directs one's thoughts to the subject of "The Monotony of Machinery," which was very sympathetically dealt with by the *Westminster Gazette* in one of its issues in the early part of last month. The text for the article was supplied by a question which arose at a conference of cotton manufacturers held in Manchester at which there was a long discussion on the difficulty of recruiting young workers for the mills. The trouble is apparently not merely an economic one. It is, the writer suggests, "part of that general striving after something better in life which is working like leaven throughout our social and industrial system." The mere watching of a machine, or the performance of some regular movement which is made to assist that machine in its regular functions with a monotony that does not vary from January to December may well be considered as a misuse of human brain and skill, but we take hope and heart from the fact that the tendency of modern mechanical development is to complete the mechanical process to such an extent as to eliminate all but those processes which require human judgment and human skill. Much of course depends upon the individual. It was a mere machine-minder who invented one of the adding machines now on the market, to whom the knot in the endless band of his machine roused the query, "If that knot could touch a lever every time it made one revolution it could be made to count." Eventually a machine was made not only to count, but to multiply, and to divide.

However, we are not all inventors, and most of us would have watched that knot without interest. The question arises in connexion with our own craft as to how far monotony plays a part in our daily task of transmitting or receiving telegrams. It was thought at one time that keyboard perforators would tend to make telegraphy too "mechanical." There may be a tendency in that direction, but it is just this tendency which must be curbed, and which being curbed the act of self-restraint itself provides the antidote to the telegraphist becoming too much a part of the machine. It is true even to say more and to emphasise that a telegraphist—upon whatever type of apparatus he may be employed—is no master of his craft if he permanently loses his discriminatory faculties in the performance of his duties. There is another phase of telegraphy which somewhat appeals to the thinking man or woman and that is the employment upon circuits where "nothing ever happens!" That phase was presented to the writer by a most competent telegraphist who had spent some years on both Inland and Foreign circuits, and who upon returning to the former uttered the words quoted above. There is of course something in this monotony of the *perfect* circuit which may make moralists stop to think of that possible impossible world where no virtue ever goes astray! My friend also mentioned that the fascination of working a long-distance circuit into another country and across half a continent always lent interest to her operative skill. It seemed "so much more serious than sending telegrams to and across London." It is an interesting theme.

The statement that the Amalgamated Wireless Company would not guarantee commercial wireless working between this country and Australia for 365 days each year has been quoted against wireless by the pro-cableites, and with a certain amount of reason. It is, however, only a reasonable provision which any sane and expert body of men would naturally insert in any agreement for the establishment of long-distance wireless systems with the present limited scientific knowledge of radio communication. When one knows that at times fifty or a hundred messages may be lost in the ether and the work of hours reduced to *nil* it is not unreasonable that Clause XII of the agreement between the Australian Commnowealth and the A. W. Company should read, "For the purpose of this agreement the Commercial Wireless Service means a service capable as regards plant, apparatus and personnel of maintaining communication throughout 300 days of every year on the minimum basis of twenty words per minute each way for twelve hours per day."

A foreign telegraph office recently wished to complain of some mutilated words which a telegraphist inexperienced in the German language had punched for Siemens transmission, and London received the following note, "the officers who has *boxed* it has not understand the German language!"

Through the interest and courtesy of an Edinburgh correspondent the following item regarding the launching and construction of new cable steamers

for the Eastern Company is presented. *Inter alia* this hardly looks like the death of submarine cables. Only an issue or two back we noted the launching of the Faraday cable ship for a firm of cable manufacturers: —

The twin-screw cable steamer *Mirror* which was launched on Saturday, the 12th ult., by Messrs. John Brown & Company, Clydebank, for the Eastern Telegraph Company, London, and her sister ship *Norseman*, which will be launched shortly by the same firm, are each 270 ft. in length over all, 37 ft. 2 ins. in extreme breadth, 25 ft. in moulded depth, and of 1,740 tons gross. They will be propelled at a speed of 12 knots by triple-expansion engines of 1,500 i.h.p. constructed by the builders. Each will have three cable tanks of a total capacity of 16,000 cubic feet- equivalent to about 520 miles of cable—two sets of the latest type of cable-working machinery, and large sheaves at the bow for cable-laying purposes.

The *Mirror* was named and launched by Mrs. J. C. Denison-Pender.

Sir Thomas Bell proposed "Success to the new ship and her owners." In doing so he referred to the enormous extensions and development in submarine cable enterprises during the past 50 years, remarking that in 1872, when the Eastern Telegraph Company was founded, the total length of cables laid would have sufficed to go only about one-third round the world, whereas in 1922 the length of submarine cables laid was sufficient to encircle the world 13 times over. He also made reference to the importance of the Eastern Telegraph and its associated companies in constituting one of the most important telegraphic links between Great Britain and nearly the whole of its Dominions and dependencies.

Mr. J. C. Denison-Pender, in replying, said Messrs. John Brown & Company and the Eastern Telegraph Company came into existence about the same time. So long as cable companies existed cable ships would be required. The future work of the vessel which had just been launched would be of no ordinary character. She would take her place in a fleet of about 16 vessels, and she would have to assist in looking after an enormous mileage of cables. She would, he was sure, do that work with absolute efficiency, under the command of Captain Allan, and would carry out repairs safely and speedily wherever they were needed.

In all walks of life it is true that it is the little things that worry and trouble us. The electrical engineer is therefore not immune from the plague of minute worries. An inquisitive mouse brings about the stoppage of an entire electric lighting installation; deep down on the ocean bed an aquatic worm bores its way into the submarine cable, and now from California comes the news that a "short-circuiting beetle" has been found or rather has found the electrical engineer and his lead-sheathed overhead cables. These beetles bore holes in the sheathing about 1/10th of an inch in diameter according to *Science*, which journal further informs us that: —

"Experiments have been undertaken at various times by the Bureau of Entomology of the United States Department of Agriculture to determine what treatment could be used to keep the beetles from injuring the cables. These experiments are summarised in a professional paper, issued as Department Bulletin 1107, 'The Lead-Cable Borer in California.' The results indicate that the beetle is able to penetrate any lead alloy used as a cable sheathing or any poison or repellant placed on it. Probably it is able to penetrate the poisons because it does not feed as it bores through. Beef tallow, when sufficiently soft, will stick to the beetle and suffocate it, and has been used with some success on the rings which suspend the cable, since practically all the boring is done near the rings. Layers of friction tape impede the boring and thin sheets of copper, zinc and steel prevent it. Sleeves of these metals can be placed around the cable at the rings, but the cost would probably be too great for general use. A new type of ring made of flattened steel-wire stock and galvanised is now being installed by the telephone companies, and it is believed that this ring is better from the standpoint of preventing attack by the beetle than the old one. Meanwhile, tallowing the rings is the most promising method of dealing with the pests."

The following are a few among many interesting items in connexion with broadcasting as sanctioned by the Norwegian government:—

"Broadcasting is to be limited to a few hours in the evening. At all other times the Telegraph Administration is to have exclusive use of the station. *All material to be broadcast must be censored by the Telegraph Administration.* The term of the concession will be limited to two years pending future legislation. Licences for receiving apparatus will be issued only to those buying or renting apparatus of Norwegian manufacture, approved by the Telegraph Administration. The company is not to have a monopoly of the manufacture of apparatus, but may require remuneration for broadcasting. Foreign manufacturers will have the right to make an agreement with the broadcasting company. The company will pay a definite fee to the Telegraph Administration for every receiving set sold or rented."

The item italicised is worthy of special note.

The following revolutionary invention should be carefully watched by all interested in the future developments of cable telegraphy. Should the anticipations of the well-known and highly scientific inventor be realised cable rates should drop considerably all over the globe. *The Times* certainly has given prominence to it but the lay press generally have apparently missed the full signification of this scientific advance.

"The invention of a new method of sending telegraphic signals, which is calculated to increase the speed of transmission by 150 per cent., was announced on April 24 to the National Academy of Sciences at its annual meeting at Washington by Major-General Squier, Chief of the United States Signal Service. It is proposed to displace the present Morse and cable alphabets by an alphabet where the signal units shall all occupy equal lengths of time and have an equal importance whether they be dots, dashes or spaces. There are to be differentiated by different intensities of a sinusoidal wave exactly in the manner that music and speech are formed."

The reconstruction of the Zbaszyn-Posen-Brest-Rovno-Zdolbunowo telegraph line, which is part of the Indo-European and State telegraph line that was destroyed during the war, has now been completed, and the information is published in these columns as much for the interest of station names with which international telegraphists have to cope as for the news itself which it is admitted is now some month or two old!

A Nation's Language.—Every man of education should make it the object of his unceasing concern, to preserve his language pure and entire, to speak it, so far as is in his power, in all its beauty and perfection. . . . A nation which allows her language to go to ruin, is parting with the last half of her intellectual independence, and testifies her willingness to cease to exist."—SCHLEGEL.

J. J. T.

TELEPHONE DEVELOPMENT STUDIES.

BY AN OCCASIONAL CONTRIBUTOR.

No matter how reliable their economic theories may be or how accurate the Engineers' calculations, a cable lay-out cannot be satisfactory if these calculations are not based on a reliable development forecast. Few telephone men can call to mind wastage caused through a too generous forecast; but wasteful reconstructions due to the actual growth exceeding the forecast have been a common experience since the telephone has been with us.

In view of the importance of an accurate forecast information on all points likely to have a bearing upon property development in the area surveyed should be sought in all directions in order that the property conditions at the ultimate and the probable periods during which property changes will occur may be correctly gauged.

For the survey work, the most valuable attribute is *vision*. The officer must be able to visualize what the locality will be like twenty years ahead. Optimism is the next great asset. Many people, unfortunately, get scared at big figures and are inclined to trim down the development in the later periods to some 2 per cent. or 3 per cent. geometrical increase per annum, regardless of the fact that in America, with a station density of 14 per cent. of the population, the increase in one year was at the rate of over 9 per cent. per annum. Some of the forecasts recently made would leave this country in twenty years time still short of the density reached in America thirty years earlier.

Above all, the Pessimist must be kept off development work. Even the Optimist must watch that he is in the right mood. For instance, he should never survey on a wet day. What vision can be expected from a man in a soaked mackintosh with a wet plan in his hands rather should he wait for the fine morning, when he can start out with the feeling that "it's good to be alive."

Some knowledge of cable lay-out will be found of advantage, as the officer will then know where to indicate separate figures for prospective buildings that will require block or internal distribution.

The first and the most important point in survey work is to determine what is likely to be on the ground twenty years hence, and it is here that vision is needed. The Surveying Officer should look over again localities which he can remember as a youngster. In London, for instance, let him see how Kingsway has replaced the slums round Clare Market; or those huge blocks of flats erected where once stood the Albert Palace. The progress thus indicated will continue in the future and requires to be fully visualized.

Having determined what is likely to be the property conditions at the ultimate period, the next step will be to decide when the changes are likely to materialise, whether in an early or late period, so that the factors determining the intermediate figures may be fixed. In this connexion, enquiries should be made of all likely sources, and particularly of the estate agents usually interested in the locality. In town work, the Borough Surveyor may be able to assist with information of probable improvement works, whilst in country districts the likelihood of estates coming into the market should be investigated and particularly the possibility of an entail being broken and land thus made ripe for building.

With the increase of fast-moving motor traffic, town authorities will be forced to deal with street widenings and with awkward corners. In allowing for this, it should be remembered that the consequent improvements will mean the displacing of a number of small properties—with perhaps a density of one line per building—by large blocks of shops, offices or flats property, with a density of from twenty to fifty or more lines per block.

Having reached the best decisions as to the property development, the next step will be to apply suitable density percentages to each class of property. It will be found convenient to fix in tabular form the percentage of density applicable to the various classes of property. The table must be based upon a definite rate policy. This is to be found in the statement that "the telephone service will not be required to make a profit, any surplus will be used to reduce the charges." Consequently, it should be assumed that there will be a continuous decline in tariff rates. Probably in the ultimate period service will be available for five shillings per month, with fees from a halfpenny for a local call to five shillings for a call to New York.

The table will vary according to the nature of the district covered by the exchange, whether sea port, manufacturing territory, market town, country residential district, agricultural neighbourhood, &c. The following was found suitable for a residential town :—

Class of Property.	*Percentage of Line Density to premises.*
WHOLESALE BUSINESS	250 per cent.
RETAIL BUSINESS—	
1st Class	250 ,, ,,
2nd ,, ...	110 ,, ,,
3rd ,, ...	60 ,, ,,
4th ,, (Back street shops) ...	15 ,, ,,
OFFICES—	
Buildings with suites of offices (each suite counted separately)	200 ,, ,,
1st Class Single Offices	130 ,, ,,
Other Offices	100 ,, ,,
RESIDENCES—	
1st Class	100 ,, ,,
2nd ,, ...	75 ,, ,,
3rd ,, ...	30 ,, ,,
4th ,, ...	10 ,, ,,
In Back Street Areas	3 ,, ,,

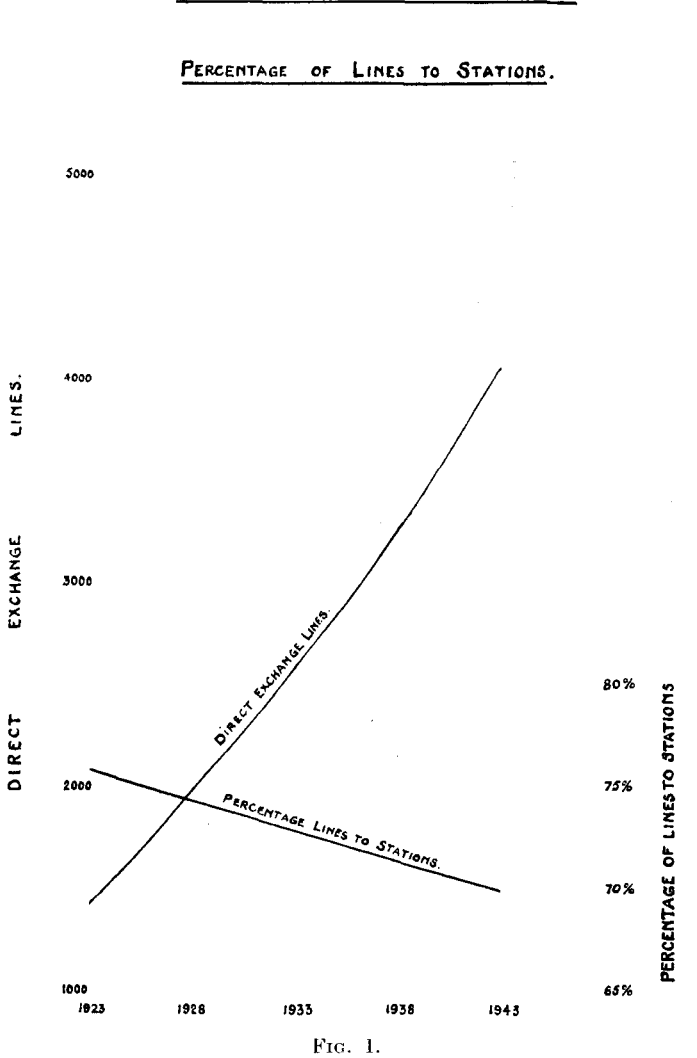

FIG. 1.

When preparing this table, shun as the plague the man who says "You wouldn't place telephones in that street if you gave them away." There is a demand for service—at a price—in the poorest quarters. In one town, during a period of competition with the Civic Fathers, service was available at one penny per day and was readily taken by the "half-crown sole and heel" man, and at the "sweets and minerals" shop in back streets; granted, mainly for the purpose of investing part of the takings on the fortunes of the forebears of "Tishy" and "Tons of Money," *but there was the demand.* Commodity prices, and with them telephone charges, will continue to fall. Lower tariffs coupled with monthly rental payments, will bring out this demand, which should be given full value in the forecast especially in the later periods.

The figures for past growth do not usually give any reliable indication of what may be expected in the future. Development has been restricted for many years: under the National regime, by reason of the Company's limited life; since the transfer, owing to cable shortage following the National Company's restrictions on capital expenditure; and, later, to war conditions.

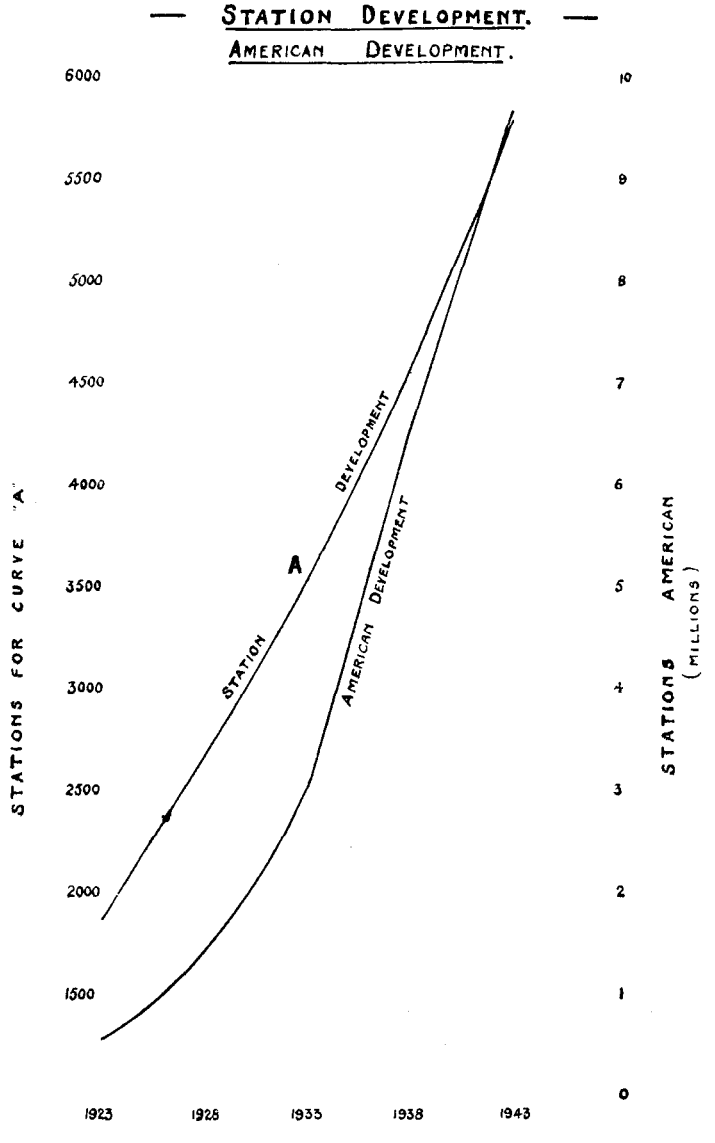

FIG. 2.

The figures for the ultimate period having been fixed by application of the proper density percentages for the expected property conditions, the difference between existing and ultimate figures should be divided between the three intervening periods. Proper allowance must be made for the property changes and development anticipated in each period. The development in back street areas may be expected mainly in the last period.

It will be found convenient for town survey, if small rough tracings on paper are taken from the blue prints upon which the forecast figures can be shewn. The tracing of the plan should be on the reverse side of the paper, and the top side left free for pencil notes which can, if needed, be erased without affecting the plan. The plans may be clipped to a stiff cardboard backing by a bull-dog clip. The figures can be readily transferred to the blue prints at convenient times.

When the survey is completed the results in total should be tested on a density basis. The existing percentage of lines to stations should be ascertained, and then projected for the period, according to the class of territory. In manufacturing areas, this percentage will be likely to fall, possibly as low as 50 per cent. or even 45 per cent. In residential districts, however, it will probably not go below 65 per cent. or 70 per cent. Having fixed this percentage, the number of stations for each period should be calculated;

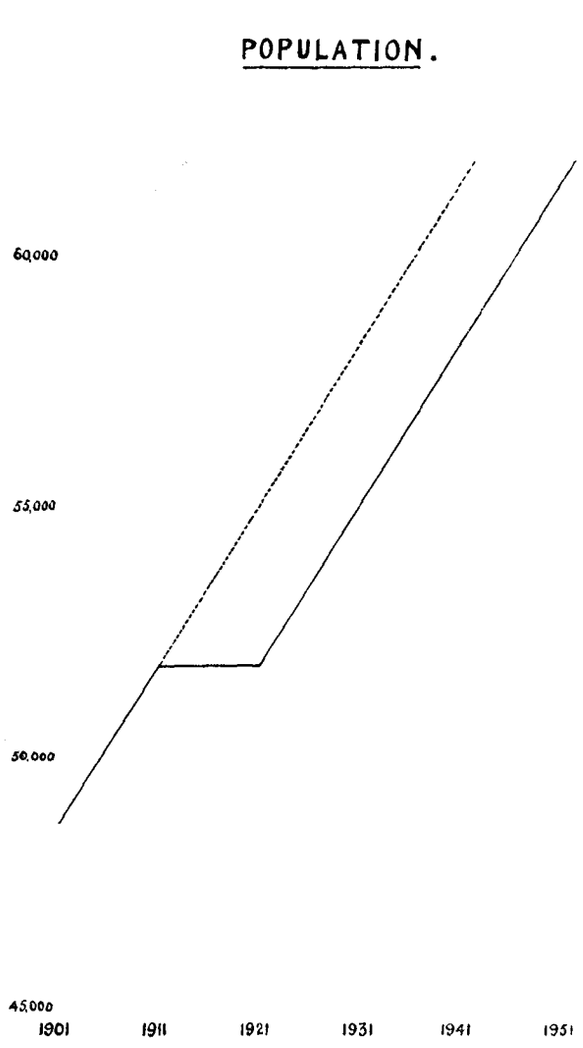

FIG. 3.

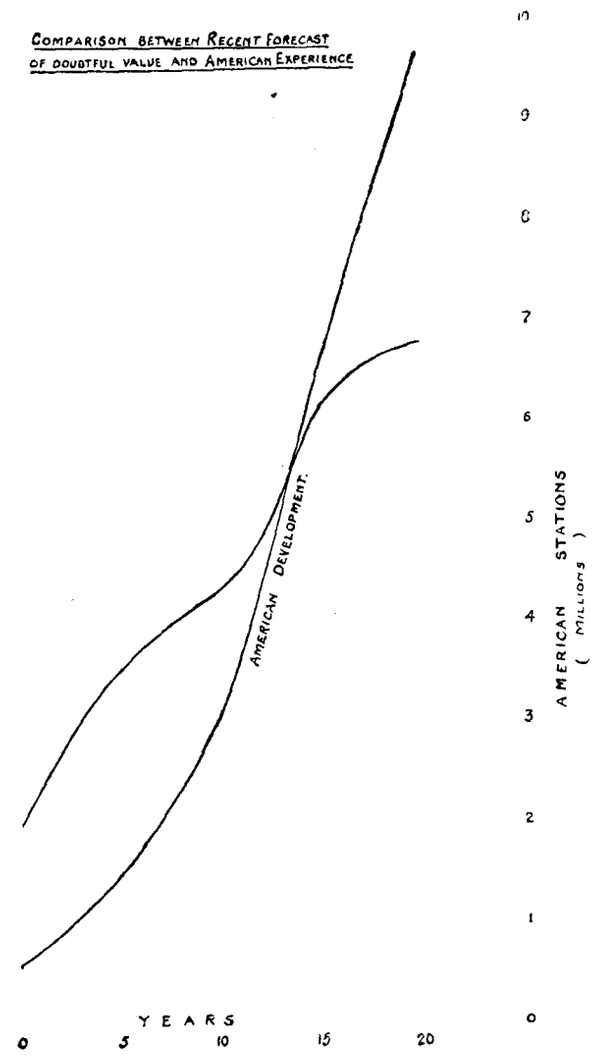

FIG. 4.

The population in the exchange area should be ascertained from the Preliminary Reports of Population England & Wales, 1911 and 1921, in which will be found the population for 1901, 1911, and 1921. These should be plotted on squared paper and the curve projected forward twenty years. Consultation with the Town Clerk or Clerk of the Urban Council will be found of advantage in deciding the form this curve should take.

The population twenty years ahead having been estimated, the density percentage of stations to population can then be obtained.

In testing the forecast for density, it is necessary to take an area which will cover not only business property, but also the residential territory surrounding the town. For comparison purposes the density figures for the area served by the Bank Exchange in London would be of no value. The dormitory territory must be included which would require the density figures to be taken for the City and the County administrative areas combined.

If this percentage is below 6 per cent, the forecast may be considered on the low side, and will require to be reviewed unless there are very sound reasons why a higher density is not considered to be possible.

The growth in each period should be on a progressive scale. Generally it may be taken that the development curve should be a true curve and not like a contour line in hilly country. A review of the figures should be made if it is found that the growth for one period is less than that for the preceding and for the subsequent period.

Before the figures are finally passed, curves should be drawn for line development and percentage lines to stations (Fig. 1) and for station development (Fig. 2) in addition to that for population (Fig. 3).

The curve for American development over a period representing approximately the same densities shewn alongside the station development in the example indicates that past experience is not being flouted as has too often been the case.

A curve (Fig. 4)—from an unreliable study—is shewn alongside American experience which indicates how sadly the anticipated development is at variance with past experience. The flattening out of the curve in the last period was due either to failure to properly visualize what the property conditions would be or to getting scared at big figures—probably both.

There are only two ways of conducting a survey: *the wrong way*—estimating the telephone possibilities twenty years ahead, of the property as it now exists and based upon present tariff rates; *the right way*: first deciding what is likely to be the property conditions in twenty years time and then assessing the possibilities on the basis of the low tariffs that will be in force.

ROTARY AUTOMATIC TELEPHONE SYSTEM INAUGURATED AT THE GLASGOW CORPORATION'S ELECTRICITY DEPARTMENT.

We learn from the Glasgow press that the Electricity Department of the Glasgow Corporation has had a new system of rotary automatic telephones, designed to afford inter-communication between the various branches of the department, installed by the Western Electric Company. The apparatus has been installed at the Waterloo Street headquarters, and at the inauguration Lord Provost Paxton "put through" the first call.

Bailie Dewar, the convener of the Electricity Committee, presided, supported by a number of his municipal colleagues, and an explanation and demonstration of the new method of "calling-up"—the first of its kind in Scotland and the second in Great Britain was given by Mr. R. B. Mitchell, the chief engineer.

The Lord Provost, prior to formally inaugurating the installation, said the main features which the new system offered in contrast to that manually operated were the elimination of the human element in setting up and clearing down a connexion which meant absolute secrecy; a very much lower percentage of wrong numbers; immediate answering, ringing, and clearing, reliable information when the number required was engaged, with a 24 hours' service every day in the week. These important features, said his Lordship, undoubtedly spelt efficiency, and the Electricity Department were to be congratulated on their enterprise. The system had immense possibilities.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE total number of telephone stations working at March 31 last was 1,050,672, of which 377,002 were connected with London exchanges and 673,670 with Provincial exchanges. The net increase during the month—8,624 stations—was again well above the average.

Although trade generally did not recover to the extent hoped for the growth in the telephone system during the past financial year was exceptional, a larger number of new telephones being added to the system than in any previous year in the history of the service. The gross number of new subscribers connected during the year was 97,030 and the gross number of new stations 165,119. The net addition to the system after allowing for cessations was 51,060 subscribers and 74,356 stations. The progressive nature of the new business is indicated by the following quarterly statistics :

	Gross new stations.	Net new stations.
April—June, 1922 ...	37,192	14,425
July—September, 1922 ...	36,884	15,032
October—December, 1922	45,469	22,485
January—March, 1923 ...	45,574	22,414

The reduction in the charge for private house connexions continues to exercise a marked effect on the new business, 32 per cent. of the orders during the 3 months ended March being for residence rate connexions as compared with an average of 25% before the charges were lowered. The total number of residence rate subscribers at the end of March was 154,628, an increase since July 1 last of 16,175, or 12 per cent. The growth in the total number of subscribers in the same period was 7 per cent.

During the year the number of applications for service refused owing to lack of spare plant was reduced by 3,488, and on March 31 last only 2,358 applications remained to be dealt with. Of these 147 only referred to the London Telephone Area, whilst of those in the Provinces the bulk are confined mainly to six districts.

The revised conditions under which new exchanges may now be opened have had an important effect on the development in rural areas. Since July 1 last authority has been given to open 335 rural exchanges. Of these 102 were open and working at the end of last month, whilst the engineering work was in progress in connexion with a further 218 exchanges.

Some statistics showing the growth during the 12 months ended March 31 last are given in the appended table :—

	March 31, 1922. (excluding Southern Ireland).	March 31, 1923.	Increase.	Increase per cent.
Exchange stations—				
(*a*) London ...	334,635	358,213	23,578	7%
(*b*) Provinces ...	604,901	654,932	50,031	8%
(*c*) Total	939,536	1,013,145	73,609	8%
Private wire stations—				
(*a*) London ...	17,206	18,789	1,583	9%
(*b*) Provinces ...	19,574	18,738	836 Decrease	—
(*c*) Total	36,780	37,527	747	2%
Total stations—				
(*a*) London ...	351,841	377,002	25,161	7%
(*b*) Provinces ...	624,475	673,670	49,195	8%
(*c*) Total	976,316	1,050,672	74,356	8%
Exchanges—				
(*a*) London ...	89	99	10	—
(*b*) Provinces ...	3,026	3,105	79	—
(*c*) Total	3,115	3,204	89	—
Call offices—				
(*a*) London ...	3,666	3,793	127	4%
(*b*) Provinces ...	11,657	12,716	1,059	9%
(*c*) Total	15,323	16,509	1,186	8%

	March 31, 1922.	March 31, 1923.	Increase.	Increase per cent.
Public call offices in street kiosks (Provinces only) ...	267	420	153	57%
Rural party lines (Provinces only) ...	3,524	6,916	3,392	96%
Public call office receipts (local calls)	£481,862	£521,566	£39,704	8%
Mileage of working wire—				
(1) Exchange system :				
(*a*) London ...	1,363,268	1,396,272	33,004	2.4%
(*b*) Provinces ...	1,753,362	1,818,967	65,605	3.7%
(*c*) Total ...	3,116,630	3,215,239	98,609	3.2%
(2) Trunk system ...	468,762	526,301	57,539	12%
No. of Inland Trunk conversations ...	50,812,269	58,437,000 Approx.	7,624,731	15%
Gross Revenue from Inland Trunk calls	£3,102,913	£3,253,200 Approx.	£150,287	5%
Outgoing International calls	£54,263	£83,500 Approx.	£29,237	54%

Further progress has been made with the development of the local exchange system, and among the more important exchanges extended during April were the following :—

Birmingham (South),
Bradford,
Leeds (manual board), and
Walsall.

The main underground system was also extended during the same period by the completion and bringing into use of new cables as follows :—

Stanmore—Northwood—Pinner—Chesham.
London—Dartford.
London—Purley—Caterham—New Oxted.
Preston—Blackburn—Accrington—Burnley.

During the month of April 47 new overhead trunk circuits were completed and brought into use, and 51 additional circuits were provided by means of spare wires in underground cables.

REVIEW.

"*The Practical Electrician's Pocket Book*, 1923." *S. Rentell & Co., Ltd.* 3*s. net.*

This is the twenty-fifth annual issue of this cheap and excellent manual, which we imagine is by now well known to most of our readers. Various sections have been most carefully re-written. For instance the chapters on Steam Boilers, Motor Control Gear, Portable Electric Tools, Flexibles, Railway Signalling, and Fuses, have all received attention, and more Special Wiring Systems have been added in order to keep pace with the times. The most recent developments in Electric Welding are treated by an expert, and need we add that a new chapter has been added on Wireless Broadcasting ? The little book has been placed in the City and Guilds list of "Works of Reference" which in itself is a testimonial to its reliability. It is compact and well printed, and covers a very wide ground in a concise and practical way. We can heartily recommend it.

The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. JUNE, 1923. No. 99.

RURAL TELEPHONE DEVELOPMENT.

OVER one hundred new exchanges have been opened during the first five months of the present year, as compared with 50 during the whole of 1922, and they are still being opened at the rate of four or five a week. The district manager or contract officer in search of new fields to conquer is hard put to it in these days to find a place of any importance which still lacks the telephone, but the revised conditions issued last June enabling the service to be extended to villages where not less than eight subscribers are prepared to pay certain prescribed rates have produced remarkable results.

A glance at a map indicating the telephonic development of Great Britain at the end of last century would show that the system reached all the principal towns in the country and penetrated every county except Rutland in England, Wigtown, Kirkcudbright, Sutherland and the Orkneys and Shetlands in Scotland, and Anglesey, Merioneth, Montgomery and Radnor in Wales. There were then upwards of 1,000 exchanges in existence, extending from Penzance to Wick and from Yarmouth to Aberystwyth, and it is probable that all places with 20,000 inhabitants (together with their suburbs) and most of those with 10,000 inhabitants enjoyed the telephone service in December 1900. A more careful scrutiny of such a map would, however, reveal that only the manufacturing districts were well covered by a chain of exchanges, and that elsewhere large tracts of country possessed either no telephone exchange at all or at best only one here and there in the more important towns. A few instances will explain more precisely the difference between the *apparent* widespread development of 1900 and the close network of upwards of 3,250 exchanges, which now covers the country. Lincolnshire, the second largest county in England, which had 6 exchanges in 1900 has now 78; Sussex which had 18 exchanges, chiefly in the seaside towns, has now over 80; and Somerset which had 9 has now 65. Similarly the number of exchanges in Rutland has risen from 0 to 9, in Hereford from 1 to 13, in Salop from 2 to 35, in Cambridgeshire from 3 to 20, in Dorset from 6 to 24, in Northamptonshire from 7 to over 40, in Wiltshire from 8 to 24, and in Leicester from 9 to more than 40. In the remote counties of Wigtown and Kirkcudbright 8 and 16 exchanges respectively have been established. But it is not necessary to go so far from home in order to demonstrate how the telephone has spread to small places. The Metropolitan system in 1900 was well developed and was served by 47 exchanges. Yet in that part of Middlesex outside the county of London there were exchanges only at Ealing, Enfield, Finchley, Harlesden, Staines, Tottenham and Uxbridge; there are now 28 exchanges in the administrative county. A similar tale could be told of Hertford and Essex, and indeed of the other home counties.

Very soon no county in Great Britain will be without the telephone. At the time of writing we learn that the exchanges in the Orkneys are ready for opening and that a scheme is under consideration to extend the telephone through Sutherlandshire, the last county to be conquered. Soon also, at the present rate of progress, the town which possesses no exchange will be inconsiderable indeed, and the captious critic who now complains of the poorness of our rural development will be moved to chide the Post Office for inflicting the curse of urban rush and hurry on the idyllic calm of the country-side.

HIC ET UBIQUE.

SOME temporary excitement was caused by an announcement in the Press that the rates for telephone calls between France and England were to be trebled as from May 1. The increased charge of course only affected calls from France to England, and was designed to equalise the rate paid in the two countries. Hitherto calls from Paris have cost, latterly at any rate, little more than 2*s.* owing to the depreciation of the franc, whilst callers from this side paid 6*s.*

THE employees of the Constantinople Telephone Company have an association of their own called "La Campania" and this association publishes a journal, a copy of which has reached us along with Mr. Douglas Watson's compliments. It is an interesting production in French containing articles on telephone finance, on faults which may arise on a C.B. system, and on the Egyptian telephone service. It also contains a description of a masked ball given by the staff and other social items. The international character of the staff may be gathered from the names of the editors and contributors: M. Avichay, B. Nefussi, Hussein Bezmi, H. Seropian, A. S. Duncan and Salomon Leon.

TELEPHONES on express trains, says the *Westminster Gazette*, have just been shown to be in every way practicable by demonstrations on the service between Hamburg and Berlin.

The Minister for Traffic, accompanied by leading officials of the postal and traffic services, spoke throughout a trial trip, without any sense of inconvenience, with the President, and with representatives of the Ministry of Finance in Berlin. Connexions are obtained through the exchange in the usual way, and it is claimed that the receiver of the message cannot detect any peculiarity in the transmission.

EXTRACT from a letter for an applicant for an experimental wireless licence :—

I have recently been invited to become a member of the local wireless society and was told they would have shown me how to fill up the form successfully; instancing a man who has received one quite recently and whose knowledge of wireless was equal to a cat's about astronomy. I prefer *truthfulness*.

I appreciate the difficulties of the present situation and am not asking any favour.

Perhaps the following will be of interest ; they are all from experimenters, or successful form-fillers.

It is not (I was seriously informed) possible to use reaction of any kind in a circuit employing a crystal detection, also that Ohm's law never applied to wireless, and last but not least, one gentleman when informed by me that the wave-length used by Paris (F.L.) was 2,600 metres, said he thought I must be mistaken, as Paris was not twice as far from here as London, and the *wave-length of London was only 373 metres*.—Yours sincerely,

****

P.S.—This is not an attempt to get the service of the B.B. Co., Ltd., for nothing or cheaply, as I am prepared to pay fully for what I get from them.

WE would direct our readers' attention to the advertisements inserted in our issues under the heading "Where to Stay." These announcements might serve a very useful purpose at a time of the year when many of us are in search of summer quarters, if readers would assist by bringing to our notice boarding houses and apartments where they have been comfortable. Cases have come to our notice where guests have been well satisfied with the places advertised. The list might profitably be much longer and a personal recommendation would always carry great weight.

MEMBERS of the Post Office Telephone and Telegraph Society of London will be gratified to learn that Lieut.-Col. T. F. Purves will be Chairman for next session. Mr. D. H. Thomson has been appointed Hon. Secretary in place of Mr. J. Stuart Jones who has resigned.

THE Latvian University recently discussed the advisability of installing an automatic exchange at Riga, which at present has some 5,500 subscribers. As the proposed change was likely to cost about 375 million roubles the scheme met with considerable opposition, but a commission was ultimately appointed to solve the problem.

GOLF.

BY the very kind invitation of Mr. Samuel Ryder, who received the team as his guests, a party representing the Post Office played representatives of the public at the Verulam Golf Club on May 2. The following was the result :

G.P.O.		*Post Office Users.*	
D. Macadie (5)	0	R. S. Fannin (7)	1
H. J. Ost (7)	0	F. K. Sander (8)	1
W. E. Weston (10)	½	F. B. Goodchild (12) ...	½
Allan Smith (13)	1	H. G. Armour (12)	0
B. Savage (11)	0	W. R. Williams (13) ...	1¼
P. F. Apted (12)	0	R. J. Knight (13)	1
A. W. Edwards (18) ...	¼	E. E. Marshall (13) ...	1
S. W. Briggs (15)	0	H. B. Green (15)	1
F. C. G. Twinn (18) ...	¼	C. A. Birtwistle (15) ...	1
H. H. Cornforth (15) ...	1	J. Ryder (16)	0
A. Gordon (18)	1	C. Davies (17)	0
G. M. Brimelow (7) ...	½	A. D. Winterbottom (19) ...	½
	4½		8¼

FOURSOMES.

Macadie and Ost	0	Fannin and Sander	1
Weston and Smith	0	Goodchild and Armour ...	1
Savage and Apted	0	Williams and Knight ...	1
Edwards and Briggs ...	1¼	Marshall & Green	0
Twinn and Cornforth ...	1	Birtwistle and Ryder ...	0
Gordon and Brimelow ...	1	Davies and Winterbottom ...	0
	3¼		3

STUDIES IN FINANCIAL ADMINISTRATION.*

BY F. C. COOK.

THE origin of this undertaking lies away in the evening hours devoted to the preparation of my address on "Studies in Whitleyism." I was considering the import of the declared intention of the Government to encourage the personnel of the Civil Service to formulate, through the machinery of Whitley Councils, constructive ideas on "public business." Suppose, I thought, the pure scientist concentrated his trained intellect upon "Business," as he had done in the region of chemistry, physics, and other departments of natural science, what would be the outcome in the next ten years or so ? Critics might urge in opposition that in the sphere of "business" there exist so many conflicting, vital interests that the scientist would not make much headway. Still, pure science may already be regarded as approaching business. The great works of Prof. Marshall of Cambridge, "Principles of Economics," "Industry and Trade," and "Money, Credit and Commerce," alone testify to it. I asked myself the question : Was it beyond the lay mind to move along the outer circle of this great subject ? Could one find the right data, and, if found, could a helpful interpretation of the phenomena of business be set out ? This paper is such an attempt.

EXPRESSION OF BUSINESS.

Business is one of our common words but full of meaning. The compilers of *Harmsworth New Universal Encyclopaedia* (nine stout volumes) have seen fit, however, to dismiss it in a few lines. This paucity of description does not satisfy. It does not explain London, Paris, New York, Calcutta, Manchester, Liverpool. It does not help us to understand Lombard Street, Threadneedle Street, Old Broad Street, St. Swithin's Lane. Take the following from among the original subscribers to the new London and Cambridge Economic Service : —"Underground Electric Railways Co., P. & O. Steam Navigation Co., London Joint City and Midland Bank, Vickers Ltd., Midland Railway, Liverpool Steamship Owners' Association, Rylands Brothers, Ltd., Schuster, Son & Co., W. T. Henley's Telegraph Works Co., Ltd., Iron & Steel Manufacturers' Federation ; do not these each suggest great business ?

REPRESENTATIVE BUSINESS MINDS.

Take also three short extracts from the Founders' Day Oration delivered by Lord Riddell to the students of Birkbeck College (omitting names) :

(1) "A" has many remarkable mental qualities, chief among them being the foresight which has enabled him to build up a huge business of which he is the head. He early said that the world would have to look to tropical regions for fats to keep itself clean and for feeding purposes. . . . He is full of original ideas of a practical sort and carries them into effect in his daily life. . . . He is a great organiser. . . . Nothing daunts him, however big or however original. . . . He is a strange combination of ideas, practical common sense, and what is euphemistically called business acumen.

(2) "B" is a different proposition. He has enormous energy, great enterprise, and the art of choosing and managing men, but ideas, as such, never enter his mind. His business is the breath of his life, and he keeps in close personal touch with his vast army of workers in the good old-fashioned way.

(3) "C" differs from both "A" and "B." He has the outlook of the British merchant and shipowner accustomed to trade all over the world, the sort of man who carries the British flag of Commerce into all climes, hard and businesslike. He is a man of great enterprise and a hard worker."

These quotations enable us to get nearer the living power, the centre of the spiritual forces which make up business, and which are expressed in creative thought, indomitable faith, desire to share "in the great adventure," collective enlistment of the hearts and minds of personnel in an honourable objective, compelling each one to believe in achieving the so-called impossible.

From beginning to end unseen spiritual forces pervade the world of business. As a single example of one interchange of thought on "big business" may we not use the words reported to have been spoken by Mr. Baldwin, the Chancellor of the Exchequer, at the first conference with the representatives of the U.S. Federal Funding Commission, viz. :—"Our wish is to approach this discussion as business men seeking a business solution of what is fundamentally a business problem"—the repayment by Great Britain of £850,000,000. And as showing that the psychological factors predominate, and interact as between one individual and another, the *Accountant* of Jan. 20, 1923, avers that something like 80,000 companies exist (in this country) whose auditors' balance sheets are unhesitatingly accepted in business and financial circles.

INSTRUMENTS OF BUSINESS.

But we must not stay too long in the apprehension of "Business" in itself. We must strive to get some idea of the symbols of business, and the essence of them. Symbols of business predicate the existence of groups of minds engaged in other aspects of national and international enterprise.

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* Paper read before the London Telephone and Telegraph Society.

INSTRUMENTS PROVIDED BY THE STATE.

For the conduct of national business the State has prescribed either its own symbols or designated the symbols of private citizens it will recognise. The Royal Mint supplies metallic currency, the Lords of the Treasury issue £1 and 10s. notes "under the authority of Act of Parliament, IV. and V. Geo. V., Ch. 14," and the Governors of the Bank of England, for 80 years, have been allowed to put in circulation (unstamped), throughout England and Wales, notes containing a promise to pay on demand, and numbering eight denominations in all from £5 to £1,000. Treasury Notes and Bank of England Notes are legal tender for any amount. Bank of England Notes are never re-issued. Treasury Notes remain in circulation until their condition makes them unworthy the appellation of money; machinery exists for their withdrawal and cancellation. All Notes are based on gold.

The following interesting extract from the "Money Market" column of Jan. 26, 1923, shows the current note circulation round about that date:—

> "With banking deposits steadily declining, to which more than one reference has been made this week, it is perhaps not surprising that the currency note circulation shows further contraction. If, however, as is so frequently pointed out, trade is improving and wage bills presumably are larger in consequence, it might have been assumed that the need of the community for till money would have been greater. Whatever the cause, the fact remains that the public require less for small purchases, and for the week ended Jan. 24 the combined notes and certificates outstanding show a decline of £4,091,868 at £279,320,207, reducing the fiduciary issue to £231,170,207, or £39,013,593 below the legal maximum for 1923 of £270,183,800. The seasonal demand for currency at Christmas brought the total outstanding up to £299,810,921 on Dec. 27, and the return of currency has therefore reduced that figure by £20,500,000 in four weeks. For the corresponding period of 1922 upwards of £20,000,000 was likewise returned, the total then being £303,299,993. At Jan. 26, 1921, the combined figures amounted to £339,943,660, and at Jan. 28, 1920, the comparable item stood at £329,554,197. There are thus over £60,000,000 less of "Bradburys" plus certificates outstanding now than there were two years ago. Price reductions no doubt partly account for this. There is no alteration this week in the gold and bank-note cover at £48,150,000, but the ratio to the total notes and certificates outstanding is 0.25 per cent. higher at 17.23 per cent. The notes called in but not yet cancelled are slightly lower at £1,513,408. In the following table the figures are compared with those of the preceding week:

	1923. Jan. 24.	1923. Jan. 17.
Notes outstanding	£258,580,207	£262,012,075
Certificates outstanding	20,740,000	21,400,000
Notes called in but not yet cancelled ...	1,513,038	1,515,861
Investments reserve account ...	12,150,038	12,462,363
TOTAL	£292,983,653	£297,390,299
Currency Note Redemption Account:		
Bank of England notes	£21,150,000	£21,150,000
Gold coin and bullion	27,000,000	27,000,000
Silver coin	7,000,000	7,000,000
Government securities	237,713,142	242,103,697
Balance at Bank of England	120,511	136,602
TOTAL	£292,983,653	£297,390,299

Gold coins are, as we are aware, now very rarely seen. What remain in the possession of private persons are being gradually surrendered and passed on to the banks, and to the Bank of England. All gold coins received over the counters of Post Offices are paid into the Bank of England.

We must not think the mines have ceased to yield the precious ore. On the contrary it was reported in the Press on Nov. 14, 1922, that the "figures for last month show that the South African Rand had beaten all records since October 1916, and exceeded the output for the same month in 1921 by 74,000 ounces."

10 Franc and 20 Franc gold pieces were being freely minted at Berne last September when members of the Society of Civil Servants were visiting the departments of the Swiss Administration. It was understood the gold was bought in London.

As throwing light on the buying and selling in the *Bullion Market* (extract of Jan. 20, 1923) the following is helpful:—

> BULLION.—China sales principally affected the silver market, pot falling $\frac{7}{16}d.$ to $32\frac{1}{4}d.$, and forward delivery losing $\frac{1}{8}d.$ to $31\frac{7}{16}d.$ Gold was unchanged at 89*s.* 9*d.* per fine ounce, but the price was nominal.

Messrs. Mocatta and Goldsmid in their weekly circular say:—

> "With the exception of the 19th instant, when the price of silver fell back to $31\frac{7}{8}d.$ owing to some China selling and re-sales by India, the general trend of the market has been upward, and $32\frac{1}{16}d.$ the highest price reached since last November, was quoted yesterday. The Indian bazaars have continued to send very large orders for shipment this and next week, and a premium over the spot price has been paid in several quarters in order to secure the metal promptly. This demand for India, which for the past few weeks has been quite abnormal, is still largely ascribed to the belief held in the bazaars that an import duty on silver will shortly be re-imposed; but the price of silver has also been affected by the sharp rise in the value of the rupee, which has been over 1*s.* 5*d.* this week. Both silver and the exchange are rather weaker to-day, and with rather less demand for the metal for India the price has receded to $32\frac{1}{4}d.$, with a quieter tendency. Owing to the shortage of supplies there has been a wide difference between the spot and forward quotations, and on most days it has been more than 1*d.* per ounce.
>
> GOLD.—India has again taken the whole of this week's arrival, which amounted to nearly £1,000,000.

The largest store of gold is possessed by the United States, and yet that treasury is not required by Americans. They do not employ gold in ordinary business transactions, and Professor Foxwell, the great authority on Currency, informs us that an American friend had to send specially to a bank in order to obtain a single gold piece in exchange for paper.

At this point I think I had better introduce one of Professor Marshall's formulae respecting currency: "The total value of a country's currency, multiplied into the average number of times of its changing hands for business purposes in a year, is of course equal to the total amount of business transacted in that country by direct payments of currency in that year." But this technical statement does not indicate the causes that govern the rapidity of circulations of currency and to discover them we must look to the amounts of purchasing power which the people of that country elect to keep in the form of currency. This will aid me in directing momentary attention to the ever-abiding responsibility of every one whose duties are connected with the handling and safeguarding money. Wherever currency is stationed there must not only be a guardian but a clear record. Whenever currency moves responsibility shifts and additional records come into being. Entire destruction of currency notes by the public means absolute loss of money. There are, however, many degrees of admissible acceptance of paper currency on the road to complete annihilation. The function of fixing the point of recognition or not of Treasury Notes has been entrusted to the Post Office.

INSTRUMENTS SAFEGUARDING BUSINESS.

(*a*) "*Contractual Capacity.*" (*b*) *Contract.*

Except in particular instances business on a large scale is not concerned with the direct use of currency. But even where the custom of handling "money" in considerable quantities for separate transactions prevails, as in the purchase of property, many antecedent factors have as a rule their due place.

These factors are of jurisprudence, and the law. They include the consideration of "contractual capacity," as it is called, and contractual capacity touches upon the recognition of "rights" being enforceable by the power of the State. Dr. Holland defines a "Legal right, in the strictest sense of that term, as a capacity of one individual of controlling with the assent and assistance of the State the actions of others." I want to lay emphasis on the one individual and another. It is very important. We know, of course, it is not given to everyone to control or be controlled by a second party. The Post Office has to take cognizance of this fact in connexion with, for example, cases of mental disability. There are other causes of disability, *e.g.*, the operation of foreign law, but we need not enlarge upon these. The legal forms of contractual incapacity are the exception. Capacity is assumed in practical affairs.

The force of capacity, capacity in the larger meaning, appears at the moment when the different commercial or industrial plenipotentiaries—knowing everything involved in the decision, what will follow from the act, the possible divergencies as the proposed scheme begins to operate, the margins for contingencies, the possible scientific discoveries, &c., and their effect upon the transaction, possible political disturbances, what the staff of the organisation can do, the whereabouts of raw material, and so on—prepare to affix their signature to the agreement. Of larger "acts" of business shall we recall two contracts?—for so we must call them—(1) of Messrs. Pearson & Co. to construct another dam across the Nile, and (2) of the great firms for the building of the new battleships for the British Government, the significance of which was so wonderfully outlined by Sir Oswyn Murray in his lecture on the "Administration of a Fighting Force" given under the auspices of the Institute of Public Administration on Jan. 8, 1923.

The contract, the document, the instrument of finance, which represents the minds of the parties is shaped finally by the hand of the legal adviser. The hope of the great contractor is the satisfactory completion of his task—that everything will run smoothly to the end. Because disputes may arise the true intention of the instrument may have to be tested by the courts. There may be penalties for non-fulfilment to time; there may be questions of interpretation, and so on. For our purpose this evening it will be sufficient to quote a paragraph from Chitty on Contracts:—

> "Contracts or obligations under seal, or specialties, such as deeds and bonds, are instruments which are not merely in writing, but which are sealed by the party bound thereby, and delivered by him to, and for the benefit of, the person to whom the liability is thereby incurred. This is the formal contract, in English law, and in no other way than by the use of this form, could validity be given

by Executory Contracts in early time. Neither a date, nor, at common law, even the signature of the party is essential to the validity of a deed. But there cannot be a deed without writing, sealing (which need not be by seal or wax) and delivery. There may, however, be a sufficient delivery without words, or by words only, without any act of delivery as where the party admitted and acted on an authorisation of his son to execute a deed by creditors of whom he was one; the only question in such case being whether the sealing of the deed was accompanied by any acts or words which were sufficient to show that the party intended to execute the deed, as his deed presently binding upon him."

There are many present this evening who have had experience in the preparation of drafts of Contracts. They know how difficult it is to provide for every material point, and to safeguard the interests of the Post Office. The rough document may have been altered again and again before it is read over for the last time, and when this has been done the document represents but the entrance upon negotiation. The difficulty of negotiation is, of course, much increased when the agreement sought affects many parties, resident in different countries, and speaking different languages. In 1921 business men of many nationalities interested in maritime matters met in Conference at The Hague. If they could not reach agreement they desired "to have a clear understanding as to what are the opinions upon which there is disagreement." In the end they came to an agreement on seven points. Reading the Hague Rules, 1921, "defining the risks to be assumed by sea carriers under a Bill of Lading," the Articles appear to be very simple, but that simplicity was only arrived at after prolonged discussion, and at times acquiescence seemed hopeless.

But we must come back to the main principle underlying this address:—Business and its instruments.

INSTRUMENTS INVENTED BY THE COMMERCIAL COMMUNITY.

Long ago the Commercial community realised that the instruments of money provided by the State were inadequate. Gold must be the basis of business, but business men did not want so much handling of either sovereigns or notes. Good faith had made the sight, the constant counting of money, something to be foregone. Even the Post Office has found it must not insist on the immediate delivery of "money" in every business transaction. Men of commerce developed the cheque system. The cheque rests (in this country), as we have just stated, upon the gold standard of the £1 sterling. A perusal of the *Bankers' Magazine* shows the extent to which the cheque system has grown, and in quite recent times the great banks of the country have opened up agencies or combined their financial operations with banks of other countries. For example, in Lombard Street you will find brass plates inscribed with the names—the Anglo-Austrian and Anglo-Czecho Slovakian Banks. The London, County Westminster, and Parrs Bank—since March 1, 1923, the Westminster—is affiliated to banks at Paris, Bordeaux, Lyons, Marseilles, Nantes, Brussels, Antwerp, and Madrid. It is now possible to take the cheque book of a London bank, and, by giving notice, draw on the account (by means of the English cheque and the ordinary procedure of making it out) in a Continental city. The cheque has, as all are aware, been brought within the terms of the Bill of Exchange 1882; but the obligation to pay this type of bill on demand is limited to the banker.

This additional instrument has given rise to many developments. In countless numbers cheques pass through the Bankers' Clearing House daily, but a document consisting of amounts (words and figures), dates, signatures, conditions, &c., induces irregularities. These shortcomings and loopholes to fraud have had to be taken notice of, and banking law and practice have now assumed considerable proportions. This is brought out by Dr. Hart in his formidable-looking, but scientifically worked out Volume on Banking Law. He says (3rd Ed. April, 1914—it is one of the books in the official library) "the importance of banking in the business life of this country, and the continually increasing range of the activities of those who carry it on, have been very clearly reflected in recent years by the decisions of the Courts of Justice and the Enactments of the Legislative. It is now scarcely possible to scan the Law Reports for a single month without observing judgments on points of law affecting one or other of the various departments of the work of bankers, while provisions bearing more or less directly upon their legal position are to be found, upon careful examination, in every volume of the statutes.

Towering above the big banks we have the Bank of England, governed by business men, and possessing special powers under the Statute of 1844. We may perhaps bring out this pre-eminence by quoting the following from the Money Market Report of the *Daily Telegraph* of Feb. 16, 1923:—

> A week ago the market was forced into the Bank, and the amount borrowed, judging by the increase in other securities, was substantial, for this item is no less than £4,810,856 higher. The drain of tax collections has only left other deposits £2,382,226 up on the week, £1,621,915 having gone on to public deposits, so that when the amount due for repayment is deducted from the market balances there is not a great deal available. Government securities have fallen £560,000. The note circulation has contracted £761,870, and as the stock of bullion has increased £2,606, the reserve shows an increase of £764,476, but the proportion to liabilities, at 19.9 per cent., compares with 20.1 per cent. last week. In the following table the figures are compared with those of the preceding week and the corresponding period of 1922:

	Feb. 14, 1923.	Feb. 7, 1923.	Feb. 15, 1922
Act. note circulation	£120,719,230	£121,481,100	£121,752,490
Public deposits ...	19,517,200	17,895,285	14,911,673
Other deposits ...	106,726,844	103,344,618	137,461,763
Rest	3,539,011	3,525,911	3,507,322
Government securities	48,507,299	49,067,299	64,425,565
Other securities ...	70,623,032	65,812,176	80,565,926
Bullion	127,493,425	127,490,819	128,762,519
Reserve	25,224,195	24,459,719	25,460,029
Proportion, per cent.	19.9	20.1	16.7

INSTRUMENTS ENTRUSTED BY THE STATE TO THE POST OFFICE.

In spite of the almost universal adoption of the cheque system in this country it is obvious it has still its limitations. It has not met all requirements. The Post Office which has for many years been empowered to provide other instruments of finance, (*a*) so called "Money" Orders; (*b*) British Postal Orders; (*c*) Telegraph Money Orders, has still a demand for these which runs into many million pounds per annum. That the state has imposed the obligation of providing for these almost infinite number of small (but not always small) transactions upon the Post Office, it follows that the business of providing and maintaining suitable reserves of money in all parts of the United Kingdom and Northern Ireland is a constant one. The Post Office Savings Bank has too its own special machinery for receiving and paying "money," and now we have the growing popularity of the National Savings Certificate with its simple but effective safeguards against misuse and complex legal points associated with other documents of value.

INSTRUMENTS IN THE FORM OF ADHESIVE AND OTHER LABELS.

The State intervenes further into financial circles by adding to the list of the instruments of finance adhesive and other labels known as stamps. We need not go deeply into the reasons for this peculiar though traditional connexion between business and the State. The Law on Stamps is contained in the Stamp Act of 1891, and Whittaker mentions the circumstances under which stamps are more commonly insisted upon. We should perhaps interpolate that money must be paid to the State first so two transactions take place to comply with Statutes or Statutory Regulations. Stamps have been compulsory for nearly a century in regard to charges on our letters, and for 50 years on our telegrams, though we have receded from the idea that they bespeak, postally and telegraphically, a stamp duty, and replaced it by the conception of a commercial service. Whether philatelists will influence the use of stamps longer than is commercially necessary we cannot venture to predict. Stamps are undoubtedly a most effective and inexpensive part of the machinery of the Post Office, but somehow we appear to be increasing the intensity of our attacks upon this non-commercial symbol. We permit accredited firms to mark their correspondence pre-paid, the machine employed automatically registering the number of packets. Payment is made by cheque once a month. From information received from the Director of Telegraphs, Brussels, and a leading representative of the Telegraph Department at The Hague, it would appear that the telegraph administrations of Belgium and Holland discourage the use of stamps for the payment of telegrams, and the French Administration is, I gather, of like mind judging from a letter (with enclosures) sent to me by the Director of Telegraphs at Paris. The Swiss follow in the same direction. The Swiss telegram form has no space for stamps. The operation of accepting a telegram which I witnessed at Brussels reminded me somewhat of the English practice of receiving payment for a telephone call. Of course, we must not infer these Continental customs prove that their accounting machinery is cheaper than our own.

INSTRUMENTS FOR DISCHARGING STATE OBLIGATIONS.

In regard to payments to the community the State does not usually use currency or cheques. It has its own system of so-called "Warrants." As we are keeping to the principle of instruments of business we may pass over the history of warrants. The documents (some 60,000 a year) prepared at the Headquarters of the Post Office were until recently addressed to the Cashier. They set out more or less in detail the purpose of the payment. They were not, I think, strictly bills of exchange. They were unlike the simple unconditional form of a cheque. They were readily accepted by the banking community, and in due course were presented to the cashier for acceptance, and payment. A short time ago a new form of warrant was adopted on which the necessary particulars are compressed, and the document so arranged that on a hasty glance it suggests an ordinary receipt. The principle of payment through banks and the chief cashier remains unchanged.

Other Departments of the State have an instrument which is not very dissimilar and is known as a Payable Order Advice and Receipt.

For small payments the system of "postal drafts" has been devised and is being rapidly extended.

So we have the State in competition with the Commercial and Banking Communities in the invention of instruments of business which avoid the use of currency with all its troublesome network of safeguards.

INSTRUMENTS OF INTERNATIONAL BUSINESS.

Going back to the commercial instruments of finance we must give some heed to the Bill of Exchange pure and simple. When we think of Bills of Exchange we associate ourselves with international trade rather than with home business. "A Bill of Exchange is an unconditional order in writing addressed by one person to another, signed by the person giving it, requiring the person to whom it is addressed to pay on demand, or at a fixed or determinable future time, a sum certain in money to or to the order of a specified person or to bearer." The balance sheets of the banks recently issued reveal that the business in Bills of exchange is a very large one, though Professor Marshall notices a downward tendency. The Post Office has to buy and sell these documents from time to time in connexion with transactions with foreign Administrations and foreign business houses. These paper instruments are in circulation all over the world. They are more universally recognised than cheques. They rest as the cheque on a gold basis. The rates of exchange at the principal Bourses given in the Press are the deciding factors of value. Here are a few quotations under date Feb. 16, 1923 :—

EXCHANGE RATES.

CLOSING RATES IN LONDON ON PLACES ABROAD.

	Method of Quoting.	Par of Exchange.	Feb. 14.	Feb. 13.
New York	... Dols. to £	4.86⅜	4.68⅛— 4.68¼	4.68⅜— 4.68⅛
Montreal	... Dols. to £	4.86⅜	4.73 — 4.73½	4.73¼— 4.73¾
Paris ...	... Fr. to £	25.22½	77.75 —77.85	76.40 —76.50
Amsterdam	... Fl. to £	12.107	11.83½—11.84½	11.84½—11.85
Belgium	... Fr. to £	25.22½	88.30 —88.40	86.45 —86.55
Buda-Pest	... Kr. to £	24.02	11,500—12,500	12,000—12,750
Greece	... Dr. to £	25.22½	388—390	382—387
Italy ...	... Lire to £	25.22½	97¾—98	97¼—97⅜
Lisbon	... Pnce to Esco	53¼*d.*	2 5/32*d.*—2 7/32*d.*	2 5/32*d.*—2 7/32*d.*
Spain ...	... Pes. to £	25.22½	29.97 — 30.00	29.91 —29.93
Switzerland	... Fr. to £	25.22½	24.94 — 24.96½	24.93 —24.95
Christiania	... Kr. to £	18.195	25.13 —25.18	25.13 —25.18
Copenhagen	... Kr. to £	18.159	24.68 —24.73	24.75 —24.80
Stockholm	... Kr. to £	18.159	17.61 —17.64	17.64 —17.66

As a simple illustration of the movements of exchange an English cheque drawn on London and presented at The Hague for exchange into Dutch and Belgian money at the same moment—or Treasury Notes will operate similarly —will yield a better exchange than if the whole transaction be carried through by the traveller into Dutch money, and when on the way to Belgium the Dutch money be converted into Belgian. The exchange itself is very simple though seemingly incomprehensible ; but the gold parity requires formidable formulae- though mathematical formulae are in every-day use by many present this evening—to show how money market equivalents are fundamentally arrived at. The following explains the relations of the English gold sovereign, the American gold dollar, and the French gold franc to one another :

The standard weight of a £1 sterling ...	—	123.27447 grains (troy).
To find the weight of fine gold we must deduct 1 12 to allow for the alloy ...	—	113.00160 grains.
(or)	—	7.32238 grammes fine gold.
The American gold dollar weighs ...	—	25.799995 grains.
Deduct 1 10 for alloy	—	23.219996 grains.
This gives 4.866564 gold dollars to £1 and 4.866564 gold dollars also ...	—	7.32238 grammes fine gold (£1)
The 10 franc gold piece weighs ...	—	3.225806 grammes.
Deduct 1 10 for alloy	—	2.903236 grammes fine gold.
therefore 7.32238 / 2.903236	—	25.22137 gold francs to £1.

It will be observed that Troy grains of fine gold are the foundation, and the calculations are taken to five or six places of decimals.

INSTRUMENT KNOWN AS CONCESSION OR LICENCE.

This audience will probably expect to be reminded of one other instrument, the "concession" or licence. I will give two instances.

(1) Concession to a wireless company by the Swiss Administration for a period of 25 years (v. Swiss Report of 1921), and (2) the extension of licences to the Eastern Telegraph Company. The *Daily Telegraph* of Oct. 18, 1922, contains the following : we (*i.e.*, the Eastern Company) have been working in close co-operation with His Majesty's Post Office working on behalf of the various Government Departments, and with India and South Africa and it has been agreed to extending our landing licences for a period of twenty-five years subject . . .

The special point I have in mind is that these Concessions remain in force for a generation and the power they give stands in the midst of changes of all kinds in commercial affairs. The instruments having been signed and delivered pass to the strong room for safety.

In these explorations it will be noticed that the emphasis has been on the instruments of business rather than on the machinery of record, or the machinery for presenting the operations of finance in prescribed forms for purposes of stewardship.

QUESTIONS ARISING FROM THE EXPLORATION.

But arising out of these considerations of business there are one or two interesting questions :—

(1) Is it appreciated by the community how much money has to be spent by the Post Office (the Department responsible for attending to instruments of small value) in rectifying the mistakes of those with whom business is done ? As throwing light on this I think an article (with illustrations) in the *Post Annual* described the processes through which the National Savings Work of the Money Order Department passed, and one photograph (if I mistake not) showed the fairly large staff engaged disentangling the mistakes made by holders of certificates. Until recent years we upheld the preservation of certain intermediate telegram forms to enable the public to satisfy themselves about their telegrams, but we found it too costly.

(2) Is the trend of affairs towards a further use of cheques or bank transfers in place of Post Office monetary instruments, &c. ? We need not trouble so much about gold. As we have seen the United States is somewhat enbarrassed by its accumulations of gold because gold is not required in everyday affairs. It is said that of a million articles received recently by Banks in the City the Bank Notes only amounted to £4,260, and Treasury Notes and coin to £2,640.

(3) Is there any sign of a trend towards local Post Office documents being *cleared, as it were, locally* ? The local retention scheme for telegrams was a step in this direction. We hesitated a good deal at first, but once having found the scheme workable the arrangement has been extended practically to all ordinary telegraph business.

If I may be allowed to mention it the principle of *central control for everything material to the whole*, and *local arrangements for distinctly local affairs*, came home to me when a party of us visited the Swiss Houses of Parliament and the Administrative Departments at Berne. The personnel of this Federal Government is comparatively small—in fact too small, so we were told—because the cantons exercise complete sovereignty in their own affairs. The Central Government's lordship over all partakes of the nature of the "life" at headquarters of a military organisation, *i.e.*, chiefly directing.

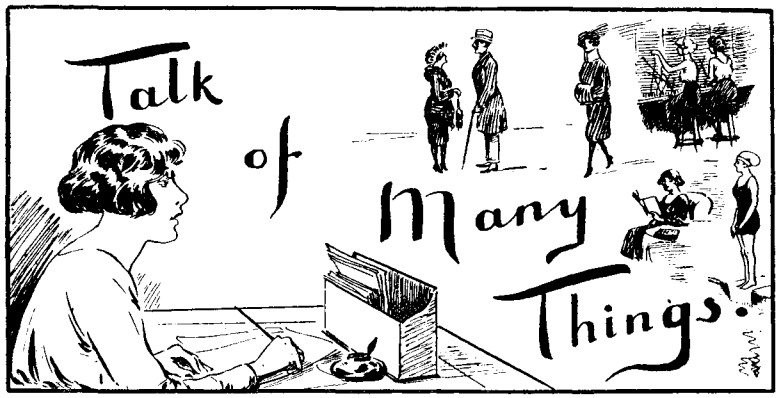
(4) In considering business from start to finish, from the standpoint of spiritual forces (the instruments of business being merely the symbols of such transactions), should not the training in financial administration include an appreciation of business (as a whole), however specialisation becomes necessary in given directions ? In other words, as a synopsis indicates, the "Economics of Business and the Study of Finance" represent a course for all students of business, accountancy, statistics, &c., being sections of it. In support of this I have noticed that the last few years have seen a great change in the attitude of commercial accounting experts towards what figures stand for as distinguished from figures themselves.

THE SPIRIT OF FINANCIAL ADMINISTRATION.

Such are a few thoughts on business and its greatness, and the symbols of business. The whole is spiritual, the entering of minds into business—into finance, and the symbols of the minds of the one group calling to associative work the minds of other groups. And financial administration appears to be "in imagination (borrowing a thought) like a spirit, everywhere pervading and penetrating that whole and its component parts." Financial Administration is concerned with the initial, the intermediate and the final operation of business, providing, constructing, using, organising instruments of finance, discriminating perpetually between "live" and "dead" instruments, "thinking" how to diminish the number of documents required to complete acts of business, how to reduce the time occupied in preparation for business transactions, how to smooth every process of business, and how silently to let each transaction pass through all its stages and enter the category of history.

For these reasons, though we have but touched the outer circle of this great sphere of human activity may we not all—all are interested in business—take for our encouragement, in the extension of our knowledge and experience of public affairs, the words of Edmund Burke who wrote "it is therefore not without reason that the science of speculative and practical finance, which must take to its aid so many auxiliary branches of knowledge, stands high in the estimation not only of the ordinary sort, but of the wisest and best men ; and as this science has grown with the progress of its object, the prosperity and improvements of nations has generally increased with the increase of their revenues ; and they will both continue to grow and flourish as long as the balance between what is left to strengthen the efforts of individuals and what is collected for the common efforts of the State, bear to each other a due reciprocal proportion, and are kept in a close correspondence and communication."

And finally, Business—Finance—Post Office—may we not say that these terms are synonymous, and that the postal, telegraph, telephone, radiotelegraph, radiotelephone systems of the world make Business possible in every direction ?



We have pleasure in printing the following article by a new contributor :—

"Zoo-Land."

Probably many telephonists look upon the Zoo as a place to visit in childhood, and it may not occur to them that it is a veritable fairy land to those who have eyes to see and ears to hear—and that grown-ups can have a much better time than the children, when paying a visit there, because they are able to appreciate the beauty that is to be seen on every hand.

When spending an afternoon there a short time ago, I was enchanted with the glorious colouring of the birds inthe Aviary—the red-crested cardinal; the golden hangnest which is a brilliant yellow with black wings; the South American sugar bird—a brilliant blue with black-tipped tail, and light jade top to its head; and the Australian flower pecker—pale green and yellow. This is only a description of a very few of the tremendous variety to be seen. There is also a bird called the Myna which hails from India. This bird speaks quite distinctly and while I was there the keeper was feeding it, consequently its flow of language was very free, and it said "Eliza," "What's the time?" "Are you there?" and "How are you?" quite distinctly. When the keeper had disappeared, I tried to make it speak by offering it a piece of bread, but the result was rather amusing. It gave a scornful look, and uttered a shrill sound rather like a steam whistle!

The bears were very amusing on the Mappin Terrace, and one dear old thing was sitting and holding its toes, which make it look like a huge toy animal.

The elephants were busily engaged carrying loads of delighted children, and four llamas drawing a small phaeton was a very pretty picture.

The mountain zebras from Cradock, Cape Colony, were beautiful creatures, with their jet black bodies and white stripes.

Two of the lions were honoured with the names of "Abdulla" and "Fatma." They were magnificent animals, and looked as if they might be posing for their photographs.

The sea lions were very active, and were jumping about in the water and barking joyfully. In the distance could be seen the goats climbing about on the upper Mappin Terrace, and one could not help feeling that everything possible has been done for the comfort and well being of the animals, in order that they should be in their natural surroundings.

The parrakeets were a blaze of colour, which reminded one of a scene out of *Chu-Chin-Chow*.

The squirrels in Regent's Park are lovely; and so tame; they will come up to the iron railing and take nuts out of your hand, and the pigeons and other birds are very appreciative of crumbs of bread, &c.

Well, I think I have said enough to illustrate what a very interesting time can be spent at the Zoological Gardens, and I can recommend anyone who is feeling "bored" or "office weary" to spend a few hours there.

L. R.

The "Telephone Service" in Poetry.

Whether realised by the writers or not, it is certain that a number of poets are inspired when writing, and do not understand from whence their inspiration comes. It is the object of this article to bring to light some of the lines where the Telephone Service has, in this way, been the subject of inspiration.

Let us deal first with some of the better-known illustrations. Wordsworth was no doubt thinking of the supervisor when he wrote :—

"A perfect woman, nobly planned
To warn, to comfort, and command;
And yet a spirit still, and bright,
With something of an angel-light."

So also was Mrs. Barbauld :—

Alive to every tender feeling,
To deeds of mercy ever prone;
The wounds of pain and sorrow healing,
With soft compassion's sweetest tone.

"No proud delay, no dark suspicion
Stints the free bounty of their heart;
They turn not from the sad petition,
But cheerful aid at once impart."

The telephonists are not forgotten :—

"Far from the madding crowd's ignoble strife—
Their sober wishes never learned to stray";

and

"She was a phantom of delight
When *first* she gleamed upon my sight";

yet again

"Two ears and but a single tongue
By nature's law to man belong!
The lesson she would teach is clear—
'Repeat but half of what you hear!'"

It is with something like reproach that Gray writes to the subscriber—

"Sweet is the breath of vernal shower,
The bees collected treasures sweet,
Sweet music's melting fall; but sweeter yet
The still small voice of Gratitude."

The Engineers are not forgotten—

"But knowledge to their eyes her ample page,
Rich with the spoils of time, did ne'er unroll:
Chill penury repressed their noble rage
And froze the genial current of the soul."

and Longfellow tries to cheer them, knowing the result of such drastic decrease in wages to which they are subjected :—

"Let us, then, be up and doing
With a heart for any fate;
Still achieving, still pursuing,
Learn to labour and to wait."

Macbeth has a word of warning for the authors of "Instructions" :—

". . . . . But in these cases
We still have judgment here; that we but teach
. . . *Instructions, which, being taught, return*
To plague the inventor."

And, in conclusion, a word which is particularly applicable to all of us who are privileged to be designated "public servants" :—

"Friend, do no crouch to those above,
And do not tread on those below;
Love those, they're worthy of thy love;
Love those, and thou wilt make them so."

"CIVIL" (*Gerrard*).

London Telephonists' Society.

The members of the L.T.S., filled with goodwill and tenderness, their meetings over (bar the shouting) are planning now their summer outing. Oh, joyous thought! Oh, frabjous day! when everything is young and gay; when fields are green, the climate kind, with troublous thoughts far, far behind—(Our space is up—the printer vexed!—*To be continued in our next*).

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

A WRITER in the *Bystander* makes the following confessions under the heading "A Poor Joke" :—

When I heard that they proposed putting telephone call offices along the Embankment I wrote a little paragraph suggesting that there would now be more suicides than ever. And then I began to wonder why I had taken the trouble to pen that obvious little witticism. Had I a grievance with the telephone people? No! Was I dissatisfied with the telephone service? No! Then why in the name of common justice sacrifice the reputation of a very splendid institution on the altar of a poor joke?

I worked myself, at last, into such a fit of remorse that I rang up my pet telephone girl—the one who says, "Shall I call you?"—and doesn't! I told her of the evil thing I had done, and I kept on telling her, until my tears filled the mouthpiece and my voice must have sounded like a Scottish elder eating damp haggis. She was very comforting. She said that everybody liked to poke fun at the telephone, and that the better the telephone became the worse were the jokes made about it.

Other humorists, please copy!

LONDON ENGINEERING DISTRICT NOTES.

HONOUR CONFERRED UPON THE ENGINEER-IN-CHIEF.

THE staff of the London Engineering District will be delighted to know that the rank of Lieut.-Colonel has been conferred upon the Engineer-in-Chief. That it may be but the precursor of further recognition is the wish of the whole staff.

Institution Meeting.

On May 8 Mr. Harvey Smith read a paper before the Institution of Post Office Electrical Engineers on "Some Mechanical Considerations in Overhead Line Maintenance." The paper was accompanied by a number of graphs which illustrated clearly the variation in stresses applied to structures, and the strains to which they were subjected due to ice accumulation, wind pressure and alterations of temperature. The importance to be attached to the elastic limit was dealt with in some detail. Tables and graphs were exhibited which enabled calculations regarding the strength and factor of safety of existing routes to be readily effected. The paper was followed by a most interesting discussion which centred chiefly on the point of elastic limit. One speaker gave some information about certain important investigations which had been made at the National Physical Laboratory, while another dealt with the enquiry on the same matter which is being made by a Committee of the Institution of Electrical Engineers.

Mr. Harvey Smith was congratulated not only upon the characteristically able way in which the paper had been prepared and presented but also upon the stimulating discussion which his paper provoked. Amongst other interesting items of information which were elicited was the fact that a new edition of T.I. XIII is being prepared which will contain much new information of great importance to engineers responsible for the construction and maintenance of overhead lines.

The paper and discussion indicated how many-sided was the work of a Post Office engineer. Each phase of the work bristles with problems and every new development brings additional problems to be solved. It is not possible for any one individual to solve all the problems, and the official hours are so full of current work that there is little time to devote to investigation. Fortunately, however, the spirit in the engineering profession is such that there are always men who will devote a very large proportion of what is regarded as private time to the solving of technical difficulties, and the result of their researches is placed freely at the service of their colleagues.

New Exchanges.

By the time that these notes appear two new exchanges will have been opened in the London Engineering District. One is at Addiscombe, and has been installed in a building of a temporary type specially constructed for the purpose, and the other is at Wanstead which has been installed in a dwelling-house which has been re-arranged and adapted for the purpose of a telephone exchange. In each case the equipment is of the No. 10 type and has been completely installed and tested out by the staff of the Sectional Engineer.

Considerable progress has been made with the construction of the Moadway telephone exchange building which is to serve the Golders Green area, and the construction of the New Woolwich Exchange building has been commenced. Other buildings are about to be put in hand by the Office of Works.

Fitting School.

This school has been re-opened, and short courses of construction are being given to groups of fitters.

Jointing School.

Additional equipment is being added which will make the course of instruction more comprehensive and useful.

"Denman" Chess Club.

The close of the session was signalised on April 18 by the distribution of prizes by R. McIlroy, Esq., the President of the Club. Following a resumé by Mr. Francis, Acting Honorary Secretary, of the season's activities, Mr. McIlroy in a few well chosen words showed both his personal interest in the club's welfare and an intimate knowledge of the game.

Prizes were then presented to the following members:—

Club Tournament.

Group 1, Mr. Realff; Group 2, Mr. Temple; Group 3, Mr. Peake.

"*Knock Out*" *Competition.*

1st, Mr. Jelfs; 2nd, Mr. Eastop.

The presentation was followed by a Lightning Tournament in which Mr. H. Barrett was successful in the final, with Mr. C. W. Cornwell as "runner up."

The Committee propose forming two teams next session to compete in the various sections of the Civil Service and Municipal Chess League, as it is felt the introduction of an additional team will enlarge the field of experience for Members of the Club.

A vote was taken as to the most convenient evening for the club meeting, and as a result the meetings will continue to be held on Thursday evenings during the forthcoming season.

Retirement.

Mr. A. J. King, after 40 years' service, has retired on a well-earned pension, and on May 11 a concert took place at Clapham Junction to mark the occasion. Mr. King was well known to the old postal telegraph staff in the S.W. District of London, where most of his life was spent. He was greatly respected by his colleagues on the staff of the South Internal Section and to show their mark of esteem presented him with a handsome gold watch. Mr. A. W. Wright, the Sectional Engineer, made the presentation, and referred to the esteem in which Mr. King was held. A convivial evening followed, which was thoroughly enjoyed by all present.

Clerical Staff Dinner.

The twelfth annual clerical dinner was held at Anderton's Hotel, Fleet Street, on Thursday, March 22. Mr. W. L. Hart, the Principal Clerk, presided, and was supported by Mr. F. Freeman in the Vice-Chair. Mr. R. McIlroy, the Superintending Engineer, was "The Guest of the Evening." The company included Mr. A. E. Cooke, the late Principal Clerk, and representatives of the Engineering staff.

A very excellent musical programme, which was much appreciated, was provided by members of the staff. Mr. J. W. Kimber, the Musical Director, was assisted by Messrs. S. L. Bickerton, F. G. Brigden, J. H. Chubbock, C. W. Cornwell, T. Flannery, J. J. French, S. G. Frost, H. W. Gardener, J. J. Gerke, E. F. Griffiths, J. W. Hamilton, Chas. Harris, G. H. Stanbridge. Mr. Fred Froud was engaged for the piano.

Mr. Hart in proposing the toast "The Guest of the Evening," said that he was particularly glad to be entrusted with that toast because it was his first public appearance in the District, and on behalf of the Clerical staff heartily welcomed Mr. McIlroy there as their guest. Mr. McIlroy's name had been familar to him since he entered the Engineering Department and he said without hesitation that his personal associations with the Superintending Engineer since November had been most happy and inspiring. He had served under several Superintending Engineers and he claimed that the experience so gained enabled him to say that from the point of view of the Clerical staff Mr. McIlroy was the right man in the right place. He demanded a high standard but it was well known that he set that standard in his own work. He was keenly alive to the staff's aspirations and disappointments, and above all, was possessed of a full share of sympathy. The toast was received with musical honours.

Mr. McIlroy, in responding, said how very glad he was to have the opportunity of being present that night. It had always been a satisfaction to him to know that the earlier years of his service in the Engineering Department had been as a Clerk in a Superintending Engineer's Office and the experience he had gained had helped him to understand not only the work the clerks had to do but the difficulties they had to face. Of course nowadays the work was much more specialised but he could remember when the Superintending Engineer's staff in each Provincial District consisted of four clerks. He referred briefly to the present system of classification and its difficulties. Time was when the Engineering classes were open to clerical officers and some of the best men had come from those classes, but they were all working together for a great Department with a great end in view. He relied on the zealous co-operation between the various classes of the Engineering Department and in that connexion was glad to see there a good many members from the Engineering side. In conclusion, he expressed his gratitude for the way in which he had been received and hoped they would have many a pleasant evening together in the future.

Mr. Rodway proposed a hearty vote of thanks to the artists and to the committee who had organised a very successful and enjoyable function. Mr. Freeman, on behalf of the staff, welcomed Mr. Hart's advent to the London Engineering District, and expressed their thanks to him for occupying the Chair on occasion.

C.T.O. BOWLING CLUB.

THE first match of the C.T.O. Bowling Club was played on the Bournville (Cadbury's) Green, Birmingham, on Wednesday, May 23, 1923, against three rinks from the Birmingham Post Office, and resulted in a win for the C.T.O. by six points, 66 to 60.

In addition to the matches shown in the List of Fixtures a match has been arranged forTuesday, July 17, 1923, against the G.P.O. (North) Bowling Club. This match will be played at Wanstead and will start at 3,30 p.m.

LONDON TELEPHONE SERVICE NOTES.

Royal Visit to Exchanges.

On Friday, April 27, a visit was paid to the Trunk and Central Exchanges by H.R.H. Princess Alice (Countess of Athlone), the Rt. Hon. The Earl of Athlone, G.C.B., G.C.V.O., C.M.G., D.S.O., and their daughter, Lady May Cambridge.

The visitors were received by the Controller, Mr. Valentine, who conducted them over the two exchanges, assisted by the respective Section Superintendents and Supervisors. Keen interest was displayed in the various operating methods and equipment.

The Earl was particularly interested in telephone troubles from the subscribers' point of view and fully appreciated the relative explanations given in regard to each, *e.g.*, the routine in regard to testing the subscriber's multiple before plugging in was demonstrated, and His Lordship realised that it was practicable—in the case of a local call on a full multiple exchange—for a smart telephonist to repeat the particulars of the call and report "Number engaged" in the same breath. He was much amused when told that subscribers occasionally challenged the veracity of this advice by retorting "You haven't had time to find out." He also admitted being wonderfully impressed with all he had seen, and agreed that the average subscriber had no conception of the magnitude and complexity of plant and organisation involved, and he expressed a wish to pay a subsequent visit with his son—Lord Trematon.

Her Royal Highness asked many questions affecting the staff and their conditions of service, after which a visit was paid to the dining-room and kitchen.

Before leaving the visitors' book was signed, the signatures appearing under those of Their Majesties who visited the G.P.O. (S) Exchanges in June, 1918.

Contract Branch.

The District Contract Manager was recently called upon to visit the White Lodge, Richmond Park, in connexion with the telephone arrangements required by H.R.H. the Duke of York. During his interview with the Comptroller of the Duke's Household H.R.H. Queen Alexandra, H.I.M. Empress Marie of Russia, and H.R.H. Princess Victoria arrived to inspect the future residence of the Duke and his bride. The Contract Manager was presented to the three distinguished visitors and was thanked by them for the part he was taking in preparing the Lodge for the reception of the Duke and Duchess.

London Telephonists' Society.

As a sequel to the suggestion made by the Controller at the Society's final meeting, Miss Cox, the President for the forthcoming Session, and a party of 25 members of the Society, paid a visit to the new Clerkenwell Operating School on Friday, April 27. Mr. Newitt and Miss Webb showed the party the various rooms comprising the School and fully explained the principal points of interest regarding the equipment and procedure in the switchroom.

The party were much impressed by the improvements which had been made in the school equipment since "their days" and the kindness of the conductors for their patient explanations of the many details.

It is hoped that it will be possible to arrange for a second party to visit the School on a future occasion.

Arrangements for the next Session are already in hand and there is early promise of meetings of exceptional interest.

379,600.

These figures are boldly displayed in the street windows of certain offices of the L.T.S., that those who run may read and note the number of telephones in the London Area. Month by month the number increase and the constant upward tendency cannot fail to impress the public that the demand for telephone service is increasing and those who are not subscribers will wonder why they are not.

It may be of further interest for it to be known that the lines are spread over 98 different exchange areas and that in one day approximately one and-a-half million calls are originated.

Another Presentation.

On May 1 the Traffic Officers entertained Mr. Horace Dive, M.B.E., at dinner and presented him with a silver kettle and spirit stand. The gift was a token of appreciation and regard for his freely given services as chairman of their Association from its formation, a post which he has relinquished since his recent promotion.

Culled from the Exchanges.

Regent.

There is nothing of any importance to report from the Western Front (Pardon; that should read "District"). The dancing season has died its yearly death, and as spring is apparently very loth to part with winter's frost and icy blasts, outdoor sports have not yet become intensely popular.

The usual charities are, however, still actively engaging the attention of our generous staff and Regent continues to carry on its monthly teas and whist drives for the disabled soldiers at Gifford House, Roehampton. The men are particularly fond of cards and tomatoes; so it is an easy matter to entertain them now that we can feel certain of satisfying their needs both social and epicurean.

A mild flutter of excitement was caused when some newspaper photographers put in an appearance at the Exchange the other day in search of fair-haired beauties whose pictures they sought to adorn some organ of the Amalgamated Press. We have all searched the newspapers diligently since the event; but as nothing yet has been seen of the afore-mentioned pictures, we think the camera must have shared the fate of cameras when such an undue strain is put upon them.

A paragraph appearing in the *Daily Mail* caused our hearts to swell with a deep and unbounded gratitude. Somebody wrote that telephonists endured more nerve strain in a day than school teachers endured in a year. It was so fresh and delightful to find somebody championing us in the Press instead of adding to the Monument of usual Public criticism that we blessed the unknown writer; and if we only knew his (or her) name we would mention it daily in our prayers.

With the exception of few brilliant glissading displays, occasionally terminating in a more or less graceful descent to earth when the floor was newly polished, nothing else has happened to disturb the even tenor of our ways. Perchance we may be more hectic in next month's report.

Central Exchange.

The Eldorado Swimming Club have arranged their third Annual Swimming Gala for Friday, June 29, at Pitfield Street Baths, Hoxton.

There are numerous club events and in addition a L.T.S. Invitation Team Race (Ladies) and also Handicap Races open to ladies in the L.T.S. Entries should be sent to Miss E. Curtis, Central, not later than June 20.

PERSONALIA.

ABERDEEN.

A meeting of the District Office, Contract and Traffic staffs was held on March 29 to say good-bye to Mr. J. H. STORRIE, M.B.E., District Manager, who has been transferred to Gloucester. Mr. Barclay, Traffic Superintendent, occupied the chair and Mr. Clow, Chief Clerk, in name of the staff, presented Mr. Storrie with a gold wristlet watch and a silver cigarette case.

Representatives from the various departments expressed the staff's sincere regret at losing Mr. Storrie and their best wishes for his health and happiness in his new sphere. Mr. Storrie feelingly replied, thanking the staff for their loyalty during the three years he had been in Aberdeen.

YORK.

Mr. J. W. STELLING, on the occasion of his promotion to Traffic Superintendent and transfer to Southampton, was presented by the York District Manager's staff and Exchange Supervisors in the Old Lincoln District, with a handsome dining-room clock suitably inscribed. The presentation was made by Mr. D. J. Barnes, District Manager, who spoke very highly of Mr. Stelling's work and abilities whilst at Lincoln where he had been in charge of the Traffic Department for many years. Mr. Stelling, who was very popular with the staff, carries with him to his new office the good wishes of all.

MISS A. BEAN, Writing Assistant, York District Manager's Office, who has resigned in view of her approaching marriage, was presented with an inlaid walnut clock by the District Manager's staff.

BRIGHTON.

Officers in the telephone branch in various parts of the country will regret to learn that Mr. PERCIVAL BAKER, Assistant Traffic Superintendent, Brighton, passed away on April 27 at the comparatively early age of 45. Although Mr. Baker had been in indifferent health for the past few years, the news of his death was unexpected as it was understood by his colleagues that he would return to duty early in May.

Mr. Baker started his career many years ago with the National Telephone Co., in the engineering section, South London District, and afterwards joined the Glasgow Corporation for whom he acted as Exchange Manager, &c. He came to Brighton in 1914 and during the war (he was physically unfit for war service) he was loaned to Coventry and Tunbridge Wells in which places he acted as Traffic Superintendent.

His loss is deeply regretted.

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[Central Press Photograph.

THE RIGHT HON. SIR LAMING WORTHINGTON-EVANS, Bart., G.B.E., M.P., H.M. Postmaster-General.

The Postmaster-General sends us the following message:

"I congratulate the JOURNAL on reaching its hundredth number and wish it every success in the continuance of its useful work."

WIRELESS PHOTOTELEGRAPHY.*

By F. WYNDHAM.

PHOTOTELEGRAPHY might be regarded as an interesting side line of general telegraphic practice. It had received the attention of a comparatively few specialists and experimenters, and those interested in the subject and desiring information thereon were somewhat at a disadvantage since there was nothing like an extensive literature to draw upon. Articles occasionally appeared in the technical press but, since phototelegraphy could not yet be said to have emerged from the experimental stage, text books on physics and electricity naturally treated the subject very sparingly or ignored it altogether. While a considerable amount of success had already been achieved working over metallic circuits, very little practical result had been obtained by radio. The war was responsible for this, since experiments of such a kind were necessarily put a stop to. It was now a question of applying to radio the most suitable of the existing systems, and with specialists working in collaboration with experts in radio technique, it was almost certain that before very long the transmission of pictorial matter by wireless would become a practicable proposition.

The ordinary half-tone process print afforded an illustration of the problem of pictorial telegraphy. It consisted of multitudes of dots and sections of varying size. The dark portions of the print resulted from these sections being so large as almost to merge into one another, while the light portions consisted of dots so minute as to be almost imperceptible to the unaided eye. The intermediate tones were represented by dots of proportionate size. Assuming that a definite value could be assigned to these sections, and their magnitudes denoted by signals of corresponding magnitude or duration, it was possible to transmit to a distant place the subject matter of a photographic reproduction. This immediately suggested that so far as the character of the matter to be transmitted was concerned, phototelegraphy should, broadly speaking, occupy a place somewhere between telegraphy and telephony. The signals required to transmit a pictorial subject of the character of a coarse half-tone print were certainly more complex than Morse signals. They were, however, not to be compared in complexity with the combinations of frequency and amplitude involved in telephony. But while thousands now rightly enjoy radio telephony in which the combinations of pitch and varying amplitude of the original sound waves are faithfully reproduced, the conditions of successful telephony were fulfilled by the reception by the human ear of the reproductions of such waves, whereas in any phototelegraphic process the received signals must be recorded, and it was necessary to provide that the trains of oscillations, each train of perhaps two, three, or more seconds duration corresponding to a length of the photograph, were recorded in such a way that they lay exactly beside one another, any point in one line being in perfect alignment with the corresponding point in every other line. In other words a high degree of synchronism was essential to secure any satisfactory result, and while this was not difficult to obtain in a fair degree working over an ordinary circuit, it became a more formidable problem in radio.

The recording telegraph of Alexander Bain, the well-known Edinburgh clockmaker, might be considered as the germ of one modern system of pictorial telegraphy which had been adapted to wireless. Bain's invention was not strictly speaking a pictorial telegraph, and he did not claim so much for it, but its principle was almost immediately adopted by another inventor—Bakewell—for the transmission of sketches which were drawn in insulating ink on metal foil. The drawing was mounted on a cylinder revolving in a close spiral under a stylus and was reproduced at the receiving station by another stylus making contact with a sheet of paper treated with a solution of potassium iodide and starch paste, a stain appearing on the paper whenever current flowed in the circuit. During the remaining portion of the nineteenth century various ideas were put forward which have since borne fruit, but little of a practical nature was accomplished until Prof. Korn developed his Selenium system, which relies on the light sensitiveness of that element. It was the most scientific system so far devised which had achieved practical results, and was a direct one, transmission being effected from the photographic transparency. The rate of working was somewhat slow, and since the degrees of light and shade varied the resistance of the circuit through the medium of the selenium cell, an undulating continuous current passed out to line and from its nature the method was by no means the most suited for adaptation to radio.

Latour of Paris had patented a method specially with regard to systems such as this. His proposal was to feed the light sensitive medium with alternating instead of direct current, amplifying, and subsequently rectifying it. There was also the alternative of breaking up the photographic transparency into a half-tone print. It would then be a question of transmitting signals of minute varying lengths but of constant amplitude. The Belin methods of transmitting from a relief print were described, as also that of Knudsen, the first inventor to transmit experimentally a picture by wireless fourteen years ago.

The most interesting system from the radio point of view was that founded on the early work of Bain and Bakewell. It was possible to produce a photo-process print in fish glue on metal foil so that the dots or sections were represented by insulating medium, and by causing a stylus to traverse the area of such a print to transmit a photographic reproduction just as Bakewell did the outlines of simple subjects drawn in insulating ink.

In practice, it was necessary to use a single line process screen, instead of a cross screen, to prepare the print, this producing not dots and sections, but bands of varying breadth, and since the path of the stylus crossed these, a series of impulses of shorter or longer duration according to the breadth of the uninsulated spaces between the bands, passed out to line or actuated the radio transmitter as the case might be.

In such a system relays could be utilized provided they were capable of working at a sufficiently high speed and the transmitter could virtually be regarded in the light of a Morse key.

There were two possible modes of recording, the optical and the electrolytic. The first had been utilized by Korn who had exploited this system of transmission. The latter had been demonstrated with success by Mr. Thorne Baker, who transmitted sketches by wireless using first a coherer and subsequently a thermionic valve as detectors.

Synchronism was a difficulty in wireless, and in the absence of any periodic check the difference in the rate of one drum over the other, though it might be disregarded in a single revolution, was multiplied in the course of a complete transmission.

The methods adopted to secure some approach to synchronism in wireless transmissions were described. The cypher method of transmitting pictures was also alluded to. It was not of the same mechanical or scientific interest as the automatic methods, but by this comparatively simple means pictures had been transmitted over distances unapproachable by any other system. The sections of a print could be arbitrarily defined by a letter of the alphabet according to size, but the weakness of the system lay in the fact that it was necessary to classify infinite gradations of tone under a limited number of heads. A certain number of letters could be assigned to tone, and the remainder used as a substitute for numerals to express the length of a succession of approximately similar tones. A block of letters equivalent to a length of the picture possessed a definite numerical value, and thus furnished evidence of any error in the transmission of the cypher.

An apparatus had been devised in which the line drawing in insulating ink placed on a roller, and rotated under a stylus, caused the requisite cypher to be printed on a tape, and the building up of the cypher into pictorial form at the receiving end could be accomplished by quite simple methods, and without the expenditure of as much time and labour as might be supposed.

Here at any rate was a system within the reach of all amateurs, supposing arrangements could be made for a pictorial radiogram to be broadcasted from time to time. The broadcasting stations might do worse than add such a novelty to their repertoire of musical and vocal items, and tax the ingenuity of owners of receiving sets to restore the cypher message to pictorial form.

Pictorial telegraphy would doubtless receive the attention of holders of experimental transmitting licences. The radio enthusiast who took his work seriously, and was content to labour patiently, was afforded an ample opportunity of contributing to progress.

[Mr. Smith, in proposing a vote of thanks, paid special tribute to Bain, Caselli and others for the early work they did in this line. He gave some interesting details of Bain's career both in London and in Edinburgh, and indicated that he was one of the most versatile of inventors in the electrical world.

Several other members expressed their appreciation of the lecture, and the vote of thanks was carried with acclamation.]

* A lecture given before the Edinburgh Radio Society.

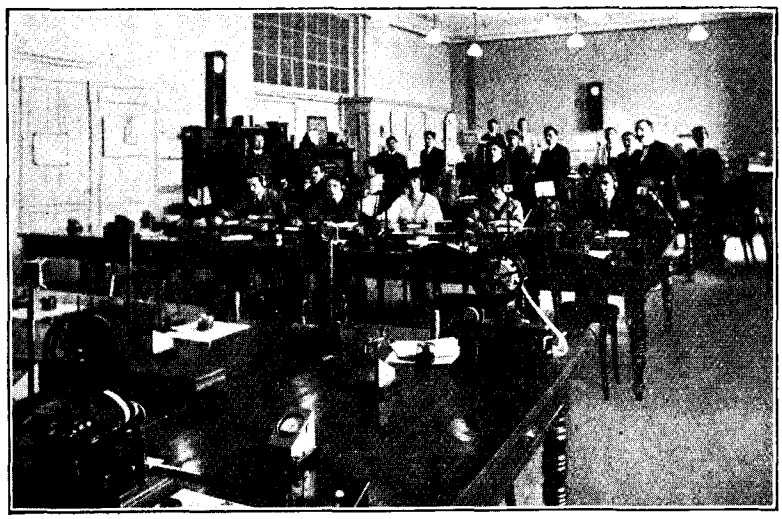
TELEGRAPHIC MEMORABILIA.

THANKS to the courtesy of the Swiss officials we are able to reproduce two photographs of the interior of the Lausanne Telegraph Office where the special international wires in use during the sittings of the International Conference are centred. In the photograph illustrating the Baudot and Siemens apparatus may be found the special four-channel Baudot specially arranged for disposing of the Diplomatic and Press telegrams between the London C.T.O. and Lausanne. Normally the traffic between London and Lausanne is insufficient to justify the use of a separate communication, but during the conference the four channels provided by the co-operation of the French and Swiss authorities if not always filled

have assured ready means for rapidly coping with the highly-important correspondence. As usual the Swiss manipulation has left nothing to be desired.

BAUDOT AND SIEMENS APPARATUS AT LAUSANNE.

The second photo represents the Hughes and phonogram circuits for giving communication with the less heavily trafficed international centres and the local extensions respectively.



HUGHES AND PHONOGRAM ROOM AT LAUSANNE.

That bright little periodical, *The Cable Room Monthly*, parodies these columns by a couple of its own in the May issue entitled "*Miserabilia*," excellently done. The spirit of the Cable Room, however, permeates the entire effort and absolutely gives a flat denial to the title. Far from denoting the miserable it is perhaps the happiest in vein of the many good-humoured if pungent local references of its eight pages.

The premature retirement of Mr. S. A. Coase, Overseer of the Cable Room, owing to ill-health has left a gap difficult—to some of us, impossible to fill. A man of sterling worth, the service is the poorer by his departure from our midst.

Eastern Engineering states regarding the completion of the laying of the new cable between Colombo and Penang that :—"it is a high speed one, and contains 630 pounds weight of copper per mile. The cable ship, *Colombia*, laid about 1,270 miles of this cable in eight days or an average speed of just under seven knots. The cable at its deepest point is sunk in three miles of water and is the second direct cable between Colombo and Penang. Up-to-date instrument rooms and offices are being added to the buildings of the Eastern Extension Telegraph Co., and a subterranean cable is being laid towards Tanjong Bungah for use in connexion with improvements which will take some time to complete."

From Russia comes the information that the Baltic Government Steamship Authority has given an order to the Radio Section to instal radio stations on 20 large steamers and the Soviet Roads Authority has made a contract with the Weak Current Trust to equip 25 receiving stations and 9 receiving-sending stations on the Onega Sea, in Tuapse, and at other points in the Crimea and the Caucasus.

Le Journal Télégraphique, of Berne, gives a brief account of an experimental public long-distance wireless service from Nordeich or Eilvese to steamers on the high seas.

Messages on this service are preceded by the word "Fernverkhr" in front of the address and in place of the name of the Coast station is substituted the word "Berlin." They are transmitted by the ordinary means to Berlin who apparently "controls" the coast station's transmission. The combined charge for these telegrams is one gold mark per word. A message of five words at the time of publication was priced at 44,560 paper marks.

We have heard and read of many devices for ensuring the secrecy of the contents of telegrams and the demand for secrecy has certainly increased since the advent of wireless.

Our Radio friends should, however, take heart of grace from a conference which was held in Venice at which delegates from International Fairs, representatives of Chambers of Commerce, banking and industrial organisations from 27 countries of the globe, representing over 200 organisations passed a resolution to the effect that the International Telegraph Bureau of Berne should give its consent to the inclusion of Esperanto as one of the recognised languages for use in International Telegraphy. If this were to be granted then, *all who run may read*—and understand! Thus, while on the one hand greater secrecy is demanded, on the other comes a plea for the other extreme.

Mr. W. H. Stoker, K.C., wrote a very interesting article on "Some Aspects of the Broadcasting" in the *Electrical Review*, a few weeks ago, and summing up thus poses the following queries, to which there is no intention to offer answers in these columns. This legal authority says :—

> "The Wireless Telegraphy Act, 1904, would seem to cover only apparatus for the transmission by wireless telegraphy of messages or communications in the nature of messages, and the receipt of these as incidental to their transmission. Questions therefore arise (1) whether a licence is necessary for apparatus for the receipt of messages or communications where such receipt is not incidental to their transmission ; (2) whether a licence is necessary for the transmission, broadcast or otherwise, of music or other things not being messages or communications in the nature of messages, and in any case (3) whether a licence is necessary for apparatus used solely for picking up and listening to broadcast musical and dramatic performances."

Congratulations to Mr. Rayner Childe Baker, C.I.E., Director-in-Chief of the Indo-European Telegraph Department, India Office, whose name appears among the new knighthoods conferred in honour of the King's Birthday.

In order to test the effects of lightning on electrical transmission lines and apparatus a laboratory test was made in the U.S.A. by the General E ectric Co. by means of a specially designed "lightning generator." According to *The Electrical World* this apparatus consists of a generator developed to produce a pressure of approximately 2,000,000 volts ; this is used in connexion with a large condenser which is charged and discharged through known inductance and resistance resulting in "a lightning impulse of immense power accompanied by a loud report. The power may be of the order of millions of kilowatts and the current 10,000 amperes, *lasting for less than one millionth of a second* !

The Department of Overseas Trade reporting upon the internal development of Poland reports among other interesting items that, "the exploitation of railways, posts and telegraphs are making satisfactory progress. London is therefore still hoping for the long-looked-for direct telegraph line, let us say to Varsovie as a commencement."

At the Royal Society's Soirée held in May and presided over by Sir Charles Sherrington, K.B.E., M.D., there were several interesting exhibits in connexion with deep sea telegraphy shown by Messrs. C. Tate Regan, F.R.S., and M. A. C. Hinton of the Natural History Section of the Department of Zoology of the British Museum. There were specimens of deep-sea cables damaged by sharks' bites, the teeth having penetrated between the coils of the wire armouring and broken off short. The samples exhibited, according to a report published in *The Electrical Review* were (*a*) cable from S.W. Africa, 250 fathoms, with tooth of *Lamna Spallanzanii*, and (*b*) from the Indian Ocean, 750 fathoms, with tooth of *Scapanorhynchus*. The latter is a deep-water shark which may have been feeding on animal growth attached to the cable some of which was still clinging to the cable.

The Telegraph and Telephone Age makes the interesting statement that the Postal Telegraph Commercial Cables System of the U.S.A. has completed contracts for laying a new cable in the Atlantic Ocean for direct working between New York and London. Its speed is designed to be 1,200 letters per minute (*i.e.*, working duplex 600 each way) the conductor being of the phenomenal weight of over one thousand pounds to the mile. The Colombo-Penang cable cited in a paragraph above shows this same modern tendency to increase the weight of the copper conductor which in the case of the American cable more closely approximates to what one would term a huge copper *rod* judged by its cross-section than what is generally understood as a *wire* ! So far as the writer is aware the heaviest *overhead* copper conductor was originally used in the case of certain London-Glasgow telephone trunk circuits, and in those early days were not beloved by linemen on the rare occasions when they actually broke down.

The new cable, the first to be laid in the Atlantic between America and Europe since 1910, is now being manufactured by the Telegraph Construction & Maintenance Co. and Messrs. Siemens Bros., and will be laid by Aug. 1.

The route will be from New York to Nova Scotia, a distance of about 1,000 miles, and from Nova Scotia to the Azores, approximately 1,750 miles, where it will connect with a cable, already laid, to Waterville, Ireland, which in turn will connect with a new cable of 320 miles, also to be laid this summer, from Ireland to England. Still another cable will be laid from the Azores to the Continent of Europe in the near future.

As the following anecdote from a trade journal has some direct "electrical" connexion with our own craft and contains some hidden moral lesson into the bargain it is inserted in these notes without further comment :—

> "There was an electrical contractor who started some twenty years ago. He worked hard early and late, personally supervised all work done, prepared and checked all estimates, and sat up into the early hours of the morning making up his accounts and planning extensions to his business. He has now retired with a comfortable fortune of £50,000. This money was acquired by industry, economy, conscientious effort to give full value, indomitable perseverance, and the death of an uncle who left him £49,999 10*s.* 6*d.*"

The encouraging Trade Returns recently published are more than welcome to the Telegraph Departments of this country. For some little time past the foreign section have thought but hardly dared to think that they had really felt aright and that there was actually a steadier increase in the commercial pulse, but traffic figures though not leaping have certainly flattered our hopes. It is hoped that every effort will be made to foster this upward tendency by an acceleration of the *delivery* of telegrams. Delivery is undoubtedly a tough question, but Major Jayne at Edinburgh apparently hit the nail on the head when he described the "batch" system as "a most unscientific one," and Mr. Highet on the same occasion when he mentioned, "bad paper and bad pencils," as a source of annoyance to the public was but echoing the conviction of every practical man in the British Telegraph Service.

The Spanish Gypsy :—

> "Nay never falter: No great deed is done
> By falterers who ask for certainty.
> No good is certain, but the stedfast mind,
> The undivided will to seek the good:
> 'Tis that compels the elements, and wrings
> A human music from the indifferent air."
>
> GEORGE ELIOT.

J. J. T.

HOW THE TELEPHONE WORKS.

BY A. CROTCH.

X.

SIEMENS' AUTOMATIC. (*Continued.*)

Connector. On this side of condensers, the relays Y and H put A line to earth through 100+250=350w. (Fig. 34). To the B wire, the battery is applied through a similar resistance RA. This arrangement is the feed to the loop on this side, when completed. At present the A line is to earth at TR2 and the B line earthed through relay CA which is energised by the battery through RA. N relay actuated by its battery, through 500w. coil, K1, C wire. When it pulls up, the circuit is *via* 500w. coil 1,500w. coil, N1 direct to C wire.

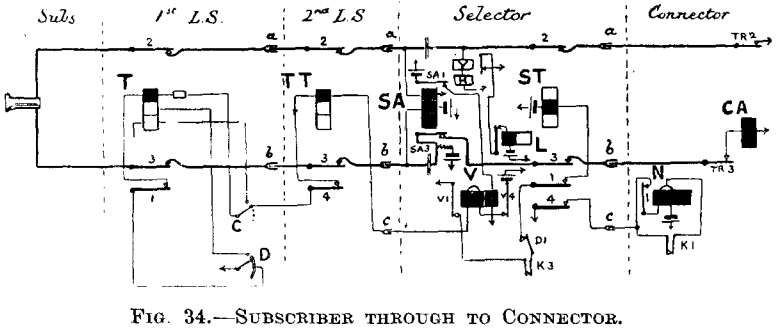


FIG. 34.—SUBSCRIBER THROUGH TO CONNECTOR.

CA energised :

CA1 dis ready for impulses.
CA2 D relay actuated by N4, D's 500w. coil, CA2, K3, W1 earth.

N energised :

N1 current through its coils and N1 passes to earth at selector ST4.
N4 actuates relay D by latter's 500w. coil, CA2, K3, W1, E.

D energised :

Connector now waiting for impulses of second digit.

2nd digit. (6) Selector relay SA releases for first impulse; this, by release of its SA3 contact, takes battery off B line and releases connector relay CA.

CA releases for 1st impulse :

CA1 actuates vertical magnet by D battery, D2, CA1, G2, vertical magnet, E.
Shaft-springs K actuated.

CA re-engaged :

D deprived of current but hangs on.

CA releases for 2nd impulse :

D's circuit restored.
CA1 actuates vertical magnet.

and so on for further impulses. At end,

CA re-engaged :

Wipers on desired level.
D deprived of current, hangs, but finally releases. When this occurs, circuit is closed to relay G.

G actuated :

By current from N4, G1,000w. coil, D1, K3, W1, E.
G1 (earth) locks G *via* D1 when D actuated.
G2 connects up rotary magnet ready for impulses.
G4. Relay D again actuated, by current from N4, which splits at G, part going through D 500w. coil, CA2, G4, W1, earth.

D energised :

D1 G locked.
D2 Battery ready for impulses.

3rd digit. (5) CA releases for 1st impulse :

CA1 actuates rotary magnet by D battery, D2, CA1, G2, rotary magnet, E.
Springs W actuated.

CA re-engaged :

D deprived of current : hangs on.

CA releases for 2nd impulse :

Circuit of D restored.
CA1 actuates rotary magnet as before.

and so on for further impulses. At end,

CA re-engaged :

D deprived of current : hangs on, but finally releases.
G also deprived of current but hangs on.

C wiper now on local contact of desired subscriber.

If subscriber **engaged,** the C wiper of his (1st) line switch will be disconnected. While G holds on, the battery at D is connected by G3 to relay CT, coils in series, N3 to C wiper. No earth being obtained there, CT is not energised.

G now releases.

Battery at D passes by CA3 to TR relay 900w. coil, W2, G1 earth: actuating TR.

TR energised:

TR2 Busy-back *via* G500 N1 applied to A line: CA relay dis.

TR3 Serves as busy-back return from B line, N 500 N1 to earth through battery.

TR1, CA relay being dis. D battery reaches TR by way of TR1 and CA3.

If subscriber **disengaged,** the C wiper of his (1st) line switch will be at normal: hence C wiper of connector will pick up this wire, which passes through the 400w. N1 coil of relay T, normal of C wiper, meter, 15w. and 600w. coils of T and earth at D wiper. In these circumstances the battery at D will find a circuit *via* G3, the two coils of T, N3 and earth at subscriber's apparatus.

CT actuated:

CT2 and CT3 put the A and B wipers through to subscriber's loop (interrupted by his condenser).

CT1 G having released, CT's 1,200w. coil dis. and battery is applied to CT's 40w. coil only finding earth at wanted subscriber's apparatus

S energised:

Battery at D now actuates S, finding earth through CA3, TR1, W2 and G1. The ringing current now passes through the 300w. coil of TR to the B line, finding earth on its return by the A line, at S2.

When subscriber replies, he completes his loop. The ringing current being much strengthened pulls up TR and TR1 short-circuits coils of S. Contacts of latter separate and the two subscribers are then through to each other, Fig. 35.

TR remains energised during the conversation.

The completion of the loop by the replying of wanted subscriber has another effect. This side of the circuit is supplied by current from the battery through RA. When the loop is established, the two relays Y and H are actuated and Y1 releases relay L.

Metering. It will have been noticed that we have not mentioned the selector relays S, Z and Y. These are concerned with the operation of the calling subscriber's meter. By their interaction and by the application of the battery by means of a cam contact a greatly increased current is sent over the C wire through the calling subscriber's meter for a predetermined length of time.

Clearing. Fig. 35 shows the circuit through from one subscriber to the other and the various relays actuated during the conversation. When the two receivers are hung up the following takes place. By breaking his loop the calling subscriber liberates relay SA: latter takes off battery from other loop (also broken by other subscriber) and liberates V which in its turn frees ST. The selector release magnet is then actuated by V2, K2, D2, ST5, E. T and TT also released, second line switch freed and first rotated to zero.

Further, ST liberates N, N3 frees CT and wanted subscriber's T relay and N2 actuates connector release magnet. The springs K and W are restored to normal and TR released.

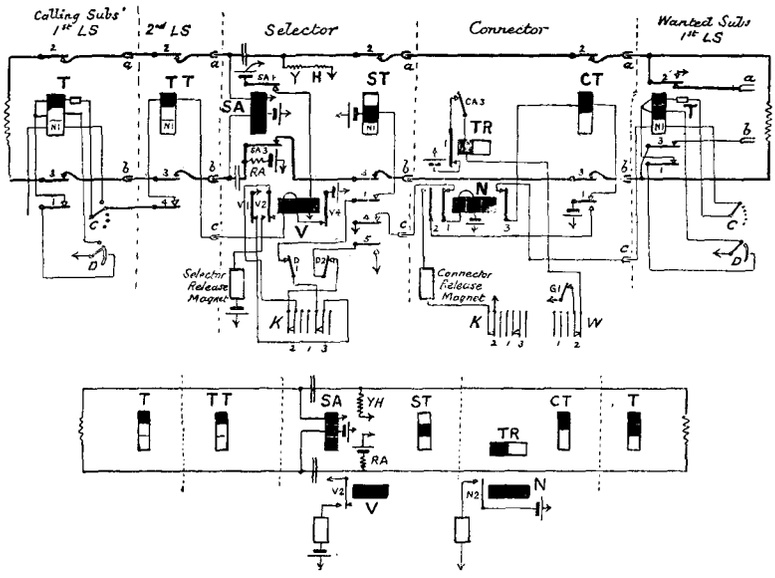


FIG. 35.—SUBSCRIBER THROUGH TO EACH OTHER.

It will be seen that a "busy" contact is indicated by its being left disconnected. A disengaged contact has the free pole of the battery connected to it, the other pole being to earth. When the seeking wiper reaches the disengaged contact, it receives a current which actuates the corresponding relay. In the A.T.M. Co.'s system an earthed contact indicates a busy selector or connector.

(*To be continued.*)

EXECUTIVE APTITUDE.

BY H. MORGAN (*Executive Officer, L.T.S.*).

THE daily influx of large quantities of correspondence, remittances, &c. to any Department, whether it be of a commercial company or Governmental body, creates a clamant demand for officers of executive capabilities, whose oversight and control will ensure the orderly and continuous flow of the work. Any impediment to such continuity will be productive of difficulty, congestion, and complaint. The primary requisite, then, of the controlling and managerial chiefs is sectional officers with an aptitude and willingess to assume responsibility, who will, by initiative and enthusiasm, induce and maintain hearty and interested co-operation on the part of the rank and file.

Administrative capacity must reveal itself by tending to homogeneity, and the possibility of easy attainment in this direction will be enhanced by executive endeavour and effort. *En passant* it may be observed that egoism, which manifests itself in a personal pride at successful accomplishment is not a derogatory trait.

While microscopic assiduity is descriptive of the analytical attention to small detail required in the case of the sectional supervisor, telescopic perspective, *i.e.*, the long view, must also have an important bearing on all his activities, and recognition of the importance of branch relativity must not be ignored.

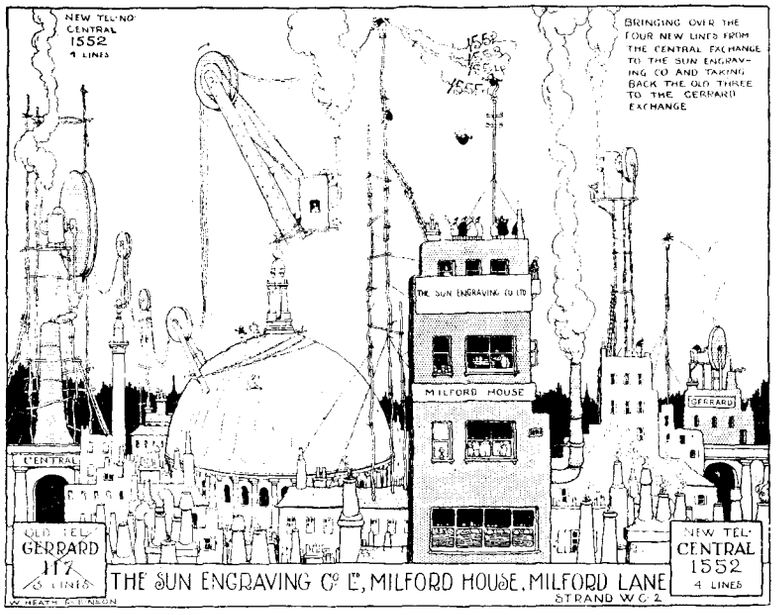
The ability to "clear things" is a very desirable acquisition, and stands out in bold relief against "shelving" with its concomitant of slovenliness.

"He who is something will do something,
He who is more will do more,
He who is most will do most."

The gradation of duties not infrequently results in a somewhat automatic performance, but this will be dissipated to a large degree if the executive officer brings imagination, and freshness of outlook to bear upon the various activities. This will prevent, also, the expression "not proper to my grade" from becoming a fetish.

From all this it is clear that executive aptitude is only developed by practical application. Excellence in things prosaic and mundane, as well as those intricate and wonderful, can only be ensured by tenacity of purpose and intelligent concentration. Oratory, literature, music, and—is the association permissible?—telephony, all prove this.

Longfellow's remarks relative to "heights" and "great men" could be quoted, but *suffisant pour le repas est assez.*



A NOVEL FORM OF NOTIFICATION OF CHANGE OF NUMBER.

THE Sun Engraving Company, by whose courtesy this picture is reproduced, have adopted a novel method of calling the attention of their clients (to whom the above card was sent) to the fact that their telephone number has been changed from Gerrard 117 to Central 1552. A characteristic drawing in Mr. Heath Robinson's fantastic vein shows this apparently hazardous feat in process of being carried out.

REVIEWS.

"*Telephony.*" *By T. E. Herbert, M.I.E.E. (Assistant Superintending Engineer of the British Post Office). Messrs. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway.* 18*s. net.*

Mr. Herbert's treatise on telephony is what it professes to be, "a self-contained elementary account of the basic principles of telephony correlated to the practice of the British Post Office," and "in the simplest form consistent with accuracy." It is essentially a practical and comprehensive book which should meet the needs of students as well as being a useful work of reference.

Mr. Herbert confines his attention to what is commonly known as line telephony, as opposed to wireless telephony with which we are now all so familiar, and he consequently deals with that magician's wand—the thermionic valve—only in its capacity as a telephone repeater, a repeater which is revolutionising line telephony almost as much as its first cousin has influenced wireless telegraphy and telephony. The book with its index occupies nearly 900 pages, and the illustrations and diagrams are well reproduced. It covers also the general principles, the practical use of batteries and their measurements, line equipment of cable or open wires, auxiliary apparatus, and magneto and common battery exchanges. We notice that Mr. Herbert has—we think wisely—not attempted to deal with the intricate subject of automatic exchanges which requires a book to itself. Perhaps he contemplates the writing of such a book to take its place on our bookshelves with his well-known book on "Telegraphy," now in the fourth edition, and the present venture.

"*Wireless Telegraphy.*" *Vol. II. Valves and Valve Apparatus. By Rupert Stanley, B.A., LL.D., M.I.E.E. Longmans, Green & Co.,* 39, *Paternoster Row, London, E.C.*4. 15*s. nett.*

Mr. Stanley is a recognised authority on valves, as he prefers to continue to call them, and this work, now in its second edition, is up-to-date—a most necessary factor in this rapidly developing branch of wireless telegraphy and telephony. He has a wide knowledge of continental and American practice and is consequently able to deal with his subject in all its aspects. We can recommend this book to readers interested in this fascinating art.

TELEPHONIC DEVELOPMENT OF BRITISH TOWNS.

THE annexed table shows the telephone development of all towns and cities in Great Britain with upwards of 5,000 telephones as at Dec. 31 last. London (10 miles radius) has now less than 20 inhabitants for every telephone station, Cardiff has attained to second place with 22.5, Edinburgh has 24.7, and Bournemouth, Bradford, Glasgow and Liverpool have each under 30.

Put in terms of telephones per 100 population the first 8 towns come out as follows :—

London	5 per 100
Cardiff	4.5 ,,
Edinburgh...	4 ,,
Bournemouth	3.6 ,,
Bradford	3.4 ,,
Glasgow	3.4 ,,
Liverpool	3.4 ,,
Manchester	3.2 ,,

while Birmingham occupies 21st place with 2.3.

These figures would be still better if the suburbs were left out of account. For example, London (County Council area), excluding outer suburbs, would have a development of about 7 telephones per 100. It may be mentioned that the development of Paris is about 5.5 per 100, that of Berlin 10 per 100, and that of Vienna about 5.5. In each of these cases the figures apply to the city proper.

TABLE.

	City.	No. of Stations.	No. of Inhabitants per station.
1	London (10 mile radius) ...	357,676	19.8
	,, telephone area ...	369,038	20
2	Cardiff	10,726	22.5
3	Hull (Corporation system) ...	13,760	24
4	Edinburgh (5 mile radius) ...	17,074	24.7
5	Bournemouth ,, ...	5,222	28
6	Bradford ,, ...	12,961	29
7	Glasgow (7 mile radius) ...	43,111	29.3
8	Liverpool ,, ...	40,256	29.7
9	Manchester ,, ...	50,585	31
10	Leeds (5 mile radius) ...	14,077	31
11	Brighton ,, ...	6,066	31
12	Aberdeen ,, ...	5,158	32
13	Leicester ,, ...	7,918	34
14	Nottingham ,, ...	9,750	34
15	Dundee ,, ...	5,028	36
16	Huddersfield ,, ...	5,245	37
17	Bristol ,, ...	10,574	39
18	Newcastle ,, ...	14,273	41
19	Sheffield ,, ...	12,352	42
20	Belfast ,, ...	9,740	42
21	Birmingham (7 mile radius)...	28,998	44
22	Blackburn (5 mile radius) ...	5,211	48
23	Bolton ,, ...	5,017	55

We learn that there are at present 12,328 stations on the Irish Free State system in Dublin and suburbs, giving a proportion of 32 inhabitants per station. The number of telephone stations in Nottingham exceeded the 10,000 by the end of March last, and by the end of May the total for London had exceeded 382,000. At the present rate of progress there will be 400,000 telephones in the Metropolis by the end of the year.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE new business in April was again satisfactory and maintained the good average of recent months. The gross new stations totalled 16,266 and the net new stations 7,006. The total number of stations in use at the end of the month was 1,056,039, the number connected with London exchanges being 379,552 and the number with Provincial exchanges 676,487. The total at the end of April was reduced by 1,639 stations in consequence of the transfer of the Jersey system to the State Authorities. This involved a loss to the Post Office system of 15 exchanges and 26 call offices.

The proportion of new lines at private residences was again high, the net increase during the month being 1,884, bringing the total up to 156,512. This represents a growth of 18,059, or 13 per cent. in the 10 months ended April 1922.

The net addition to the number of call offices was 91 making the total at the end of April 16,574. Of these nearly 5,000 were in rural districts, and there are now 450 public call offices in street kiosks, 19 new kiosks having been installed during May.

The number of rural party line subscribers was increased during April by 122. There are now 7,038 subscribers to this service as compared with 3,747 a year ago. Good progress was made during May in connexion with the installation of new exchanges in rural areas, 40 additional exchanges having been opened for service during the month. Of the 361 exchanges authorised under the revised conditions announced in June 1922, 142 were open and working at the end of May, whilst in 205 of the remaining cases the engineering work was in progress.

The development in rural areas in the six months ended March 31 last has been much greater proportionately than in urban areas, thus :—

	Rural.	Urban.
Percentage increase in number of exchange lines ...	9%	4.5%
Percentage increase in number of stations	10%	4.2%

The improvement in the calling rate as compared with last year is maintained in April and May although there is no sign of a revival in traffic as compared with recent returns. The trunk traffic, however, shows an upward tendency, the number of calls in the three months ended March 31 last being 17 per cent. higher than in the corresponding period of 1922.

For the financial year 1922/23 the approximate number originated effective local calls was 730 millions. This total represents an increase of 48½ million calls (or 7.1 per cent.) over the previous year, but part of the increase is, of course, accounted for by the growth in the number of subscribers.

Further progress was made during May with the development of the local exchange system.

Among the more important new exchanges opened were the following :—

London : Addiscombe and Wanstead.

Provinces : Eastbourne and Liverpool (Waterloo).

The following important exchanges were extended :—

London : Dalston, East Ham and Streatham.

Provinces : Altrincham and Birmingham (Northern).

The main underground system was extended by the completion and bringing into use of new cables as follows :—

Hinckley—Leicester.

Manchester—Denton.

Birmingham—Dudley.

Dudley—Stourbridge—Cradley Heath.

Manchester—Hyde—Glossop.

Newcastle-on-Tyne—Durham—West Hartlepool.

During May 187 new overhead trunk circuits were completed and brought into use, and 221 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

Machine telegraphs have been introduced on the following routes :—

Baudot. Glasgow—Edinburgh—Dundee.

,, Cardiff—Bristol—Exeter.

,, Carlisle has been made intermediate on the existing installation between Glasgow and Newcastle-on-Tyne.

Teletype. Liverpool—Preston.

VACATION.

To thoughts of mountain, sea and stream.
The normal mind reverts,
When summer with benignant beam
Its empire first asserts.
And in his turn each hies away
Resolved to leave behind him
All faces, facts and forms which may
Of office life remind him.

Vain hope ! for how can he elude
In any rural spot
Its Trail, or find a solitude
Where telephones are not ?
And cable stations dot the shore,
And Wireless, ever-spreading,
Haunts him at Brighton and Bognor,
At Ramsgate, Ryde and Reading.

Besides on every beach he'll see
" Executives " in groups,
Bright minions of the A.G.D.,
Telephonists in troops ;
And Smith, whose family is posed
For ordeal photographic,
Finds that his focus has enclosed
De Hoskyns of the " Traffic " !

Brown braves the Channel, but there is
In Etretat no help,
And Jones, surprised, encounters his
Surveyor on an Alp ;
While with Assistant Engineers
Gay Brussels simply bristles,
Inditing postcards to their dears
Or family epistles.

MORAL.

He only can enjoy recess
Who owns by sea and shore ;
" I should not like this place unless
I loved officials more."

W. H. G.

The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. JULY, 1923. No. 100.

OUR CENTENARY.

AND so we have reached our hundredth number. It brings many recollections to mind. The JOURNAL began during the War. It took its rise from a general feeling that those of us who came from the National Telephone Company, and those of us who had spent a lifetime in the Post Office, had much to interchange of information and of experience. To this extent it was in its origin predominantly a telephone journal. It had an ancestor in the *National Telephone Journal*. Yet it was not to be a telephone journal in any restricted sense, for there was a wide field of discussion of telegraph and telephone problems, and even in the most anxious days of the war there were many of us who had visions of wider development and a more intensive growth of the application of various types of machines to telephone and to telegraph purposes. In a hundred months there have been many changes. The telephone service has expanded, especially in its long-distance aspect. The telegraph service has added to itself long-distance cable communications. There are further visions for us to descry. Wireless telephony across the Atlantic is practicable, and is being considered as a commercial possibility. Further developments of long-distance wireless telegraphy are being considered, and the application of telegraph machines, both to long-distance and short-distance telegraph lines, seems to have a range of operations before it of which we could not have dreamed when this journal began.

Those who are responsible for the JOURNAL have honestly and loyally tried to fill a niche in the world of journalism. They have tried, too, to be one further point of cohesion between the thousands of men and women to whom telegraphy and telephony are a calling and a profession. They have been accused of being too dull and of being too technical; they have been accused of giving too much room to little gossip and of giving far too little room to little gossip. They have been accused of indifference to feminine interests, and they have been assaulted for giving permanent space to feminine interests. If there is safety in the multitude of counsellors there is gratification in the multitude of cancelled criticisms. At least, it can be said for this venture that it has brought to the knowledge of all of us some aspect of telegraph and telephone technique of which we were unaware, some aspect of telegraph and telephone practice which deserved reconsideration, some aspect of telegraph and telephone utility as a service to the public of which we had not been sufficiently proud. Having said this by way of very modest self-commendation, let us say also that if only all those who have knowledge to impart and the skill to impart it, will come forward and use this medium to the end of communalizing knowledge and experience, it will be infinitely to the general advantage, and, more than that, it would help us who are responsible for this journal to remove any suspicion of the reproach of dullness of which we may have seemed to be guilty. It may be true, probably it is true, that the brighter and more brilliant amongst us need more persuasion to crystallize their brightness and their brains in print than those of us who are more pedestrian in our phrases and more commonplace in our conceptions.

The future is more interesting than the past. It was a happy lecturer in economic history who said that while it was true that every economic condition should be studied in the light of history, it was more than true that it should be studied in the light of future history. Naturally, like all journalists, amateur and otherwise, we are anxious to increase the circulation of this paper, but we say that our anxiety is based not on any narrow or selfish end, but principally that it may tap a wider area of contribution of thought. We should be content indeed to be the handmaid of the Telegraph and Telephone Societies. New societies are being established, and we are not the less pleased that some of them should include the postal aspect of our common work in the foremost place of their efforts. There seems to be some uncertainty as to the true function of a handmaid, just as it is to be gathered at the present moment that there is hopeless uncertainty as to the future of any domestic functionary of any kind. In so far as this journal is the handmaid of these societies it will strive to bring to thousands who could not be members of the societies, since they live in scattered towns and scattered villages, the full value and influence of papers and discussions with which the societies have been favoured, and it will strive to be a permanent record of all that is of interest. There is one other aspect. Naturally enough the pendulum swings from war and the hatreds of war to the groping for international understanding and our JOURNAL happens to be read all the world over. It represents one product of English telegraph and telephone thought, and is quoted as representing that thought. It takes its place in the commonalty of telegraph and telephone discussion wherever members of our craft are gathered together, whatever language they may speak, whatever methods or systems may be theirs to operate. Thus, if we venture to blow a little trumpet on the occasion of the hundredth issue,

it is not with an apologetic or wavering note. We know quite well what we have not achieved; we know quite well what there is to be achieved. Between the limits of these two confines there is room for eager and enterprising endeavour, and it is there that we trust, before the two-hundredth number comes to be written, this paper will find its place.

EUROPEAN TELEGRAPH STATISTICS.

THE *Journal Télégraphique* for May gives the first instalment of its annual statistics of telegraphic development in 1921. It offers an opportunity for some interesting comparisons of the principal European systems and of the progress made since 1920. These comparisons, however, are necessarily inexact, for, although in most cases railway telegraph systems and private lines are excluded, in other cases mixed telegraph and telephone routes are placed to the credit of telegraphic development, and the German figures include the whole of the telephone trunk lines for which a considerable deduction would need to be made.

We have selected for purposes of comparison the figures showing the length of routes in kilometres belonging to each of the larger countries, as being on the whole a figure less adversely affected by the qualifications we have mentioned than the total wire mileage. They are as follows:—

	1921.	1920.
France and Algeria ...	205,712	223,480
Germany	222,968	222,046
Great Britain	161,898	160,149
Italy	62,032	60,072
Spain	53,013	51,935
Poland	—	31,267
Czecho-Slovakia ...	—	21,924
Roumania	—	20,184
Jugo-Slavia	—	20,090
Sweden	12,308	12,849
Norway	12,574	—
Austria	11,600	—

It may be observed that the three first States have an average of between 200 and 300 inhabitants to each kilometre of route. The development of France is highest in proportion to population, although, for some reason, its figures have declined sensibly since 1920. The position occupied by the various countries on the list may be said to correspond roughly to the magnitude of their population qualified by the extent of their area.

The number of apparatus in use (including telephones employed in telegraph work), is as follows:—

	1921.	1920.
Germany	57,142	51,179
France	30,052	28,151
Great Britain	26,305	25,004
Italy	20,002	19,241
Sweden	6,617	6,462

The total number of telegrams in both Great Britain and Germany exceeded 83 millions in 1921, 64 millions in France, and 20 millions in Italy. This serves to show that the British lines are more intensively worked and carry a higher proportion of traffic than those of the other large States.

HIC ET UBIQUE.

THE report of the Swiss Telegraphs and Telephones for 1922 shows that the total number of telegraph apparatus is 2,464, an increase of 93. The total number of telephone stations is 167,440, an increase of 7,108. There are 21,583 stations in Zürich, 14,189 in Geneva, 12,538 in Basle, and 10,703 in Berne, over 7,000 in Lausanne, over 5,000 in St. Gall, and over 1,000 in Aarau, Baden, Biel, La Chaux-de-Fonds, Fribourg, Lugano, Lucerne, Montreux, Neuchâtel, Schaffhausen, Thun, Vevey and Winterthur.

A CONTRACT Manager sends us the following:—

As a matter of interest, you may be interested to see a label which I found attached to each telephone on a large installation hired by a firm of cement manufacturers.

IS THE CALL NECESSARY?

I pointed out to them that, as we had spent much time, thought and money on designing for them an installation which would enable them to transact their business economically and more speedily than any other method, it was, to put it mildly, distinctly unkind to put up a label of this nature. I suggested to them that the logical conclusion of their argument was that they should attach a similar label to each bag of cement which they sent out asking whether it was necessary to open it, that they should have such a label on their cigarette cases, and that also it would no doubt be entirely in keeping with their point of view if, when they went to a hotel for a drink or a meal, they should ask themselves whether it was necessary. Naturally the firm considered I was going too far, but it is often easy for a man to cut at another's means of business in an attempt to benefit his own.

A CORRESPONDENT writes:—

We hear so much of how they do things in America, that it is refreshing to have a direct testimonial from an American over here that at least in one thing we can beat them, and that notwithstanding a Government Department is in control.

An enquiry, by post, from the American representative of an American Press Agency, whether a temporary exchange telephone circuit could be provided from the Troon exchange to the golf course, in connexion with the Open Golf Championship in June, was received on June 1, a quotation and agreement was sent and received back accepted on the 4th, the engineer had work in hand on the 5th and completed it on the 6th. The remark made by the subscriber when he saw the result was that we certainly beat America in so promptly supplying his demands. He admitted he could not have got it quicker, or even as quick, under similar conditions, on the other side.

He was not told how it was done, but it was certainly the outcome of intelligent anticipation and co-operation.

A VALUED contributor who ought to know better asks us: Did Adam apply for a constructor's wireless licence when he made a loud speaker out of a spare part? Was he on the Eve of discovering high frequency osculation, and anticipating hurts (Hertz)?

WHERE ARE WE GOING?*

BY G. BUCKERIDGE.

THIS question might be asked of any one and various replies obtained. The purpose of my question is to find out where our paths lie telephonically. Recently we have seen the introduction of a policy of retrenchment inevitable in the present state of the country's finances. The experience and skill of the staff at present available is greater than that of which we have any previous knowledge, and it is possible that it can do more than we anticipate. The new policy should cause reflection which is rarely palatable. It resembles too much a mirror looked into under the most favourable conditions, revealing all our unsatisfactory features and defects and the result of mistakes we would like forgotten. This is impossible, but if we are honest and anxious to continue to do well the outcome of reflection should be to assist us to avoid previous pitfalls and causes for regret. It is with this object that I ask, "Where are we going?" in connexion with the London Telephone Service, in which we, here, are engaged, and with the reputation of which, I think it safe to assume, we are keenly concerned and anxious to see in the premier position we feel it should hold, not only because London represents the heart of the British Commonwealth, but particularly because as craftsmen and craftswomen our endeavour is to produce the best possible.

Being a body of average persons, we are influenced by environment and, to this extent, limited accordingly. Unconsciously we are apt to place our aims and achievements in the same category as our environment, *i.e.*, London. To substantiate any title to a premier position now is difficult. Looking back to 1914 and earlier, we had more cause for comfort. The service in London was in most respects better than elsewhere. In fact we had realised more than a few of our aspirations and were concerned in overcoming the remaining limitations entailed by the system, and maintaining a good service. Looked at widely our path was much less uncertain and difficult than that in front now. At that time what London did and required, was a standard for general consideration, and we helped a good deal in many directions to assist in producing the system which enables the handling of telephone traffic to be the apparently routine matter we find it to-day.

Without any preparation or warning, the war started and our service was called upon to handle questions outside anything in the personal experience of any member of the staff. Considerations of development were restricted to cases of absolute necessity. The war and its need were the sole considerations, and the service was governed and administered by unusual events and circumstances. Experience, more than a strict regard for maintaining and improving standards, controlled the Telephone Service. Labour was in such demand in every direction that experienced telephonists, being very intelligent women, had no difficulty in finding employment, better paid than the service offered. Many of our women and practically all our men of military age and capacity who could be spared, found positions on active service. In fact the flood of patriotism became a cause of serious embarrassment, and strong measures had to be applied in order to ensure that the service was left with a percentage of experienced officers, sufficient to enable it to be carried on effectively.

A large personnel had to be provided and switchboards fitted for the innumerable offices acquired and built for temporary Governmental Departments appointed to deal with the war and its needs. Victoria Exchange, for example, reached a height of importance never contemplated, and the number of P.B.X. telephonists considerably exceeded those actually in the switchroom. They numbered at one time about 300 and were all carefully selected and experienced.

Practically all the male night staff had to be replaced by the female telephonists and the work of recruiting, selecting and training the individuals required represents an outstanding example of the manner in which sudden emergencies were provided for and overcome.

Many other examples could be quoted showing the extent to which energy and thought had to be diverted from its ordinary purposes; but what I have indicated, is sufficient to make it clear, that during the war years, it was possible to devote little attention to ordinary problems. Apart from this, the fluctuations of the war, personal worries and losses, limitations of palatable food, and the restrictions in outside recreation except in certain directions, reduced many of those carrying on at home and elsewhere to a standard very much below normal. Work was an effort, only performed with difficulty.

Hostilities ceased, and optimism reigned supreme. A better world seemed to have been created and before it was possible to realise the trend of events London was faced by a boom in trade with an accompanying heavy increase in traffic, which diverted all the thought and energy available in the direction of providing for what appeared to be immediate development.

Automatic exchanges were seriously considered and pending a decision relief manual exchanges were designed, fitted and opened, and for a period the opening of new exchanges became part of almost every week's work.

These were critical times, the heavy traffic had to be handled by a junior staff, whose work gave little satisfaction. The development questions had to be dealt with by officers returned from active service whose train of thought (like that of those at home) had been broken and swamped by new impressions and in some cases numbed by ghastly personal experience. Re-settlement in some cases appeared impossible, but it was effected. The fact remains that a severe handicap was imposed on our desire to do quickly and well what we realised was necessary for the good of the service.

The optimistic note died out and the happier world became the old world with its problems larger, more difficult, and more immediate; complaint and dissatisfaction became the order of the day. Labour disputes and continual strikes followed, and the European rates of exchange and resettlement difficulties quickly killed the trade boom—if ever it was a boom.

Cost of production increased in every direction including telephone costs, and the question of rates and service became the subject of a very antagonistic press discussion, with a heavy bias in favour of automatic telephones everywhere. Eventually a Parliamentary committee was appointed to consider the subject. With the publication of this Committee's remarks and recommendations, the Press antagonism subsided and although still critical, there is generally an expressed realisation of the many sides to the question and a desire now to be helpful.

In passing I would like to point out that all telephone administrations have been subject to considerable criticism since the war, and, in the report of the rates committee, the British telephone gains by comparison in every respect.

The end of the boom in trade coupled with the introduction of the new rates caused a drop in the calling rate per line. The temporary relief exchanges became difficult to justify, and well-established exchanges which had never been able to use all the fitted calling equipment, found that additional equipment would be required to produce the standard load per position during the busy hour.

Further consideration was necessary and it was decided to abandon for a time the question of automatic exchanges, until such time as the costs became commercial, and, in the case of automatics, more experience and information had been obtained regarding the various systems.

The decided slump in traffic caused London to be left with a large redundancy of staff; the schools had to be closed and recruitment of new staff stopped.

During the whole of this difficult period a good deal of thought was being devoted to the resettlement of the male night staff and the improvement of their conditions. The female night staff engaged during the war was replaced, if suitable taken on for permanent day duty, where possible found positions at P.B.X.'s, and in other cases dispensed with.

A short experience of the new rates proved that a reduction was possible in the charges, with the result that sufficient increase of traffic was produced to justify re-opening the school and the recruitment of new staff. The position was eased too by the fact that the demand for new telephones was being met readily. It is hoped that recruitment will continue and with more liberality than is at present indicated.

Other changes are taking place which may have a bearing on the development plans already decided. Rebuilding has begun and is being carried on in London with extreme rapidity, and building will probably be permitted which allowof at least three more floors being erected than formerly. Probably larger blocks of telephones will be required than were anticipated originally. Some of these new blocks of offices are being fitted with automatic installations, which appear to be suitable for use eventually over the Department's exchange system. In small essentials, *e.g.*, the changing of five figure numbers, preparation for change is going on.

Automatic telephony has been boomed to some extent during the four difficult years which have passed by since the war and the influence of its attendant handicaps, and in every direction and by all the known means propaganda has been utilised to boom wireless telephony. The interest already stimulated is extraordinarily wide. From a comparative mystery confined to laboratories or for probable use in the case of future wars, wireless telephony is spreading from country to country. Youths, content previously with speed and its attendant interests, acquire wireless sets and supplement them by every tried and untried addition which promises improvement.

Continued direction of thought and energy to this subject may result in the present limitations being overcome before automatic telephones become general, and sooner than we deem it possible every individual may be able to represent the present calling subscriber and the exchange and make desired connexions without any assistance. The apparatus or the atmosphere may be the cause of complaint then and no doubt the press of the day will be as full of solutions, as ready and accurate, as some advanced at present.

At present, however, continual reference to the wonders and potentialities of wireless telephony will not alter the fact that it offers no solution of the known requirements in this or any other country, and its development has only reached a stage below that of manual telephony in 1885 to 1890 when any subscriber could hear others who happened to be speaking without actually desiring to do so. Manual telephony developed comparatively slowly to the stage in which we find it now, and similar progress will be made in wireless telephony. That the progress will be quicker and more certain is undoubted. The experience and technique acquired will ensure this, particularly as the public concerned is more receptive and educated and will have to assist more personally in the application of the facilities provided.

* Presidential address read to the London Telephonists' Society, Session 1922-23 (slightly abridged).

I have endeavoured to indicate how much our endeavours to progress technically, maintain a good standard of service, and keep pace with the development requirements have been frustrated by circumstances during the past eight years.

Superficially we appear to have stood still, but actually this is not so. Much thought has been applied to telephones quite outside the requirements of our present manual system and as a result we are, I think, all much more ready and capable of meeting the changes in front of us when economically possible; meanwhile our chief care is the manual system which must be well maintained and continue to produce a good standard of service in order that telephony generally may not become a by-word and labelled as useless by public opinion. Our present system has already been tagged by means of astute propaganda as unsatisfactory and unnecessarily expensive, regardless of the actual facts, and our chief endeavour must be to justify our policy and remove any cause for further reproach.

It may be recognised that London has no especial claim for outstanding merit in the matter of service and will be considered generally in the matter of economy without special regard for its conditions and problems. Apparatus and practice here are now very much standardised, but great diversity of apparatus still obtains elsewhere and, in consequence, problems not immediately affecting us will arise, and accompanying changes of policy and practice will result, the need for which we may find difficult readily to appreciate.

In the matter of size though, London has a very strong claim in questions relating to the formation of policy and precedent, and it is therefore certain that any change introduced will be made with due regard for this fact.

Some figures may prove interesting as showing how large London is.

At the time of writing there are 37 districts, containing 3,115 exchanges, for telephone administration purposes. In London there are 28 per cent. of the total exchanges (only 11 other districts having a larger number of exchanges) and 31 per cent. of the total working subscribers' lines. The latter number is likely to increase rapidly and soon in a circle of about 20 miles diameter, there will be more than one-third of the total lines.

London averages 2,025 subscribers' lines per exchange, as compared with 134 elsewhere, and administers 66 of the 310 exchanges with 300 or more lines.

These 66 exchanges contain:—

40 per cent. of the total subscribers' lines.
52 per cent. of the total staffed positions.
52 per cent. of the outgoing junctions and trunk circuits.
84 per cent. of the total incoming junctions and trunk circuits.

They handle:—

52 per cent. of the total unit calls.
22 per cent. of the total local calls.
68 per cent. of the total junctions calls.

The "A" and "B" telephonists day loads in London average 561 and 341 unit calls respectively as compared with 621 and 83 elsewhere.

London employs 50 per cent. of the telephonists, 59 per cent. of the supervisors, and 70 per cent. of the clerical hours available.

London has 12,900 or roughly 40 per cent. of the total P.B.X. installations, many of these being heavily loaded and of great importance, serving the Headquarter Offices of Government Departments, which in any national emergency become vital to the well-being of the country.

Per 1,000 calls, London is slightly better in written complaints, and worse in verbal complaints regarding local service. The written and verbal complaints per 1,000 trunk calls are slightly more than elsewhere. The differences are, however, very slight and, in my opinion, it is probable that the London figure for verbal complaints represents the conditions for the whole country more accurately. The concentration possible and methods of recording render a comprehensive record much easier to keep.

What we now have to consider is the further improvement of the service during the period of translation from manual to automatic or wireless telephony, paying particular attention to economy in order that we may assist the Government in its endeavour to make the country's budget balance.

One of the most important events in London was the opening of the Toll Exchange in an endeavour to complete all short-distance trunk calls on a no-delay basis. This will go a long way to effect the introduction of standard operating practice throughout the country.

This exchange opened in September 1921 and already one extension has been made which now enables calls to most exchanges in a circle of 50 miles radius to be completed direct and without delay. With the further extension of the present Toll Exchange and the eventual opening of a new exchange London will, in the service given to this type of call, be much in advance of anything which appeared possible in 1914. Generally the handling of these calls at Toll has shown considerable economy and has revolutionised the standards and achievements previously considered satisfactory.

By the introduction of loading devices, phantom circuits, &c., and the resulting promise of improved transmission and reduction in the cost of long trunk routes, we hope such routes will be provided eventually on a traffic basis, thereby obviating the necessity for giving so much consideration to "paid" time. No doubt all long-distance calls will be completed on a "no-delay" basis. Shortly trunk exchanges should become a means of communication between districts only, and in London for the handling and control of continental calls. In this matter it is difficult to visualise how much has been achieved, but the improvement already clear is a great augury of what will occur as the toll system develops.

How can our local service also be maintained and improved under prevailing conditions?

Our present position is that as a body the staff is of exceptional experience and is generally handling comparatively low day loads under conditions which are satisfactory, the apparatus provided being well maintained and in most respects satisfactorily fulfilling the demands put upon it. Great improvement has been made during the past four years, but we have not in many respects attained the standards of service we desire, and as the need for economy co-ordinates the work and staff more rigidly, there are indications that further improvement will be more difficult. This efficiency of our staff is now being reduced by the learners who have been recruited in order to replace wastage which is occurring rapidly. We cannot stand still; any attempt to be content will result in a falling off in all respects. Achievement of improved results is the best stimulus it is possible to receive in this matter.

One reason for failure, which I have heard advanced, I should like to dispose of at once *i.e.*, that the present-day telephonists have no interest in any standards and are content to handle their daily work as it comes along without much regard for results. My personal experience has always been that telephonists, made aware of what is wanted, will do everything possible to achieve the standards, and the quality of our service can be quite as safely left in their hands, as in the hands of those responsible for their direction. In all circumstances they do what is required.

Having touched briefly on the apparatus and staff which leave little room for improvement or criticism, there are one or two methods worth mentioning which in my opinion, would, with slight modification, go a long way towards helping the attainment of the standards we wish to reach even with altered conditions.

Our chief practical difficulty with the present low calling rate is to produce the standard load per position in the busy hour. This applies particularly to the temporary relief exchanges but also to well-established exchanges, where up to now the calling equipment has always proved ample. Allowance is of course made in the standard load for dropped positions, but in practice the results are not entirely satisfactory. Telephonists at positions adjoining those dropped, handle loads above the standard, even when the supervisors distribute and the telephonists' team calls. This has the effect of making the service uneven and local observations taken on subscribers working on a dropped position bring this tendency out noticeably.

An increase in the calling rate would overcome this, but it is improbable that this will mature with the present rates. It is a question whether additional calling equipment should not be provided in those exchanges where the deficiency is particularly noticeable. I should like to hear whether any alteration is proposed in this connexion. Meanwhile supervisors in charge of sections must recognise the circumstances which render dropped positions necessary during the busy hour and by definitely allocating calling equipment for attention by certain telephonists the loads can be made even.

At slack hours of the day dropped positions have always been with us and have presented no difficulty.

There are several drags on "A" telephony which could be removed. Firstly, the present method of handling coin box calls. The wait which occurs while the coins are being inserted is the cause of the difficulty. This trouble is not so noticeable in the busy hours, but during the afternoon and early evening when a large percentage of the calls handled in certain exchanges are from coin boxes allowance is not made for such a high percentage of this class of call and our service standards become difficult to attain. The fitting of pre-payment coin boxes would overcome this difficulty, as the wait would only occur with those boxes, when calls were made requiring more than three pennies.

Such boxes have already had an extensive trial with satisfactory results. At present they are expensive to instal and there seems to be difficulty in deciding on their extension. I cannot in the time at my disposal attempt to justify the assertion, but in my opinion it would pay to extend the use of these boxes to busy coin box circuits.

The second drag is the making out of tickets and offering to call subscribers when calls prove ineffective. There is a large amount of wasted effort involved in this, and the subject is one which could easily be made the matter for an evening's discussion. The ground has, however, been fully explored and I am satisfied that we do not justify the work entailed. In view of the time which has been spent on the subject a decision would be welcomed.

Recently we have paid more attention to the quality of the service given to calls which cannot be completed and have to be connected to the desk in order that information may be given to the caller. The number of such calls is increasing and will tend to do so in London, owing to the number of large exchanges, which necessitates a great concentration of lines in small areas. The changes caused owing to removals, recoveries, changes of name, the adjustments of exchange areas due to the opening of new exchanges and the high percentage of junction calls are the chief causes which produce these connexions. The results of our observations are not so satisfactory as we should like, and there is a good field for study in order that our service shall be worthy of our other achievements. I have no doubt that in this connexion we have a problem in London unique and worthy of more attention than it receives locally at present.

An early effort should be made to alter the present Directory Enquiry system. This has been the subject of consideration by a Whitley Council Committee. At present five exchanges answer Directory Enquiries, supplemented by the Headquarters Directory Enquiry section. The exchange work is generally performed on the information desk and interferes with other work which should be legitimately handled there. In addition, the standard information desks are not suitably designed for the accommodation of the records required for Directory Enquiries, and as a result supplementary tables have to be provided, giving the Directory Enquiry switchrooms an untidy appearance and making the time taken to get the information in reply to an enquiry unnecessarily long.

The present system also makes it difficult for the Directory Enquiry officers to give a good speed of answer in the first stage of an enquiry, with the result that irritation is caused. In addition the first reference is made hurriedly and information already in the current issue of the Directory is overlooked. Some idea of the magnitude of this work can be gained when I mention that the alterations made in the Directory per day average 180, roughly 1,000 per week, or 26,000 from the issue of one Directory to another. As London becomes bigger this work becomes increasingly difficult to handle and the need for alteration more and more apparent. This question is one which might be settled quickly as at present the information desk work at Directory Enquiry centres is carried on with difficulty.

The high percentage of junction traffic in London is an aspect of the Telephone Service which is our peculiar problem. No other administration is limited to the same extent by the difficulties which are the accompaniment of this section of our work. Local calls are rarely the cause of difficulty or complaint now except in those exchanges where full multiples are not available on the "A" side, and it is certain that we shall not instal exchanges of any size in future with local transfer circuits. A high percentage of junction calls carries with it "wrong numbers," and, with this, false "Number engaged" and "No Reply" advices.

You are, most of you, handling this work and are familiar with the practical difficulties, and recognise that many of the causes of errors are outside the control of the telephonist. In passing I would like to pay tribute to our London "B" telephonists who in the loads they handle satisfactorily under existing conditions cannot be surpassed. Their dexterity appeals always and is the most frequent cause of comment by visitors to our exchanges.

Breaking in by "A" telephonists and picking up junctions not allocated, allotting wrong numbers and junctions, by "B" telephonists, poor transmission, and delays caused by testing large groups of auxiliary lines are the chief contributory causes of wrong numbers and are all being considered.

Devices have been experimented with which permit of only one "A" telephonist being on an order wire at a time, also devices for testing auxiliary lines in groups instead of singly. Owing to slight mechanical and electrical defects they have not proved perfect, but sufficient experience has been gained to prove that the present difficulties can be overcome, and special effort should be directed towards the completion and general application of these devices.

Circuits for use as order wires only have also been tried, supplemented by devices in the case of split order wires, so that an exchange is not connected with the "B" telephonist, unless a number is being asked for. When applied generally the transmission difficulties will be reduced and the coupling of order wires simplified. With the present staff this possibility of concentration will be welcome. We have to couple positions where the transmission is not good, and an early completion of the fitting of all the approved devices for improving transmission is more essential now than at any time in our experience.

Recently particular attention has been given to the marking of the subscribers' and outgoing junction multiples and most reasons for picking up wrong numbers and junctions have been removed. In consequence considerable improvement has occurred in these respects.

Now that the need for economy becomes the first aspect in consideration of any question, it will be necessary to explore every avenue which will reduce the time value of junction calls during the slack hours, and endeavour to make it comparable with the busy hour value. This matter is in hand and there is hope that by routing calls specially in the slack hours we shall eventually be in a position to complete junction calls with equal facility throughout the 24 hours of the day.

I have always thought that we do not fully utilise the experience of our Assistant Supervisors, Class II, and I feel that with further training in a section of the school, devoted specially to records, their preparation and application, they would become much more valuable servants of the Department. For some years now this grade has been standing still, the outlets for promotion being scarce.

The school course suggested should be available also to the telephonists selected for the performance of the exchange clerical work.

In all cases where particular aptitude, &c., are displayed, Supervisors should be given an opportunity of being transferred to the Headquarters clerical force where their specialised knowledge and training would be valuable.

Everyone is aware how much of the special training suggested is done locally at present, but the avidity with which the exchange staff loaned to the accounts and other branches for special work has assimilated and performed the duties required, makes it clear we are not at present fully utilising the experience our staff acquires. In the service the clerical duties are generally regarded as superior, and it seems natural that after some form of practical apprenticeship the performance of some of the superior duties should be possible.

I should also like to see something more done in our schools for the proper training of subscribers' P.B.X. telephonists. There are roughly 13,000 telephonists at subscribers' offices and changes are numerous; many enquiries are made as to whether the Department can supply or recommend trained telephonists, and if it were generally recognised that the Department was prepared to train telephonists for subscribers, a means would be provided by which improvement would be effected when a telephonist was required for a P.B.X.

Overloaded Theatre Box Office and Railway Office lines cause a very high percentage of "No Reply" and "Number Engaged" calls. These lines are particularly subject to very heavy fluctuations of traffic. Isolated cases are dealt with from time to time, but no general means of reducing the cause of the difficulty has been evolved. In some cases as many as 1,000 ineffective calls have been reported in one day on circuits of this kind and it is certain, therefore, that we shall have to overcome this cause of complaint before automatic telephones become general.

The time available limits the scope of an address of this nature and only allows one to touch generally on the many problems in front of us. Each problem is sufficient in itself to form the subject of a special paper and discussion, and this is the reason for the limited presentation I have put forward.

I think, however, I have made it clear that the position before us now is very much what it was in 1914. Our advantages over the position then are that we have thought a good deal more in the direction in which we wish to go, and every call completed now means additional revenue. Our disadvantage is, that we have lost to a large extent eight valuable years in which normally we could have shown a complete change.

It appears that telephones will have to find much of the money for their development and this can only be done by looking at every proposal with a view to profit. In these times of stress Mr. Smith who has no need for a telephone has a rooted objection to paying indirectly for Mr. Jones' telephone, no matter how much Mr. Jones (*vide* the Press) may advocate his need for cheapness. Incidentally the Press has shown no desire up to now to advocate cheaper newspapers.

At present there is an expressed recognition of our desire to pay our way and a greater appreciation of our service by the public, and the more each individual member of the service can do in the formation of opinion to that end, the easier we shall find it to get fair consideration, not only for the financial proposals for development and progress, but also for those financial proposals which affect us individually.

PRESENTATION TO MR. HARVEY LOWE.

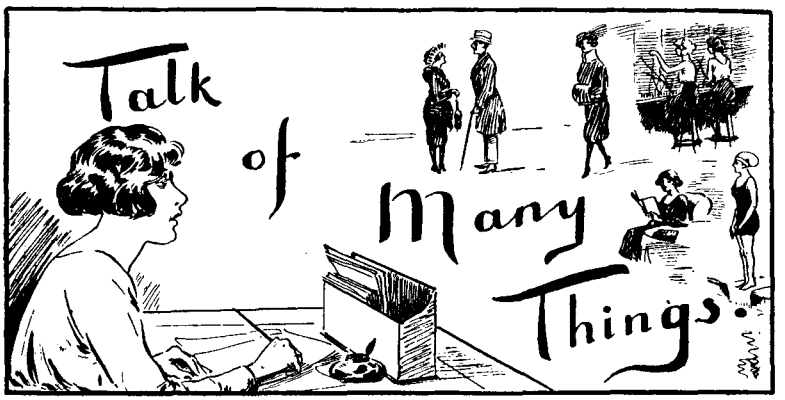
ON his retirement last month, Mr. L. Harvey Lowe, Deputy Chief Inspector of Telegraph and Telephone Traffic, received a presentation subscribed for by members of the Traffic Section and other colleagues. Mr. Harvey Lowe who entered the service of the National Telephone Company in Birmingham in May 1887, became Local Manager at Coventry in 1892 and at Birmingham in 1893. In 1896 he was appointed District Manager at Chester, and was transferred to London as Manager of the Western District in 1903, being promoted to the position of Assistant Metropolitan Superintendent in 1907, which post he retained until the year of the transfer to the Post Office. Since 1912 he has held the positions of Deputy Controller of the London Telephone Service and Deputy Chief Inspector of Telegraph and Telephone Traffic at Headquarters.

PRESENTATION.

MR. HIRD, the general manager of Siemens Brothers & Co., Ltd., presented Mr. R. H. Peet, on the 2nd inst. in commemoration of his 50 years' service with the company, with a gold watch bearing the following inscription: "Presented to Reginald H. Peet, Esq., by his colleagues as a mark of appreciation on completing his fiftieth year on the staff of Siemens Brothers & Co., Ltd., March, 1923."

This mark of friendly feeling and good fellowship on the part of his colleagues was much appreciated by the recipient. The directors of the company supplemented this handsome gift by a substantial cheque.

WE TELEPHONISTS



The Early Morning Casual.

O, Lord High Maker of Rules, whoever you may be, one morning when you have partaken of crisp rolls and golden butter, delectable bacon, exquisitely flavoured marmalade and hot coffee; when you feel at peace with the world and your own digestion, will you not go straight to your office and make a new rule which shall add to the well-being of telephonists and all who come into contact—aural and actual—with them? Will you not summon your minion forthwith and say unto him—or her—Ho, Scribe! Indite me the words I shall forthwith dictate. Make it known instantly that all those long-suffering telephonists who are called upon to perform early eight o'clock duties are to be privileged to take ten minutes casual before 10 o'clock of the morning; wherein they may partake of milk, Bovril, cocoa or such sustenance as they deem most fit to revive their strength and spirits until the time of their mid-day meal. If indeed you should do this for us, then would we all rise up and call you blessed. We have searched the Book of Rules to see if it might be that already this Christian thought had come to you, but, we must confess, we know even less than we did before. Alas, it is always so!

Imagine to yourself, O Mighty One. Telephonists who are on duty at eight o'clock are obliged to have breakfast at half-past six or a quarter to seven. Girls cannot eat a hefty meal so early in the morning. They have to wait until half-past eleven for lunch. That means five hours with nothing very much to subsist upon. They get cold and hungry. Their discomforts make them peevish and impatient. They cannot forbear so easily. They speak sharply to a subscriber who is rude to them. The subscriber happens to be married to somebody whose sister is hoping to be engaged to a Member of Parliament. The subscriber confides his telephonic grievance to the said Member who eagerly snaps at the tit-bit. Questions are asked in Parliament. Important Bills are laid aside whilst the Honourable Members discuss the shortcomings of the Telephone Service. The affairs of the Nation are all at a standstill. It is a serious thing! And all for the want of a glass of milk!. .Will you look to it for us, *dear* Maker of Rules.

Seriously, though, this is an important matter. The early morning casual would make the whole world of difference to telephonists on early duty.

DOROTHY TURNER.

No. Six Hundred.

The following has been received with the laconic remark, "Found in the waste-paper basket." We hope our contributor will continue his search, and give us the benefit of it.

I.

L.T.S., L.T.S.,
L.T.S., onward!
Your Traffic Instructions
Number six hundred.
Night-duty for Traffic men
Fortnightly—now and then,
How to go, why and when,
Vide—six hundred.

II.

"Night Service of highest grade,"
Was there a man dismay'd,
Not though each fully knew
Someone had blundered;
Theirs not to make reply,
Theirs not to reason why,
Theirs but to learn T.I.
(Traffic Instruction)
Number six hundred.

III.

A day off before the night,
A day off to set them right,
A day off is always bright,
E'en tho' it thunder'd.
Each Headquarter's rota swell,
Each poor district man as well,
Must each do a duty spell,
Reporting to code H/L,
See T.I. six hundred.

IV.

They'd journey thro' country air,
To visit exchanges there,
Guiding with loving care
A night staff of talents rare,
While all the world slumber'd.
They'd peep in the battery-room,
Groping downstairs in gloom,
Snatching refereshment.
They'd list while subscribers fume
Times yet unnumber'd,
Their chief inspiratio1, not
T.I. six hundred.

V.

A day off may be all right,
A day off may be all bright,
But what can repay the sight
Of table encumber'd!
Cases to right of them,
Cases to left of them,
Cases in front of them,
Register'd, number'd.
Stormed at by Chiefs in turn,
What if, as faces burn,
Under their breath they learn
Curses—six hundred.

VI.

When will this duty fade,
Or pass to another grade,
How L.T.S. wondered!
When L.T.S. T.O.A.
Has shown a far better way,
Saved the men, saved the pay.
When Night-service equals day,
Then shall Controller say
"Cancel 'six hundred.'"

Discipline (*with apologies to Dorothy Turner*).

The Section Supervisor's told me all about my sins,
The First Class dittoe's rubbed it in; and everything begins
To look uncommon cheerless; and I think I've got the blues,
It almost seems it's time I tried to mind my "p's and q's"!

The "Chief" with great solemnity has told me off, and oft
Have I repented sorely, and returned the answer soft
That haply might her wrath assuage, the threatened door avert,
When otherwise I might have been indubitably curt.

All this I've borne with patience; though perhaps a stifled moan
Escapes involuntarily sometimes when I'm alone.
But yesterday I had a shock; I thought I should have dropped,
For now the giddy limit's reached. My increment is stopped!

REHOBOAM.

London Telephonists' Society.

FORGIVE me if I seem upset; my pen is dry, my eyelids wet. Last month we somewhat briefly stated an outing had been contemplated. It had! It is! But what a blow! To *Windsor* they elect to go. To choose a name like that—*quel crime. Windsor's a word that has no rhyme.* So how can we in adequate rhymed verse its countless joys relate; or find another phrase for it, that would this merry outing fit. E'en "upper reaches of the river," only suggest Yank words like "flivver." If only they

had chosen "Liss"; how *facile* to find rhymes for this. Ah, well. The best that we can do is to remind each one of you, to come (if you are not away) on July 7th (a Saturday); that seven-and-six will pay your fare, and a meat tea when you are there; that you will much enjoy the lure of Windsor Castle, we feel sure; and when it's over each will say: "Please take us there another day."

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

CORRESPONDENCE.

THE APPEAL OF THE REPLY-PAID TELEGRAM.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

I READ with much interest the account in last month's JOURNAL of Major Jayne's lecture at Glasgow on "Can we increase our telegraph traffic."

One is constantly seeing special advertisements in the newspapers of traders drawing attention to some "line" which they are anxious to sell at greatly reduced prices, and it occurs to me that if such firms were approached by telegraph representatives and shown the advantages of sending reply-paid telegrams to their best customers the response would be immediate and very satisfactory.

The appeal of the reply-paid telegram is very strong and by sending, say, 500 such telegrams costing about £50 a large amount of business undoubtedly would be done.

A personal canvass of, say, 100 large wholesale or retail houses in London and the large provincial towns would give an indication of how the proposal would be received.

From the Post Office point of view the proposal seems attractive as the message would be a "common" one and would require less transmission than single messages.

I have some recollection that prior to the war when *The Times* wished to sell the *Encyclopedia Britannica* it used the method of reply-paid telegrams to urge intending purchasers to purchase copies.

W. A. V.

TELEPHONE DEVELOPMENT STUDIES.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—May I venture to request you to notify in the next issue of the JOURNAL that I am not the author of the very interesting article on Telephone Development Studies which appeared in the last issue of the JOURNAL. While I consider it a most admirable article in every way, I do not wish to borrow anyone else's thunder. Quite a number of my friends appear to be convinced that "an occasional contributor" and I are one and the same person. I am, sir, your obedient servant,

H. JULIUS MACLURE.

G.P.O. North, June 16.

SOUTHAMPTON AUTOMATIC EXCHANGE.

BY the time this issue is published, the Southampton Exchange will have been converted to automatic working. The Siemens system has been adopted, the initial equipment providing for 3,200 lines, and the exchange has an ultimate capacity of 5,200 lines. The manual board employed in connexion with the automatic exchange is composed of 5 "A," 2 "B," 9 trunk signalling, and 2 enquiry positions. An order wire key-sender position of a new type has been installed.

Not long since Mr. S. O. Allen, District Traffic Superintendent by way of preparing subscribers for the change, gave an address on the subject to the members of the Southampton Rotary Club. The following report is abridged from the *Southampton Daily Echo*:—

Mr. Allen spoke of the progress of telephone exchanges from the earlier stages of magneto, common battery, semi-automatic, and finally full automatic telephone working.

The principle of the automatic telephone system, he said, was the removal from the operating of everything not requiring human intelligence, although to some extent it was still necessary to rely upon human intelligence to dispose of the more complex forms of operating such as the long distance calls, enquiry, difficulties met with in the automatic machine, &c. The full co-operation of the subscribers in the operating was essential, and in addition highly-trained mechanics constantly on patrol duty were necessary to supervise and maintain the high standard of working necessary to the system.

The automatic system had now passed the experimental stage, and its success had been proved by the various systems tried by the British Post Office administration. It had passed through severe tests, and had proved highly successful both in regard to efficient working and to fully meeting the needs of the telephone subscribers. There were already 16 automatic exchanges working in this country, and there was a large number in hand. There could be no doubt that the rapid progress of automatic telephones in this country was now an assured fact.

A great feature about automatic telephones was the rapidity of service, the elimination of errors, and the absolute privacy of connexions, the average time from the commencement of the ringing of the subscriber called being only five seconds.

Mr. Allen then went on to demonstrate with the aid of specimens of the various parts of the automatic apparatus the principles of the system and how the telephone worked. The principle was described as the "switch decimal step by step system." Electrical impulses, explained the speaker, were sent by subscribers through switches, the medium being the subscribers' dial. The movement of the various switches corresponded to the digits on the numbered dial. A device was provided to give each subscriber access to the automatic exchange at any moment required. A piece of apparatus named the pre-selector carried the call through a chain of connexions, and at the final point either completed the connexion by starting the ringing of the bell, or, if the number was engaged, emitted an intermittent humming sound, which was to be recognised as "number engaged." Should the line be out of order for some reason, or if the subscriber dialled a number not yet allotted or a number not now connected, a humming sound of high pitch was heard. The subscribers who experienced difficulty of any description could always get assistance by dialling a selected number to call in the enquiry operators, who would make every endeavour to remove the difficulty, or provide a satisfactory explanation.

Mr. Allen demonstrated a call from the moment the subscriber lifted his receiver until the called subscriber answered, by exhibiting switches which performed all the operations that were at present done manually.

The call offices, he said, would be worked on a manual basis, on the latest principles of common battery working. This was necessary for the collection of the coins.

The apparatus was provided with various devices to indicate any trouble on any part of the plant, so that faults could be remedied with the minimum of delay. These alarms performed the function of assisting subscribers who might for some reason find themselves stranded, it being possible for the mechanics to cut in on the apparatus and assist the subscriber's connexion.

Subscribers would be able to obtain direct connexion by dialling straight to the operator at the following sub-exchanges:—Hythe, Bassett, Bursledon, Eastleigh, Netley, Totton, Westend, Woolston, and Rownhams, all these exchanges having a special indicator number which would be announced in a special issue of the directory.

Mr. Allen told his hearers that all subscribers would receive a circular fully describing the new system, in addition to new instruction cards.

To assist in the successful opening of the new Exchange it was also being arranged for Post Office representatives to call on all subscribers and to invite them to see a demonstration of how the telephone should be operated.

A FEW "DONT'S."

The speaker sounded a few precautionary notes, which the following are a few:—

"Don't replace the receiver while making an enquiry."

"Don't touch the dial after the connexion has been completed."

"Don't hold the connexion when the busy signal is heard, otherwise your line will be engaged to other callers."

"Don't forget to give your own number for every trunk call."

"Don't forget to use the new numbers which will be shown in a special issue of the directory."

"Don't accelerate or retard the speed of the dial."

EARLY SUBMARINE TELEGRAPHY.

BY SIR CHARLES BRIGHT,
F.R.S.E., M.INST.C.E., F.R.A.E.S., M.I.E.E., F.S.S.*

I WOULD first of all say that this commemoration comes about through telegraphy being the basis of our Institution's forerunner—the Society of Telegraph Engineers and Electricians. My discourse is concerned with early submarine telegraphy.

A Spaniard named Salva suggested the feasibility of submarine telegraphy as far back as the year 1795, while in 1811 Sommering and Schilling conducted a series of experiments, in which a soluble material, said to have been indiarubber, was first used for insulating the wire.

In 1840, Prof. (afterwards Sir Charles) Wheatstone explained to a Committee of the House of Commons the methods by which he thought it possible to establish telegraphic communication between Dover and Calais. Then in 1842, Prof. Samuel Finley Breese Morse, the well-known American inventor of the telegraph apparatus bearing his name, laid down across New York Harbour an insulated copper wire through which he transmitted electric currents. Hemp soaked in tar and pitch, surrounded with a layer of indiarubber, constituted the insulation. Morse was a great letter-writer, and records of his early work are based on his own statements at a time when he noted in his diary: "I am crushed for want of means, my hat is hoary with age, and my stockings all want to see my mother."

Effective submarine telegraphy, however, owed its birth to the introduction of gutta-percha for insulating purposes early in 1847 by the late Dr. Werner Siemens, elder brother to the late Sir William Siemens, the first President of our Society in 1872, who must also share considerable credit in this as in most other early electrical problems. Michael Faraday about the same time independently pointed to the insulating properties of gutta-percha.

On Jan. 10, 1849, the late Charles Vincent Walker, electrician to the South-Eastern Railway and one of our original members, laid a gutta-percha covered conductor, 2 miles long, in the English Channel. The wire was coiled on a drum on board the laying vessel, from which it was paid out as the vessel progressed. Starting from the beach at Folkestone, the line was joined up to an aerial wire, 83 miles in length, along the South-Eastern Railway, and Mr. Walker on board the *Princess Clementine* succeeded in exchanging telegrams from London.

Previously, that is to say June 16, 1845, the brothers Jacob and John Watkins Brett (bric-a-brac shopkeepers) had registered a company for the purpose of telegraphic communication between this country and France, and on July 23 of that year they applied to Sir Robert Peel, Prime Minister and First Lord of the Treasury. They were referred to the Admiralty, Foreign Office, &c., and gradually became involved in a departmental correspondence and passed backwards and forwards from one Government office to another. This was but a repetition of the experiences of the late Sir Francis Ronalds, who, when bringing his early telegraph to the notice of the Admiralty, was informed that "there is no need for electric telegraphy of any kind in our country." I may here mention that it was Ronalds who left us his library of some 6,000 books. In 1849, after considerable correspondence with both Governments concerned, a concession was obtained by the Bretts for the laying of a cable between Dover and Calais. Twenty-five nautical miles of No. 14 copper wire, covered with ½-inch thickness of gutta-percha, were then manufactured, the electrician's tongue being the only test applied to some of the lengths. The shore ends for about 2 miles from each terminus consisted of a No. 16 B. soaked in diarubber solution, conductor covered with cotton thick lead tube. The rest of whole being encased in a very percha insulated wire above descr was composed of the gutta- weights were fastened to the line. A number of 30-lb. leaden vessel—a small Thames tug having 0-yard intervals, the laying was put on. The laying of the line be stopped every time one successfully effected by the late Char a huge reel on deck was 1850, but it only lived to speak a few mo Wollaston on Aug. 28, —one being a short complimentary commun less incoherent words Bonaparte, shortly afterwards Emperor of on to Louis Napoleon French.

The signalling apparatus consisted of a needle instrument which was set up in a bathing ke Wheatstone shine.

Jacob Brett—who later on became an Hono our Institution—had a document signed by twen Member of who declared that they had seen the electric teleg renchmen, between France and England. The signals were working incoherent, the operators at each end blaming those at mewhat and tauntingly suggested that the excitement, or someth other, must have gone to their heads. The glory of this telegra else, unfortunately, short lived, for after the first evening it maint as, an obstinate reserve, and never spoke again. An attempt d then made to raise the wire; but, owing to the leaden weigh that had been attached in order that it might be successfully sunk, all efforts were in vain. A considerable length was, however, brought up by a fisherman in his trawl, who carried it off to Boulogne in triumph, as "a piece of rare seaweed with a pith of gold"!

This enterprise excited little attention at the time. It was in fact, regarded as a "mad freak" and even as a "gigantic swindle." When accomplished, *The Times* remarked, in the words of Shakespeare, "the jest of yesterday has become the fact of to-day"; but a few hours later it might with equal truth have been said that "the fact of yesterday has become the jest of to-day"! The feasibility of laying such a line and of transmitting electric signals across the Channel had now, indeed, been proved. The signals obtained had, moreover, the effect of eradicating the then very prevalent belief that, even if the line were successfully submerged, the current would become dissipated in the water. It now remained to find a satisfactory method of protecting the insulated conductor from injury during and after laying.

On Dec. 19, 1850, a new concession was granted to Jacob Brett by the French Government, and on the strength of this the Submarine Telegraph Company (since absorbed by H.M. Post Office) was formed. But £300 was all that the public would subscribe, because it had been proved that submarine telegraphy was an impossibility! Yet these early pioneers, with that peculiar obstinacy that characterises inventors, actually went on believing in their own ideas.

Thomas Russell Crampton, a leading railway engineer of that time, came to the rescue with £7,500 of his own and a similar amount from his friends. Then Mr. Küper, a colliery engineer, came along and said: "Why not protect your gutta-percha covering by an iron sheathing?" The cable with its pit-rope like sheathing of to-day was duly made, and on Sept. 25, 1851, a procession with a man-of-war to lead the way, started from the South Foreland to the shores of France. All went well until they were in sight of the opposite coast, when the cable gave out. Another mile was order, manufactured, and laid; and on Nov. 13, actual messages were exchanged on a more or less practical scale.

The Bretts then applied to the Government for a monopoly to connect England and Ireland electrically. This time they were not so fortunate; for, on Sept. 10, the Admiralty wrote that "they had watched with interest the progress of the experiments, but had no power to grant a right." On the 18th the "Foreign Office is directed by Viscount Palmerston, to congratulate you upon the success of your experiment, and to state that the matter does not relate to the business of his Lordship's Department."

*Reprinted from the *Journal of the Institution of Electrical Engineers.*

On the same day the Admiralty again wrote, "that whatever privileges can be granted, can proceed only from the Treasury." The next day, the Treasury "acquaint you that it is not in the power of the Lords Commissioners of Her Majesty's Treasury." They got the same answer on Sept. 28. On Oct. 18, 1850, they received the following letter from the Treasury:—"Although sensible of your perseverance in bringing the submarine telegraph about, and in view of the great public benefit likely to arise in that connexion, but it is not in their Lordships' power, &c."

Cables were then laid between England and Ireland; and although the first two efforts were failures—partly due to faulty design—in 1853 my father, the late Sir Charles Tilston Bright, another Past President of the institution, successfully connected the two islands—this early piece of cable work being performed at the age of twenty-one.

Then followed a number of lines laid across the English Channel, in the Mediterranean, and elsewhere. Most of these were attended by failure, due to breakage of the cable, or to it being paid out with so much slack (for want of satisfactory controlling gear) that it reposed in festoons at the bottom of the sea.

We now come to the period when a much more difficult problem was dealt with—the spanning of the Atlantic Ocean by laying and speaking through a cable 2,000 miles in length, the depth being upwards of 3 miles. Many eminent scientists had said it would be impossible to deposit the line at so great a depth; and that, even if laid, it would be a mathematical impossibility to transmit electrical signals through such a length. The Atlantic cable scheme was, indeed, considered at this time (1857) another wild scheme of people that were to be pitied, but its realisation later was aptly described as "the great feat of the century." We have had, of course, many "stories" of the Atlantic cable, several of which may be said to be stories in every sense—mainly resulting apparently from dreams emanating from outside this country. The actual facts, however, are still available in the form of official documents and records. Some of these I have already had pleasure in presenting to our Library.

The projectors of this undertaking, who were the subject of so much pity, were John Watkins Brett, already alluded to, the prospective Managing Director, Cyrus West Field, a wealthy American business man of enormous energy, who had with considerable foresight bought the sole landing rights for a cable at Newfoundland, and my father, who also became the engineer.

There were evidently some spirits who believed in the enterprise—or in those at the back of it—for the Atlantic Telegraph Company was formed within a few days, almost the entire capital being raised in our country by the public issue of 350 shares of £1,000 each.

The proposed route was surveyed in what we should now consider to be a somewhat "sketchy" fashion; for whereas, in the present day, we sound at intervals of about 10 miles, at that time soundings every 100 miles were considered to be abundant.

The manufacture of the line was duly proceeded with—partly at the Greenwich works of Messrs. Glass, Elliott & Co. (afterwards the Telegraph Construction & Maintenance Co.), and partly at Messrs. R. S. Newall & Co.'s factory near Liverpool. The iron sheathing was composed of several strands of fine wire.

The Governments of the countries concerned encouraged the scheme to the extent of lending certain vessels for laying the cable, as they had done previously for the survey. The main contribution from the United States was the *Niagara*—a splendid example of the frigates of that time; a smaller vessel was also provided by each Government to land the ends, pilot the way, and act as consorts generally.

(To be continued.)

THE PIVOT OF THE TELEPHONE SERVICE.

By E. J. JOHNSON (Glasgow)

WHAT is a pivot? To quote a small dictionary, it is tersely defined to be "*a pin on which something turns.*"

In any organisation or piece of mechanism there are many "pins on which something turns," and the organisation which produces the Telephone Service is no exception to the rule. Each pivot is of importance, in fact, vital, to efficient working, but many are out of the public gaze, and others only emerge at intervals and one regularly once a quarter when the account arrives.

One—*the* Pivot—is a delicate and sensitive portion of the mechanism, and as it is always in the limelight of public criticism, it is very necessary that it be kept well polished and oiled so as to work without friction.

I do not refer to the Traffic Department. The great British public is supremely indifferent to its existence—excepting when it has a complaint to make or requires advice in connexion with a new private branch exchange or something special; then it is remembered and the possibilities of such a department are explored, with, it is to be hoped, satisfactory results.

The Pivot—now we come to our subject—is the operating team or division in exchanges, which has somewhat the same relationship to the other pivots of the service as those of the last wheel in a clock train bear to the others in the mechanism. The operating team consisting of a group of telephonists and their supervisor is, in the eyes of the telephone user, "*the* Pivot" of the service.

For a pivot to be efficient it must be equal to any strain which may be be put upon it; therefore the units of work or number of valued calls to be handled by an operating team must be kept well within the capacity of the team to handle. On the other hand, a pivot is kept bright and in good working condition by constant revolution; in other words, an idle pivot is liable to get rusty and lose its polish. So it has been observed is the case with the operating team. A rightly-adjusted load keeps the team in good working form and polish, so that in the critical eyes of the public, and also of the Service Observation officer, the service sparkles.

Any sign of flaw, crack or disintegration of particles is fatal to the efficiency of a pivot. The operating team must therefore work together and each ndividual member do her part, as do the atoms in the pivot, to the making of a complete and efficient whole.

For efficient working a pivot must be kept free from grit and be well oiled. It is the Supervisor's part to remove all friction in the nature of temporary unevenness of load, by adjustment of staff and by the transference of calls to less busy telephonists, prompt reporting of faults and throwing out of use of faulty cord circuits, etc., taking over any difficult calls, and advising her telephonists how to act in cases of difficulty and doubt.

The Supervisor will see that the pivot is kept oiled by judiciously encouraging her telephonists when the calling rate is high and difficult and praising them for work well done. By efforts to secure harmonious working between each member of her team, the granting of suitable reliefs and generally seeing to the well being of the telephonists under her charge, friction is eliminated and smooth working obtained.

The necessary polish will be secured by constant watching by the Supervisor of methods and expressions and by giving the advice and correction suitable to the circumstances.

Thus the operating team, "the pin on which the service turns," will fulfil its functions and ease the working of all the other pivots which are doing their part to create an efficient telephone service.

It is necessary that there should be a good adjustment of parts and careful oiling—excess and deficit are both harmful—in all mechanism where Pivots are concerned, and the same applies to the telephone organisation.

While it is of the utmost importance that the supervision should be ample, the danger of over supervision, which may be compared to the bad effects of over attention to and excessive lubrication of pivots, is to be avoided. To continue the simile, as the amount of oil necessary for a pivot is largely determined by the nature of the work to be performed, so the amount of supervision necessary to produce good results should be determined by the class of work the team has to undertake. Over-supervision has a tendency to irritate and to clog the working, while the correct amount of instruction, encouragement and reprimand has the opposite effect. It is here that the tactfulness of the Supervisor is displayed and is one of the most important points to be considered when questions of promotion arise.

The efficient control of an operating team demands qualities of initiative, control (of self as well as of others) sympathy, tactfulness as well as a thorough knowledge of telephone operating in all its branches, including manipulation.

The Supervisor must show the telephonist how to act, it is of little use reprimanding for talking if the Supervisor is to be seen conversing herself. A policy of "do as I say and not as I do" will never promote good working and must react adversely on the service.

These few notes must be brought to a close with any necessary apologies to other pivots, and doubtless each one feels that "My Department" is "the pivot" but I think that in the eyes of the public the telephonist's is "*the* pivot" and as such it behoves all concerned to do their part to supply the wherewithal to keep the wheels and pivots revolving so that in the subscribers' estimation "*the* pivot" may properly fulfil the functions demanded of it and deliver a telephone service which shall give satisfaction to all users.

WHERE TO STAY.

The attention of our Readers is directed to the following list of Boarding and Apartment Houses.

BRIGHTON.—Rusthall Boarding Establishment, 11-12, Cannon Place. Central. One minute West Pier. From 2 guineas weekly.

CLEVEDON (SOMERSET). — "Ravenswood." Beautifully situated on cliffs, overlooking sea and woods. Ideal holiday resort. Near golf links, charming walks. All comforts studied. Moderate inclusive terms.—Apply, Miss Bruce.

DEAN FOREST.—Severn-Wye Valleys. Beautiful Holiday Hor (600 ft. up). 60 rooms, extensive grounds, motors, golf, billia tennis, bowls, croquet, dancing.—Boarders 47*s.* 6*d.* to 63*s.* Prospect s—Littledean House, Littledean, Glos.

EASTBOURNE.—The Polytechnic Boarding House, 109-111 Tideswell Road. Board Residence. Homely & Comfortable. Liberal Table. Mid-day Dinner. Central position. 7 mins. Station, 5 mins. Pier. Rec. by "The Polytechnic," Regent St., London. Mod. Terms. Mrs. Edwards,

SHANKLIN.—Glenavon Private Hotel. Comfortable Brd.-res. Electric light and gas fires all bedrooms. Free billiards, splendid cuisine (separate tables). Highest recommendations.—T. Geere. 'Phone 37.

TORQUAY.—1, The Birklands, Babbacombe Road. Good Board-Residence in best part of Torquay. Overlooking Torwood Gardens. Convenient and central. Electric Light, Bath, &c.—Mr. and Mrs. Trevitt.

LONDON TELEPHONE SERVICE NOTES.

Demonstrating the Making of a Telephone Call.

AN item of general interest is a scheme now in hand for demonstrating to the public the ways and means of making a telephone call. The idea is to have what might be called a portable "fit-up" which can be erected in suitable places such as lecture halls, &c. There will be two demonstration panels representing A and B boards respectively, and with the addition of two telephones representing the equipment at subscribers' offices or houses it will be possible to trace the progress of a call "in the making."

The problem of educating the telephone public has always presented difficulties chiefly because very few opportunities occur of getting a number of subscribers together.

The intention under this scheme is to demonstrate before audiences of considerable size, and it will be interesting to follow the course of events and observe how the demonstrations are received and what the effects are.

* * * *

Weather Forecasts by Telephone.

Recently the general usefulness of the telephone was extended by making it possible for weather forecasts to be obtained on enquiry. The results in London are not without interest. The largest number of enquiries have, so far, been received from subscribers on exchanges in the centre of the town. It may be, of course, that those living in the suburbs and rural districts around London prefer to rely upon their own prognostications and in consequence look upon the official forecast with scorn, but whatever be the reason, the town dwellers and workers seem the more anxious about what the weather will be than the rural subscribers.

The greatest anxiety, if enquiries can be regarded as indicating anxiety, has so far been in regard to week-end prospects.

* * * *

"Stile-strip" Method of Passing Numbers.

An experiment of considerable importance is now in progress in connexion with the method of passing numbers. Habit is a hard task-master but the writer can testify that the average telephonist is proof against it. On the first morning of the new method, he (the writer) quite innocently asked for a number, using the old method. A slave of habit; but not so the telephonist, the required number was repeated correctly with a slight pause between the hundreds and tens figures with just the right amount of emphasis which administered a well deserved reproof—not intended of course—but nevertheless taken to heart.

* * * *

London Telephonists' Society.

A summer outing has been arranged for Saturday afternoon, July 7, when Windsor will be visited. The programme includes a conducted visit through the Castle and the party will meet together for tea at one of the hotels.

The arrangements are in the hands of Messrs. Thomas Cook & Son, and all that is wanted to ensure success is a fine day.

* * * *

382,700.

Since last month's total of 379,600 the number of telephones in the London area has increased by 3,100. Apart from the speed of service, such an increase represents a definite improvement in the service in that it enlarges the field to existing subscribers and improves their prospect of getting the person they want on the telephone.

* * * *

Literary Institutes.

FROM A CORRESPONDENT.

The City and Holloway Literary Institutes are gradually, but surely, becoming well known and extraordinarily popular in the Post Office Telephone and Telegraph Services. The students are almost entirely composed of Post Office workers. Consequently it was a particularly interesting and happy occasion when Mr. John Lee, the Controller of the Central Telegraph Office visited the City Institute at Graystoke Place on Wednesday, June 6, to lecture on "Public Services." With the highest compliment, we cannot say that he "lectured" purely and simply; but rather that he talked to us most delightfully. In all he said there was a shrewd wisdom, common sense, a subtle humour and a whimsical originality which appealed to his hearers; and more than one remarked afterwards, "Yes, that is just what we feel ourselves; but somehow, we cannot put it into words like that."

We are so apt to regard the Heads of Departments as beings beyond our sphere, unapproachable, lordly creatures who are not called upon to endure the ordinary little trials and discomforts of every-day business life, that it was uncommonly good to have one of them among us, quite obviously feeling and thinking with us and for us.

Culled from the Exchanges.

Regent.

On certain days of the week there is a general demand for late duties. This fact, coupled with the rows of wet, workmanlike bathing costumes hanging outside the various lockers leads us to believe that the members of our Swimming Club are leaving nothing to chance. The group of silver cups surrounding the Challenge Shield, which were modestly displayed in the Exchange, are dear to our hearts; and if, as it well may be, we lose any or all of them this year, it will certainly not be through want of every effort on the part of our swimmers. It is on the knees of the gods, but that, of course, only makes it all the more worth while, and anyway, here's to hoping.

For once in a way, our sympathies are entirely with our subscribers. Poor things! After having drilled them for untold years to double, double, always double (figures of course—nothing more!) we have now got to politely intimate by emphatic intonations that sometimes they may "double" and sometimes they may not. This led to an excusable outburst on the part of a busy subscriber at a Government office, on the first day of the new system of repetition. Every number the poor man asked for was twisted inside out and upside down by the demurely polite telephonist, according to rules, until in the end he did not know what he wanted himself. Finally, he took the receiver off and in answer to the "Number, please?" said 'Admiralty!" and added, grimly, "Now play about with that!"

PERSONALIA.

LONDON TRAFFIC STAFF. TELEPHONISTS.

Resignations on account of marriage:—

Miss M. M. CHAPMAN, Assistant Supervisor, Class II, of the Trunk Exchange.
Miss C. M. S. WYATT, Telephonist, of the Trunk Exchange.
Miss V. C. WILBRAHAM, Telephonist, of the Trunk Exchange.
Miss E. J. RUSH, Telephonist, of the Trunk Exchange.
Miss E. B. SMITH, Telephonist, of the Trunk Exchange.
Miss E. E. SHEA, Telephonist, of the Trunk Exchange.
Miss E. E. LE SUEUR, Telephonist, of the Trunk Exchange.
Miss A. H. LORD, Telephonist, of the Western Exchange.
Miss N. TYLER, Telephonist, of the Victoria Exchange.
Miss C. A. PAGE, Telephonist, of the Victoria Exchange.
Miss I. RAWLINSON, Telephonist, of the Holborn Exchange.
Miss F. M. WARMAN, Telephonist, of the London Wall Exchange.
Miss M. C. ANDERSON, Telephonist, of the London Wall Exchange.
Miss O. E. WILSON, Telephonist, of the London Wall Exchange.
Miss O. G. SALZMANN, Telephonist, of the Western Exchange.
Miss V. M. GILCHRIST, Telephonist, of the Western Exchange.
Miss M. C. STRONG, Telephonist, of the Woolwich Exchange.
Miss R. GORE, Telephonist, of the Museum Exchange.
Miss A. ANDREW, Telephonist, of the Regent Exchange.
Miss H. KENNEDY, Telephonist, of the Greenwich Exchange.
Miss K. OVER, Telephonist, of the Palmers Green Exchange.
Miss C. K. CROOK, Telephonist, of the Barnet Exchange.
Miss E. M. CARLISLE, Telephonist, of the Finchley Exchange.
Miss E. M. BLAKE, Telephonist, of the City Exchange.
Miss A. BOWER, Telephonist, of the City Exchange.

GOLF.

Secretary's Office *v.* London Telephone Service. Played on June 11, 1923, at Bush Hill Park.

Secretary's Office.		*L.T.S.*	
SINGLES.			
J. D. MacNair (6/4)	1	W. L. C. Rathbone	0
C. L. K. Peel (3/2)	1	W. A. Valentine	0
W. E. Weston (2/1)	1	W. H. U. Napier	0
T. A. Prout (5/4)	1	M. Larkins	0
B. Savage	0	P. W. Chivers (4/3)	1
F. C. G. Twinn (7/5)	1	C. D. Upham	0
	5		1
FOURSOMES.			
Peel & Weston	0	Rathbone & Chivers (1 up)	1
MacNair & Twinn	0	Valentine & Napier (4/2)	1
Savage & Prout (7/6)	1	Upham & Larkins	0
	1		2

THE

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CONTENTS.

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SUBMARINE CABLES AND OCEAN FLOORS.

By J. J. T.

TELEGRAPHISTS and telephonists will probably wonder what interest this subject can possibly have to them individually or collectively, at least in relation to their respective crafts. Probably a few of the latter whose duty is mainly on "Trunks," when taking or passing calls for Belfast, Dublin, Cork, &c., in the West, or for Paris, Brussels, Amsterdam, and the various relative extensions eastward, may at times have given a little imaginative thought as to how communication under the sea is established. Even of those who have some knowledge of the form and construction of a submarine telegraph or telephone cable, very few have considered the organisation and knowledge necessary for the laying down of the submarine lengths. The special structure and apparatus of a cable-laying vessel is undoubtedly a subject of passing interest to the average telegraphist of that particular subdivision of telegraphy which, day in and day out, more closely associates him or herself with the longer lengths of sub-aqueous communication with France, Belgium, Germany, Canada, Russia, for example. Nevertheless, it is doubtful whether many even of these have given much thought to the necessary connexion between oceanography and submarine cable-laying. The study of sea-bottoms is an old one. There are maps of the 16th century in existence which plainly denote that oceanography was even then a very serious part of the science of navigation. Naturally there was no relationship between the former and telegraphy until the earlier half of the 19th century when, first trans-channel and then trans-oceanic telegraphy became international facts.

Hydrography, under which heading our subject now ranges itself as a section, here in England, is the special study of the Hydrographic department of our own Admiralty. The President of the International Hydrographic Bureau (which bureau was formed as the result of the International Conference held in London in June-July 1919) is Vice-Admiral Sir John Franklin Parry, K.C.B., R.N., a descendant of both Franklin and Parry of Arctic fame. This science deals with the nature, depths, contour, and currents of the ocean floors of the globe. It is, of course, closely allied with the science of navigation and the latter's handmaid. In this direction alone it has a natural and intimate relationship to submarine cable telegraphy and telephony and to submarine cable-laying and repairing vessels in the matter of an ordinary voyage.

When the connecting of Europe with the United States *via* Newfoundland by submarine telegraph cable was projected, the United States despatched in August 1856 Lieutenant-Commanding O. H. Berryman, in the U.S. steamer *Arctic*. The results of this expedition were the first ideas we had of the nature of the ocean

separating the two continents. Berryman obtained 24 soundings on the Great Circle Track between Valentia and St. John's, Newfoundland. He used a machine known as the Massey's Sounding Machine, also one by M. Lecointre, and hove in the wire by the barrel of a steam winch.

In 1857 Captain Joseph Dayman, R.N., in H.M.S. *Cyclops*, obtained a line of 37 deep sea soundings on the Great Circle Track from Ireland to Newfoundland. He was assisted by Mr. J. Scott, Master, R.N. This work was repeated in September and October 1858 in H.M.S. *Gorgon* having as a colleague Captain Otter (who had previously surveyed Bull Arm, Newfoundland). For this Captain Dayman received a commemorative gold watch and an address on parchment from the Mayor of New York. Captain Otter, R.N., commanded H.M.S. *Porcupine*, which vessel appears to have crossed the Atlantic in September 1858. The first Atlantic cables were laid along this Great Circle track where soundings to a maximum of 2,400 fathoms have since been charted.

In October 1858, Captain Dayman, in H.M.S. *Gorgon* obtained a good "absolute sounding" in 2,350 fathoms, latitude 47° 6′ N., longitude 12° 57′ W., and Lieutenant Berryman in the United States Brig *Dolphin* obtained 2,190 fathoms at a position about 60 miles to the southward.

The laying of a cable is by no means the easy matter which one might suppose, especially is this the case with deep sea and ocean cables. It is not merely a paying out of so many miles with a percentage of slack between two points. It is not always even a question of a straight line. The questions which demand answers before a cable is laid are, among others, (*a*) the nature of the sea-bottom upon which the cable is to be placed, whether rocky, oozy, pebbly, sandy and if the latter whether stable or shifting. (*b*) The varying depths in which the cable will finally pose. In connexion with (*a*) instances are not lacking in which an appreciable length of submarine cable has been literally swallowed up by a moving sandbank and repairs have involved the bridging over of the gap by many miles of new cable. In the West Indies it was once necessary after constant repair to take a certain cable round a submarine volcano crater as previously it had laid across the edges of the crater and remained suspended until chafed through. As regards (*b*) it was in all probability the failure to realise the necessity for a closer study of ocean depths and their relationship to the breaking strain imposed upon a deep sea cable in the process of laying, together with the less complete data then available, that resulted in the failures of the first attempts to lay submarine telegraph cables on the floor of the Atlantic Ocean. Telegraph history relates how on Aug. 5, 1857, the *Agamemnon* and *Niagara* sailed from Valentia and how, when the latter vessel had paid out 355 miles the cable snapped in 2,000 fathoms of water, or a depth of about 2¼ miles.

How also upon Aug. 5 of the following year under the direction of Captain Otter, already mentioned, the shore end of this cable was landed at Bull Arm, the first message being transmitted through it on the 31st of the same month, although it again broke on the following day and was finally abandoned. In 1865 another expedition set out, this time losing 1,200 miles of cable. In the succeeding year on July 27 Staff-Commander John Hooper Kerr, R.N., who was in charge of H.M. Newfoundland Hydrographical Survey, successfully piloted the *Great Eastern* into Heart's Content, with the new Atlantic cable.

In 1869 Kerr assisted the *Great Eastern* when she laid the French Atlantic cable between Brest and St. Pierre, thence to Duxbury and Massachusetts.

The *Great Eastern*, previously, for a short period, called the *Leviathan*, was 692 ft. long, width 83 ft., horse power paddles 1,000, screw 1,600, designed by Mr. I. K. Brunel and built at Millwall. Messrs. Glass, Elliot & Co. acquired her as a cable vessel in April, 1864. She sailed with the first Atlantic cable from Sheerness July 15, 1864 and returned Aug. 19, 1865.

She arrived at Bombay with the Bombay-Suez cable Feb. 27, 1870, sailed and laid the fourth Atlantic cable June 8 to July 3, 1873. Sailed and laid the fifth Atlantic cable August and September, 1874.

Later this huge vessel picked up the 1865 cable and brought the end into Trinity Bay.

These brief facts tend to prove that the various factors bearing upon the breaking strain of a cable which, submerged, weighs say 2½ tons per mile—the 1865 cable was much heavier—when suspended over the sheaves of a cable-ship's dynamometer into ocean depths measured in nautical miles could not then have been fully collated. Nor was it then possible for those pioneers to have been in possession of such facts as that contained in a statement by Mr. Judd of the Eastern Telegraph Company at the Jubilee Conference of the Institute of Electrical Engineers in February 1922 to the effect that the pressure upon a cable in 1,000 fathoms of water was somewhere about one ton per square *inch*.

SOME SPECIMEN WEIGHTS OF SUBMARINE CABLES, &C.

Length in Fathoms.	Type.	Weight immersed in sea water.	Weight, dry.
1,000 ...	"Shore End"	143.5 cwt.	209.1 cwt.
1,000 ...	"Intermediate"	82.2 cwt.	123.2 cwt.
1,000 ...	"Deep Sea"	22.6 cwt.	37.0 cwt.
1,000 ...	"Grappling Rope	26.4 cwt.	—
1,000 ...	Deep Sea Cable Sheathing wire	—	23.04 cwt.

To the knowledge gained by these very expensive first experiments of cable laying our Admiralty have added the full fruits of continuous observation and experiment. The Hydrographic Department, however, has been ably assisted by observations made by the various cable-laying steamers which have crossed and re-crossed the oceans year after year, and laying new cables or working at repair after repair have sounded the depths, certainly with zeal and enterprise. The Admiralty have laid tribute upon this knowledge and up-yielded it by publishing these duly verified facts, together with those contributed by their own surveying vessels, in Annual Reports under such headings as:—"List of Ocean Depths and Serial Temperature Observations" received during the year —— from H.M. Surveying ships, Indian Marine Survey and British Submarine Telegraph companies. The old cable steamer *Faraday*, now replaced by her more modern namesake, after nearly 50 years of service supplied information upon several dates, that of May, June and July, 1903, near the route of the Direct U.S. cable of 1874-5, being of particular importance. As about 50 per cent. of the above-mentioned material is made up of cable-ship's soundings it may appear invidious to mention any one particular ship or company, but in referring to this famous boat of Siemens one does not forget the steamers associated with the Eastern Telegraph Company, the West Indian and Panama, the All America, and the North and South American cable companies as well as the vessels of other manufacturing and cable-laying firms.

Incorrect soundings are naturally to the detriment of these organisations and would cause very excessive expenditure, but as one who knows the excellency of the work done has truly said, "equipped with the very best of apparatus the natural scientific accuracy of the navigators of cable-steamers can be absolutely relied upon with regard to the information supplied by them."

The Hydrographer, as one realises when his charts are closely studied, goes very severely into details especially in the matter of ocean floors, for we find the following among the descriptions of the quality of the bottom, as recognised by seamen. Rock, coral, grey ooze, yellow sand, white stone, shingle, mud, volcanic ooze, &c., may suffice in general terms, but where the laying of cables

is concerned this is hardly considered adequate by experts who would more definitely analyse the material found on ocean floors as in the following list:—

Calcareous.	Pteropod.
Cinders.	Pumice.
Clay.	Rock.
Coral.	Radiolaria.
Diatom.	Sand.
Foraminifera.	Scoriæ.
Globigerina.	Shells.
Gravel.	Shingle.
Lava.	Sponge.
Madrepore (decayed coral).	Stones.
Marl.	Tufa.
Ooze.	Volcanic.
Pebbles.	Weed.

When the depth exceeds 1,000 fathoms the quality of the bottom consists excessively of *Protoza*—these minute organisms are one-celled animals, divided into two sub-heads *Gymnomyxa* and *Corticata*—the former, which concerns this article, is again divided into (1) Foraminifera, (2) Radioralia. The average temperature of their habitation is below 40° Fahrenheit; at 2,000 fathoms the average temperature appears to be (in the Pacific) about 35.3° Fahrenheit.

Fully nine-tenths of this deposit (which forms an excessively fine, light-brown muddy sediment at the bottom of the specimen bottles, but when dried becomes white or reddish-white like fine chalk) consists of minute animal organisms called Foraminifera, provided with thick skeletons composed of carbonate of lime. The chief species of Foraminifera found is known as Globigerina and in all its various stages of growth forms at least 85 per cent. 5 per cent. is composed of Foraminifera of about four or five other species all of which are calcareous organisms, the remainder consists of partly animal and partly vegetable organisms provided with siliceous skeletons and envelopes.

Manganese nodules are sometimes found in the ooze. In the Pacific, Radiolarian ooze crops up with the Globigerina ooze. Bottom temperature is of serious importance to cable laying and occasionally high bottom temperatures are met with.

The Hydrographic Department is perhaps the most silent in its work of all other departments of our silent navy. Its labours never cease; yet beyond its periodical reports it seldom comes under the public eye, and when in print in the public press its doings are passed over by 95 per cent. of newspaper readers as a dry-as-dust paragraph even if they trouble to read the few lines to the end.

In some part of the world the ocean is ever changing more or less. Now and again some huge earthquake produces visible signs of its upheaval by flooding the land, swallowing up an island or two in the ocean, or pushing up the ocean floor into the daylight at unlooked-for places. Professor Milne, before the Mathematical and Physical Science Section of the British Association at Edinburgh in September 1921, vouchsafed the opinion that "submarine earthquakes were often responsible for breakages of cables which occasionally occur without assignable cause." The report of the Committee of Seismological Investigation,* however, made several attempts to prove this by obtaining definite dates and places of cable breakages, but comparison with the records of seismological instruments produced no corroborative evidence except the negative one that in several instances the instruments were *phenomenally quiescent*! It has been stated that the cable companies concerned do not wish the details published for business reasons. The theory is that submarine shocks of this comparatively minor character do not for some reason or other affect seismological apparatus. Nevertheless, deep sea cables *do* break and in some cases while there is no *traceable* cause there is no applicable theory to account for the breakage other than a seismological one.

The Jamaica earthquake of 1907 severed the Jamaica-Colon cable as with an axe except that one of the sixteen sheathing wires parted at its weld some fathom away from the cut. This breakage was shown to Professor Milne, the seismologist, at the time. Both ends were recovered and shown to Milne who exhibited them at the Royal Society. A year or two back three of the Atlantic cables snapped in close succession, and no one appears to have been able to assign a cause except that of an earthquake.

Of course, during cable repair, in the open ocean, when both ends are being hove on board—preparatory to splicing up—undue strain may cause the cable to "kink." This twist in the cable—as other repairs in the vicinity are made, or, at the time of splicing (being well under water) may become squeezed, fracturing the sheathing wires which, after years, corrode away and part—the stretched core develops faults and suddenly parts, this without earthquake causes.

Cartographical and in recent years, Hydrographical, records show these changes in the contour of the ocean floor very plainly sometimes at considerable depths. Volcanic ooze has been dredged up in the Atlantic near the Azores, and volcanic stones as far north as the 60th parallel.

There are, of course, other definite causes of cable breakages. Round our own coast in shallow waters, dragging anchors and fishing boats are not an infrequent cause. A tale is told of the early experience of a private company which owned certain cross channel submarine telegraph cables, and which found that the anchors of fishing smacks frequently fouled their cables, and that the owners thereof in their impatience to disentangle them, more often than not hauled cable and anchor on board and cut away the cable with an axe. The company, with an unpardonable lack of knowledge of fisherman psychology, issued a notice that they would prefer to compensate the owner of any entangled anchor if he would simply cut away the anchor instead. This notice was followed by so many applications from "unfortunate" and guileless fishermen who had "lost" anchors owing to submarine cable entanglements, that the company withdrew the notice and applied the Act of Parliament with much more satisfactory effect!

Another instance is told, and that of the Grand Banks of Newfoundland, where the fishing skipper had taken on board and cut a certain cable to clear his anchor—which, before letting go, he had repaired—in his estimation by reef-knotting the ends together.

A Government hydrographer of the writer's acquaintance relates how in the shallow waters off the mouth of the Orinoco, a chemical action of the river bed used to eat into the inner sides of the sheathing wires hollowing these wires out into curious spoon-shapes until they became so weakened as to snap.

There are, of course, the raids made by the *Teredo* worm, which has a particular penchant for gutta percha, and there is *Eunice Floridana Pourtales* of Mediterranean depths, which, though only four inches long, has jaws which make him a most annoying and expensive enemy of cables. Sharks at 250 and even 700 fathoms are at times responsible for submarine cables in the waters off South-West Africa, and in the Indian Ocean being damaged, in justice, be it said, apparently unwittingly, as such damage by the *Lamna Spallanzanii* and *Scapanorhyncus* respectively was probably done when these voracious creatures were attempting to strip the cables of animal growth, leaving behind them, in two cases cited, respective samples of their dental equipment.*

(To be continued.)

* *Electrical Review*, Sept. 30, 1921.

* T. & T. JOURNAL, July, 1923, p. 175.

HOW THE TELEPHONE WORKS.

By ARTHUR CROTCH,
M.Inst. P.O. Electrical Engineers, Silver Medallist and Honorsman in Telegraphy and Telephony.

XI.

THE RELAY AUTOMATIC SYSTEM.

THIS dispenses entirely with all mechanism and depends for its operation on relays alone. The essential principle can be seen from Fig. 36, where the vertical lines 1, 2, 3, 4, 5, are five subscribers' lines, and the horizontal ones *a*, *b*, *c*, *d*, *e*, are connecting links

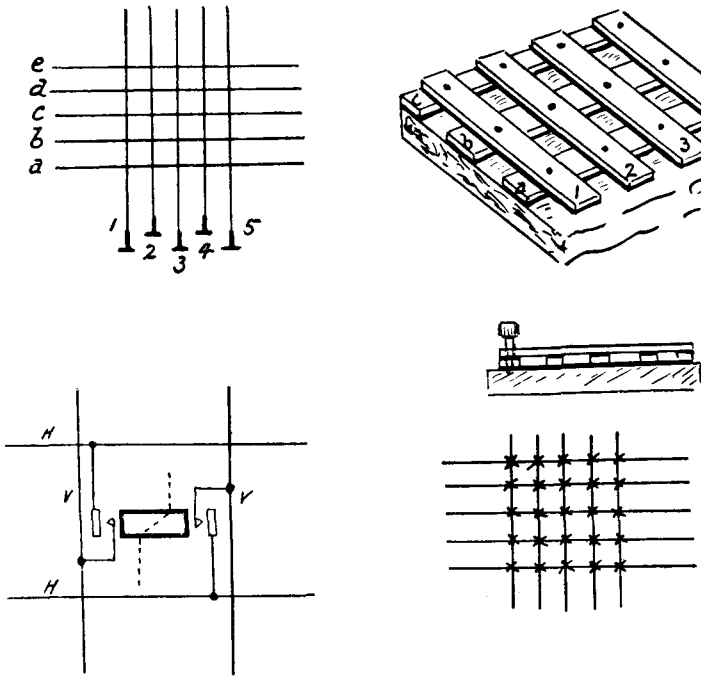


FIG. 36.

between them. That is, if suitable means of connexion are arranged at all points of intersection between the vertical and horizontal lines, we can connect subscriber No. 1 with *a*, *b*, *c*, *d*, or *e*, and so on with the others. To put one subscriber through to another it is only necessary that both shall be connected to the same link. A simple way of doing this is shown in the same figure, where a number of brass bars are fixed parallel to each other, and over these another set running at right angles to the first and insulated therefrom. At every junction or crossing a hole is drilled through both bars so that the insertion of a metal plug shall put them in connexion with each other. For loops or metallic circuits, a double set is of course required. Obviously a connexion like this is easily effected by a relay as in the same figure, by connecting the fixed contact springs to one pair of lines and the corresponding movable contacts to the other pair. The starred intersections shown indicate that such relays are fitted at all these points.

Fig. 37 gives a bare outline of the system. Each subscriber's loop is equipped, at the exchange, with a line, a cut-off and a fault relay, LE, CO and F. The lines then pass to the links, a link-connection relay, LC, being placed at each intersection. To the left, five other lines intersect the links; these are the out-trunks, that is, a calling subscriber will be connected by a disengaged link to an out-trunk. These intersections are similarly furnished with out-trunk connecting relays OTC. On the right is another set, the in-trunks, on which a call is received; these are provided with in-trunk connecting relays, ITC. Finally, at the right hand top corner, another intersection occurs, the trunk-connecting group, furnished with out-trunk to in-trunk relays, OT/IT. The function

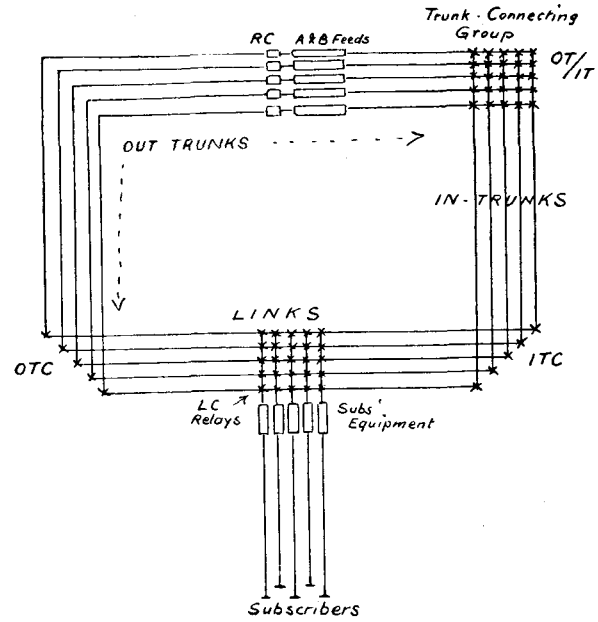


FIG. 37.

of this group is easily seen—to connect the calling subscriber on an out-trunk to the required subscriber by means of an in-trunk and another link.

In the same figure will be seen an "A and B feed," and a recorder-connector RC and these are included in each out-trunk. The first is equivalent to the cord circuit of the ordinary manual exchange, and contains relays having similar functions. The connector has other relays which, at the proper time, bring the subscriber into communication with the "recorder." The last-named receives the series of impulses corresponding to the wanted subscriber's number, and then "marks" or selects this subscriber, the remaining operations of ringing and getting through following in their order.

How this marking or selecting is done is shown in outline in Fig. 38. Making the circuit of the whole exchange are five single wires, the "units marking wires." From the recorder, five wires are teed on to these and further tees are taken to every group of five subscribers *via* the contacts of an in-trunk testing relay ITT, to the five subscribers' exchange equipment. That is, these wires reach the subscriber's apparatus by a kind of back entrance, not *via* the links. When the ITT relay is at normal the wires are disconnected, but when ITT is energised, they are all put through to the subscribers' apparatus. From the recorder an additional wire, the "fives marking wire," is brought to the coils of the ITT relay and it is by means of this wire that the relay is actuated and the five wires put through.

All the subscribers are arranged in groups of five. The board we are considering is a 50-line one, and will, therefore, contain ten groups of five subscribers per group. Allotted to each group are five links, but this number may vary. These links, however, are individual to the group, so that for the ten groups there will be 50 links, involving $25 \times 10 = 250$ link-connecting relays. Each link has access to one out-trunk and one in-trunk, involving 50 OTC and 50 ITC relays. A link-marking or selecting relay LM is also included with each link, totalling 50. Each group has also an out-trunk testing relay OTT and an in-trunk testing relay ITT for the purpose of seeking a disengaged trunk.

In the figures, we show five out-trunks. The actual number depends upon the needs of the traffic. Their terminations on one side are multipled, by means of jumper wires, to the links of the

various groups, and on the other they terminate in the trunk-connecting group, hence it will be noted that the jumpers from 50 links converge on 5 out-trunks. Containing, as they do, the A and B feeds and a quantity of other apparatus, they are a most important

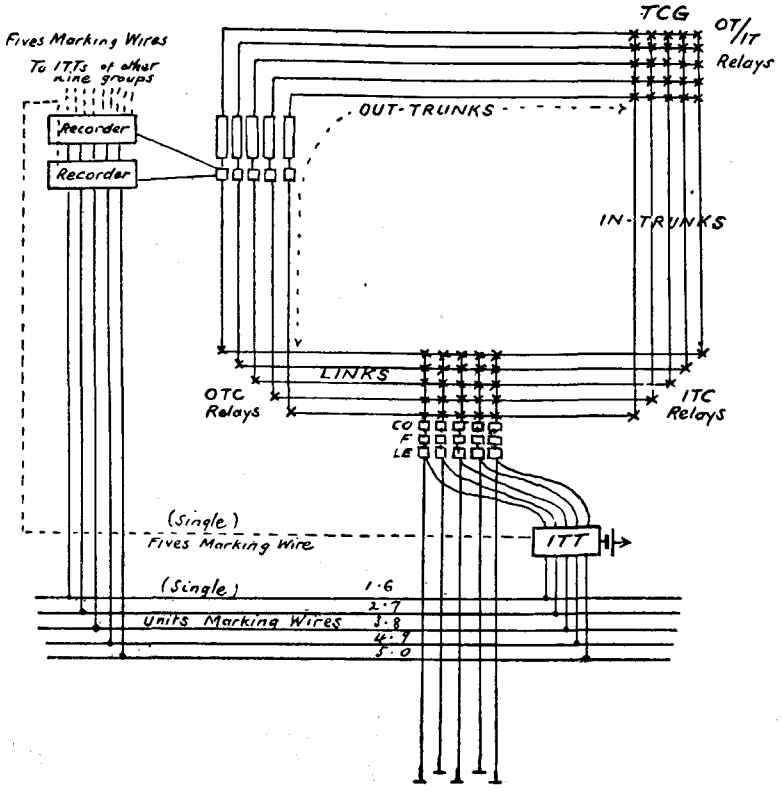


FIG. 38.—CONNEXIONS OF A SUBSCRIBERS' GROUP (5 SUBSCRIBERS.)

group. The five corresponding in-trunks are relatively unimportant, as they serve merely as connexions: they proceed from the trunk-connecting group and at their other ends are multipled to the links in the same manner as the out-trunks.

For a 50-line board, two recorders are generally employed. One or the other is connected at will to an out-trunk to receive the impulses and its function is then to mark or select, first, that one of the groups of five in which is contained the wanted subscriber, and then the subscriber himself.

A 50-line board involves two digits or figures. Clearly, we cannot utilise the units 1 to 9, as unless we prefix a cypher they will be single digits only. Further, the use of the 10-19 is barred in order to avoid the use of the single tens figure 1. Hence the numbering is from 20 to 69, which gives us the 50 required. These are then arranged as follows: First group (say the 20 series) 21, 22, 23, 24, 25; the second, 26, 27, 28, 29, 20; so that the units run 1, 2, 3, 4, 5, and 6, 7, 8, 9, 0. This is shown in the figure. It really means that the twenties, &c., are divided into two sets of five, one running concurrently with the subscriber's numbering; in the other, numbers one to five in the group, have an arbitrary numbering attached, viz., subscribers 26, 27, 28, 29 and 20. That is, the third in the first group will be 23, the third in the second, 28.

This splitting up of each ten subscribers into two groups of five each is the key to the somewhat peculiar numbering of wires and relays. The five "units marking wires" for instance, are numbered 1.6, 2.7 (one and six, two and seven), &c. That is, they may serve as numbers 1 or 6, 2 or 7, according to the group of fives in which they are employed. Relays 1.6, 2.7 again, may act as relays No. 1 or 6, 2 or 7, &c.

We can now take a bird's-eye view of the operations involved, leaving for a later stage the details of how those operations are carried out. A subscriber lifts his receiver, requiring a certain number. Before he dials the number he requires a link and an out-trunk. The operations, however, are not carried out in that sequence, but the apparatus automatically and electrically marks or selects a disengaged out-trunk and disengaged link. It then actuates the corresponding OTC relay, and then the LC relay

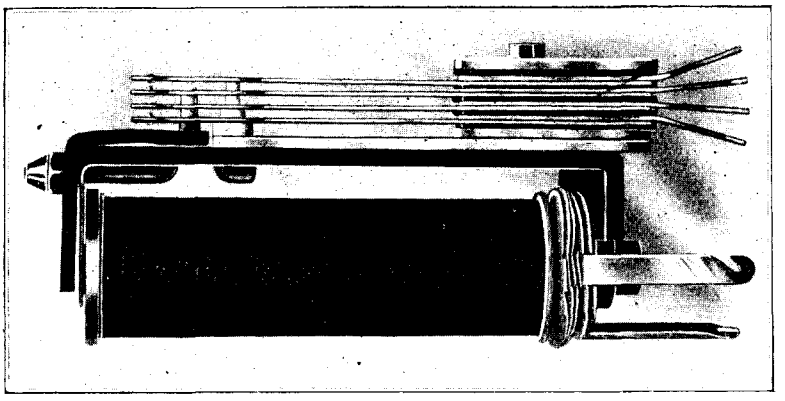
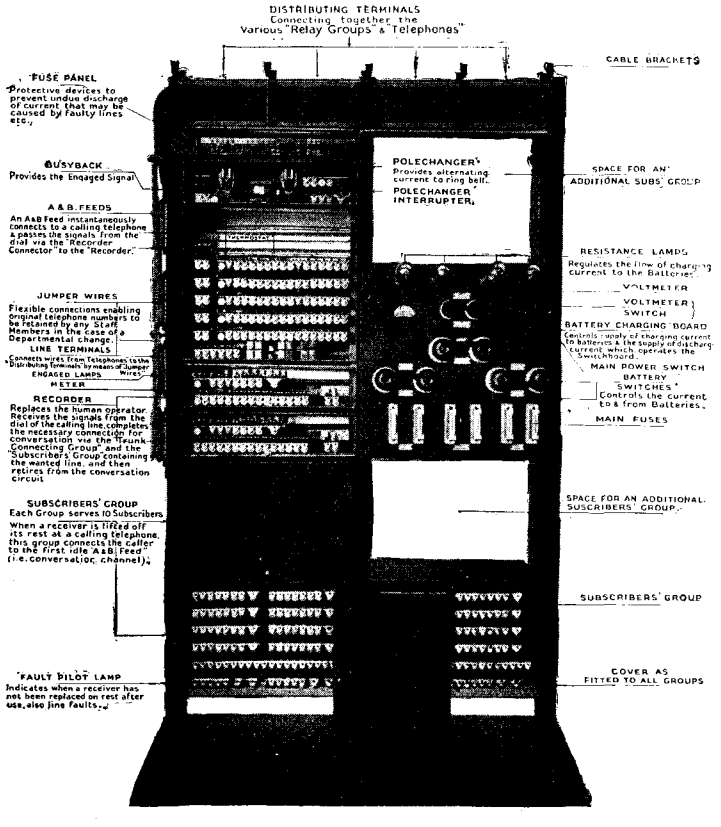


FIG. 39.

required, that is the trunk is selected first, not the link. Then follows a connexion to a disengaged recorder, which receives the impulses from the calling subscriber's dial. Imagine this number to be 37. The receipt of the first figure results in the marking or selecting of a particular relay, which will lock itself and be prepared at the proper time to earth the wire leading to the ITT relay of group 1 or 2 of the 30s series, and thus actuate that relay. The receipt of the second figure, 7, will indicate that it is the second group of the 30s that is required, and that the wanted subscriber is the second in that group, *i.e.*, 37. Another relay is locked and is prepared to send current along the required line at the



50 LINE P.A.X. SWITCHBOARD.
EQUIPPED FOR 30 LINES.
SIX TRUNK TYPE.

FIG. 40.

proper time. That is, the two relays are locked so that it is not necessary that the next operation shall follow immediately, but an interval may elapse without detriment to the combination. This is necessary because only one of these marking or selecting operations can be effected at one time. It requires an almost infinitesimal time to actually connect up the selected line, so that no practical ill results—indeed, the subscriber is quite unaware whether the operation has been completed at once or whether it has actually been delayed.

The two recorders may be engaged simultaneously in receiving impulses, but only one at a time can be actually "marking" or selecting. This will readily be understood when it is appreciated that the operation of marking involves the use (for a very short time) of the five common "units marking wires."

The subscriber is selected by means of, or through, his "back entrance," and he is quite unaware of this selection. The next operation is the marking or securing of a disengaged in-trunk and link. This again is effected by the co-operation of the wanted subscriber's own apparatus and in-trunk equipment, and having been so effected, the subscriber's line is tested for "disengaged" or "busy." If the former, he is rung up, and if the latter, the busy tone is passed back to the calling subscriber.

The illustrations now following give some details of the 50-line board itself. First, Fig. 39 shows the relay in use throughout, the only difference being in the number of contacts employed, resistance of the coils, &c. Some, in order to render them slow-releasing, have a block of copper at the rear end and one, the ringing trip relay, is arranged to be slow in energising. On the board itself, Fig. 40, are mounted (or space provided for mounting) five panels or boxes, each containing ten subscribers—that is, two groups of five—with attendant relays. Another panel carries the two recorders and others the power equipment, &c. Fig. 41 shows the subscribers' group; that is the two sets of five. Taking, say, the left hand set, the first row contains the five LC relays, OTC, ITC and LM relays of link 5 and so on, for the five links. In the sixth row down are the five CO relays and five F relays and in the lowest row the five LE relays, the OTT and ITT relays. In Fig. 42 are shown nine A and B feeds, each with its relays A, B, G, BBM, RT and RG, and the "recorder connectors" RC1, 2 and 3, with the relays F1 and RP (first-impulse and recorder-preparing). Fig. 43 gives the relays of the recorder: five units, five tens and five impulse relays, with their "holding" or retaining relays, and BY, P, RG, &c.

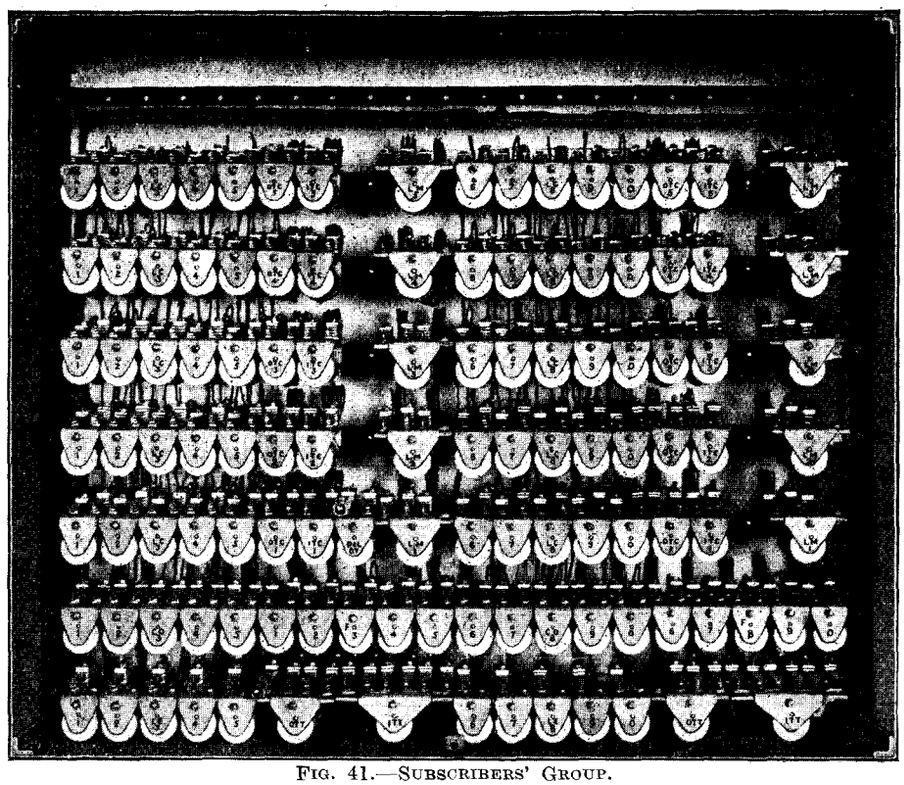


FIG. 41.—SUBSCRIBERS' GROUP.

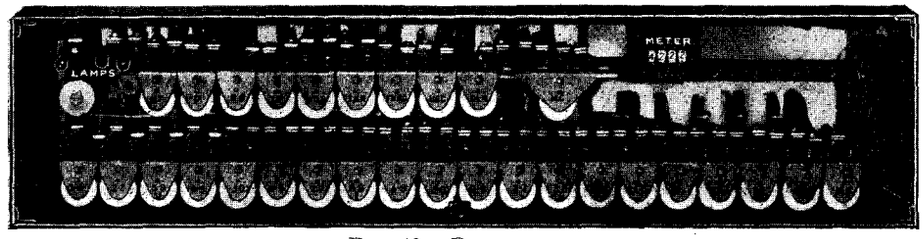


FIG. 43.—RECORDER.

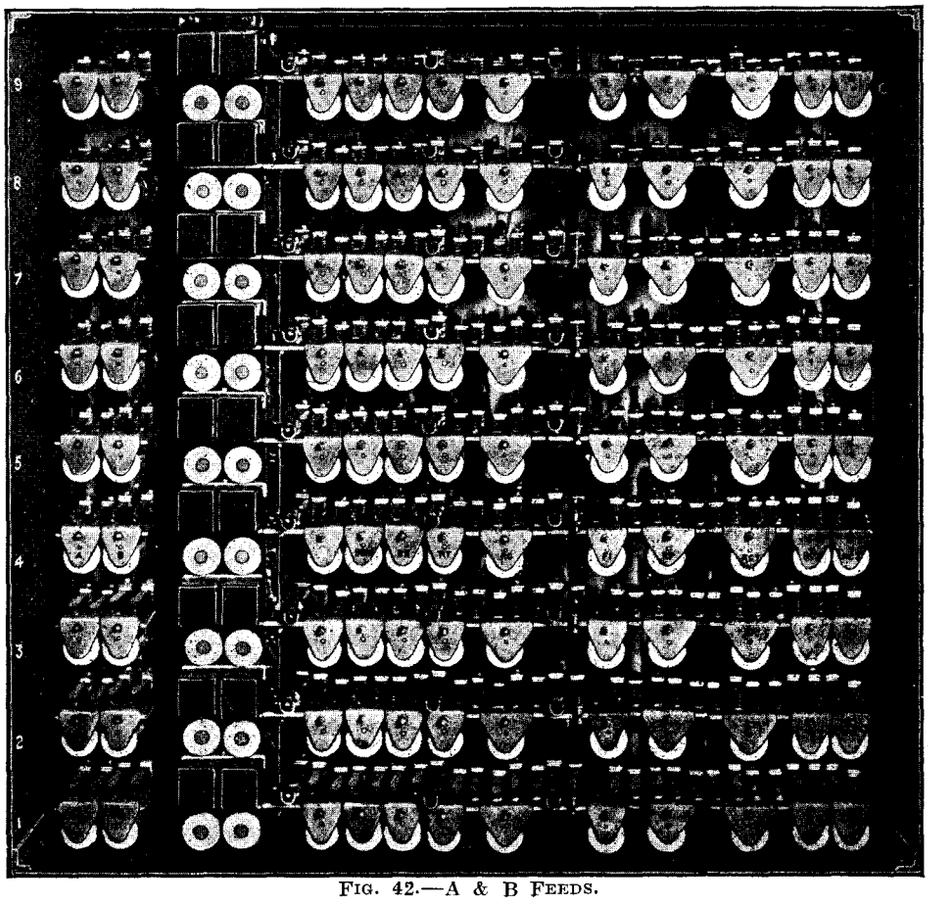


FIG. 42.—A & B FEEDS.

(To be continued.)

THE PERSONAL FACTOR. SHOULD IT BE IGNORED OR NOT?*

BY ELEANOR M. MCALLISTER.

IN a service composed mainly of women it is impossible to ignore the personal factor, however desirable it may seem to do so. No one would dream of living too near a live volcano, and in many ways the human mind, and especially that of a woman, is very like a volcano of the liveliest order, and it is impossible to know when an eruption will occur. The human mind fortunately responds to environment, and those who are responsible for the satisfactory organisation of an exchange would do well to remember that.

Where large groups of people are to be dealt with one must ever consider first, the greatest good of the greatest number, but where the local arrangements are such that every unit comes under observation (and who either could or should deny that that is the case in the telephone service ?), surely it would be no great matter, given imaginative and sympathetic supervising officers, to get the best out of the staff by tact and good management. The best results seem to me to be obtained in a community where the authority lies, apparently at any rate, but lightly, and where every member of the staff is treated as a responsible individual.

If only learners, when first admitted into the service, could, while yet in their first enthusiasm, be brought to realise their own absolute personal usefulness, and to think clearly for themselves, the outcome should be splendid. Naturally, it is no good merely thinking, one must also occasionally express one's thoughts (one of those volcanic eruptions might come along else) and that is where a society such as the London Telephonists' Society ought to be of such great advantage, for it is only by discussion that a perfect understanding and confidence can be arrived at between members of all grades of the service ; and understanding on the part of those in authority and confidence on the part of those in subordinate positions is the bedrock of all organisations.

As regards the operating staff, much might be done to improve working conditions if only toleration of thought were exercised between the individual members.

When many people of entirely different characteristics are brought together, it is impossible to avoid the friction and argument generally so rampant (so many people consider " argument " and " discussion " as being synonymous), but it is always advisable to suppress the more extreme characters : they invariably have such a demoralising effect on those of a weaker calibre.

While home affairs are naturally not to be allowed to obtrude unnecessarily into business hours, their effect is bound to be reflected on the brains of all but the strongest. The ideal staff would, no doubt, be able to forget their domestic difficulties at will, or else regard them through the haze of a philosophy mildly passive. The latter is a state to be cultivated by all who possess a certain amount of patience ; but there are many who would regard such a course as one requiring too much self-sacrifice, for how many I wonder, would think it preferable to forego the doubtful delights of an occasional hysterical upheaval in order to obtain a serenity of mind suitable to the proper performance of official duties.

There are those whose chief pleasure in life is to grumble and fly off into the most uncontrollable rages at the most insignificant trifles, and it does not seem to me that they are in a minority either ; whether they are or not, however, they are most unpleasant and not to be ignored—one grumbler will frequently infect a whole section with discontent, and should, therefore, be suitably dealt with, and the most suitable way is not always the most obvious because one must always remember that there may possibly have been something to grumble at. Fortunately, there is always the reverse side to every question, and we all know how much pleasure we get from working with those whose temperaments are compatible with our own.

In an office where, by the very nature of the work, things go wrong without apparently being the result of any human agency, it is frequently difficult to avoid many petty annoyances, but if all were to make the best of a bad job, how much better would the whole system be. In the case of pleasant surroundings is it not acknowledged what a lot of pleasure may be derived from placing a few flowers in a switch room. If these and many other details of a similar nature react on the mind and are conducive to a happier and better worker, environment is one of the greatest powers to be considered in dealing with the personal factor.

Come, now, to think of what would happen if the " powers that be " tried to relegate the staff to the position of automatons. With people whose national characteristic is freedom, such an attempt would be more likely to turn us all into raving Bolsheviks. Do try and think what a Bolshevik telephone service would be ; it is too horrible to contemplate !

Intensive discipline seems bad to me under whatever circumstances I can think of it ; it is so unreasonable ; it deprives people of the right of self expression ; in fact, it lowers them to the level of the proverbial worm, and we all know what the worm did eventually.

We have an example in Russia of what occurs when a suppressed people ultimately realise its suppression. A revolution ! And what is more, a revolution of people incapable of coherent thought, than which nothing can be more terrible.

Yet it is the natural outcome of forcing human beings to work under an unreasonable authority, their brains become clogged and the work produced purely mechanical, so that when the lower grades of the staff come to take up the reins of authority and leadership, they are totally unfitted for such a position, being quite unable to think for themselves. Some there are who might say that it is only the scientific side of the service which is worth development and recognition. But who is to recognise and develop the service ? Man ! Who then is master, service or man ? Again I think the answer will be man. The human being, being composed of a certain amount of brain and a large amount of egoism, clamours aloud for recognition, and more often than not forces himself to be heard. Therefore, I think you will agree with me on the impossibility of ignoring the personal factor.

* Prize paper read before the London Telephonists' Society.

LONDON ENGINEERING DISTRICT NOTES.

Amateur Athletic Association.

MR. F. R. GABY, of the Mayfair Fitting Office, was successful on Saturday, July 7 last, in winning the 120 yards' Hurdle Race at the Amateur Athletic Association's General Championship Meeting. The time taken was 15½ seconds, beating the previous best championship performance.

Adventures of Living.

In *The Adventures of Living*, by John St. Loe Strachy, the author describes the four most perfect faces that he has ever seen. He says :—

" The fourth figure in my gallery of the visions that the turn of the road took from my eyes and ' swept into my dreams for ever,' was seen during a purely prosaic walk in South Kensington. Unsuspecting, unperturbed, I was bent on a constitutional, or maybe, a shopping expedition, when there suddenly arose before my astonished eyes, out of a manhole in the middle of the street—I honestly believe it was the Cromwell Road, a young workman with flaxen hair and a short beard, a man with something of the face and figure which the Italian painters gradually came to attribute to the Christ. Though the trained eye might notice a resemblance in the outline of the face, the happy smile and negligent air showed nothing of the Man of Sorrows.

He was just an ordinary Englishman."

Evidently a P.O Jointer.

Works in Progress.

The holiday season is now in full swing, and many members of the engineering staff are trying to forget telephones while they seek the restoration of vigour by the seaside, at the farm or on the moors.

Apart from the brief break during the actual absence from duty there is no cessation of the activity of the Engineering department. Planning and execution has to be carried out many months in advance of the date that plant is to be brought into use.

Seasonal variations, therefore, only affect engineering officers to a very slight degree, except perhaps that the burden is heavier owing to the absence of colleagues.

Such extra burden, however, is cheerfully borne in the circumstances, and when the holiday comes it is all the sweeter.

The provision of external plant is proceeding apace. The shortage of plant, which was a legacy of the war, has been overcome, and with the exception of a few small areas where there are wayleave difficulties, there is no part of the London Engineering District where applications for telephones are temporarily refused owing to shortage of plant.

In addition to the schemes for providing plant for subscribers line development, many schemes for additional junction and trunk cables are in hand.

There is much activity on the internal side also. Extensions are being carried out at Brixton, Clerkenwell, Dalston, Hendon, Hornsey, Kensington, Streatham and Walthamstow Exchanges. Plans and estimates are being prepared for other extensions. A large new exchange to be named " Royal " is being built in Great Tower Street by contractors.

A new exchange was opened at Esher on July 11. A new exchange at Southall is nearing completion.

In the majority of these cases the work is being executed by the engineers local staffs.

Engineers' orders are being placed for other new exchanges to be built by contractors under the supervision of the Sectional Engineers.

It is evident that there will be plenty of scope for working off the additiona energy acquired during the brief respite in sea or country air.

The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. AUGUST, 1923. No. 101.

UNDERSTANDING AND APPRECIATION.

WE often wonder how the less imaginative part of the public conceive of the nature of telephone service and all it implies, not especially we mean of the electrical transmission of a conversation between two telephones of which they may have obtained some vague knowledge from a scientific text book, but of the complex system built up of so many ingenious links which enables any subscriber to be placed in direct communication with any other in Great Britain and with many others abroad. In these days of scientific achievement so much is taken for granted, and so many people are quite incurious to know "how it's done," that they are unable to understand or allow for any falling short of perfection in a service for which they pay, however marvellous a conquest of time and space it may involve, and however nicely-balanced a combination of human skill and watchfulness with physical forces it may require. They would contend that they pay what is demanded of them, and that it is for expert persons to overcome all contingent difficulties in satisfying their requirements. The contention is, of course, justifiable so long as such requirements are reasonable, but it is precisely in determining what is a reasonable or unreasonable standard of perfection in a public service that a little understanding of the problems involved in providing it is so useful.

We imagine that a subscriber's crudest conception of telephone service is of an organism in which, by taking the receiver off the hook or by ringing the exchange, he gains the ear of a telephonist ready to give more or less undivided attention to his calls, who, somehow, by means of an infinite, magical network of direct lines within her control, ought to be able to place him in immediate communication with anyone with whom he wishes to speak. Within reasonable limits, he is not far wrong, but he is far from visualising the immensity and complexity of the ramifications of exchange service. Can he imagine what it means to put each of the 350,000 London subscribers, for instance, in direct communication with all the others, or to do the same for a like number in Berlin, or for a million in New York? It seems so simple a process for an Avenue subscriber to call for Richmond, for a Croydon subscriber to call for Hampstead, and to find himself speaking to his correspondent within a few seconds, that it becomes natural to suppose that the process by which all the subscribers on London's 100 exchanges are placed in communication with one another is a simple one. It is only when delays and difficulties arise that it occurs to the subscriber to question the simplicity of the process. Yet, so many hundreds of millions of effective calls pass yearly that the ineffective ones which loom so large in the public eye will appear inconsiderable, viewed from the proper perspective. And here we do not speak of Great Britain alone; in all telephone using countries the same phenomenon occurs, and the service at home is always the worst in the world to the disgruntled subscriber.

The truth is that the telephone service is not a spectacular or easily demonstrable one: its processes are silent, elusive, and invisible. Much good is invariably done by inviting subscribers to view a busy exchange at work; they go away with a better understanding of the nature of the service, of the care and attention devoted to detail, of the dexterity and assiduity of the telephonists. They learn that the latter, whatever other human weaknesses they may be heir to, do not read novelettes, eat chocolates, flirt, knit jumpers, or foxtrot whilst at the switchboard. They learn also, what the less considerate subscriber is apt to forget, that they share her skilled attention with many others, But a visit to a telephone exchange gives no idea of the vast external network, the 21,500 junction lines, for instance, which connect London's exchanges with each other, or the 515,000 miles of trunk wire which are at each subscriber's disposal. In a sister form of communication, the older-established railway, the position is very different. Its manifestations are more spectacular and invariably awaken in the boy an interest which often persists in the man. Not only are its difficulties and achievements commonly appreciated and understood, but even the unsympathetic has ocular demonstration of them. The dullest, least enquiring mind understands why traffic is disturbed by race-meetings, why his morning train is late on Saturdays in summer owing to the rush of holiday traffic. He can appreciate and make allowance for the difficulty of working trains into the bottle-neck of a terminus, and why there are delays at junctions or when signals are adverse.

We have been moved to some of these considerations by a paragraph in a Sunday paper in which a writer, after sarcastically congratulating the Postmaster-General on getting a telegraph message from Canada in less than one-thousandth part of a second, complains that it took him half-an-hour to get through from a wayside call office in Cambridgeshire to London—only 40 miles distant. Of course, by half-an-hour he means the delay he suffered

and not the time the message took to pass over the wires, and is comparing like with unlike after the fashion of his kind, but that is by the way. We do not know whence he spoke and have no means of corroborating his timing, but what interests us is his attitude of mind. Does he visualise a trunk service which should provide a direct line and no-delay service from every exchange and rural call office in the kingdom to London, and, if so, has he any idea of the technical and economic impracticability of such a scheme? Or does he imagine some sort of omnibus line serving all the villages between Cambridge and London, and if so what kind of service would he expect from such a circuit? It is useless to ask these conundrums, because the probability is that the writer did not visualise the position at all. Now, had it been a railway service in question, he would not have expected to find through and fast trains from any and every wayside station to London, even if it were only 40 miles away. He would have been content to travel by slow train to the nearest junction and wait there till such time as good fortune sent along a London train. And he would be lucky to make the journey in a couple of hours. All this seems to us to point to the desirability of more publicity for telephone and telegraph methods. The more the public know of the procedure of these services, their difficulties, their compass and their value, of their limitations as well as their triumphs, the better they will understand them and appreciate them.

HIC ET UBIQUE.

WE congratulate rather belatedly the Engineer-in-Chief on his Colonelcy. The *Gazette* of April 17 had the following announcement:

Royal Corps of Signals (Home Counties Divisional Signals), Major T. F. Purves, O.B.E., M.I.E.E., late R.E., to be Hon. Col.

We also heartily congratulate our colleague, Mr. John Lee, Controller of the Central Telegraph Office, on receiving the C.B.E.

THE following European cities had upwards of 100,000 telephones at Dec. 31 last:

London (Telephone Area) ...	369,038
Berlin (Greater)	355,691
Paris	173,300
Hamburg	113,482
Copenhagen and suburbs ...	111,580
Stockholm	103,760
Vienna (about)	100,000

It will be many years before this list is increased. The next largest telephone systems at present are those of Manchester, 50,585, and Munich, 49,646.

WE have received an interesting brochure in French and Spanish from Don Ignacio M.A Echaide, giving a description, history and statistics of the telephone system of Guipûzcoa in Spain. It is the most highly developed of any Spanish province, containing 17.8 telephones per 1,000 inhabitants against 12.2 in Biscay, 12.1 in Barcelona, and 10.2 in Madrid. The book is very well got up, and contains 6 photographs of exchanges and a map.

THE great thunderstorm last month was not without its effect on the telephone service. 3,000 London subscribers' lines were reported out of order. 150 junction lines and 126 trunks were effected, and 4 of the Paris lines, 1 Amsterdam and 1 Rotterdam trunk lines were down. The majority of the London lines were restored by the evening.

THE telegraph and telephone services are apparently an educative influence. J. J. T., in his "Memorabilia," records that the public protest because they can't send "alright" as one word in a telegram, and that a newspaper asserts that this spurious compound is in general use. It is no doubt based by false analogy on "already," which means something quite different from "all ready," but we deny that it is in general use by educated writers.

Then we have an American visitor saying that he thinks that Londoners burr their "r's" more than they did thirty years ago, and ascribes this to the instructions in the telephone book. We cannot, however, say that we have noticed it. The educated Londoner obstinately refuses to pronounce an "r" at all, except at the beginning of a syllable. Although he is contemptuous of the rhyme of "dawning" and "morning," or "water" and "quarter," in print, these rhyme perfectly in his usual pronunciation. He sometimes pronounces an "r" at the end of a word when it is followed by a vowel, but we have heard a cultured Londoner deliberately pause to breathe between Mr. and Adams, and enunciate "Mista 'Adams" rather than say "Misteradams." We are afraid that all the telephone books imaginable will not teach him to distinguish between "quota" and "quoter," and "father" and "farther."

THE following paragraph recently appeared in the Press with reference to a telephone company's meeting:—

> "Mr. Blank demanded a pole, but, in the absence of sufficient support, this fell to the ground."

REVIEWS.

We hope that our readers have found interest and information in the articles entitled "*How the Telephone Works*," *by Mr. A. Crotch*, which have now been running for some eight months in this Journal, and are now concluding with a description of the Relay Automatic system. Mr. Crotch's object has been to give a brief but workable explanation in simple and unpretentious form of matters and instruments which our readers have to handle every day.

We take this opportunity of drawing attention to the works which our contributor has published during the last few years. These include:

Telegraphic Systems (*C. Griffin & Co., Ltd.* 6*s.*): A work detailing the different systems of practical telegraphy in use in the British Post Office to-day.

The Elements of Telephony (*E. F. & N. Spon, Ltd.* 2*s.*): An elementary work on the telephone, including the instrument itself and the theory of its working, switchboards, multiplying, automatic signalling, common battery working, &c.

Telegraph Secondary Cell Installations (*S. W. Partridge & Co.* 2*s.* 6*d. net*): A work going into full detail on the secondary cell and the various pieces of machinery necessary for the equipment of a large telegraph office.

The Hughes & Baudot Telegraphs (*S. Rentell & Co.* 1*s.* 6*d. net*): A little *brochure* giving full explanation of the Hughes type-printing telegraph and the theory and application of Baudôt's use of the multiplex system combined with his own equal-letter alphabetic system.

The latest work is "*Telegraphy*," (*E. F. & N. Spon, Ltd.* 4*s.* 6*d.*), a revised edition of an earlier one, "*Elementary Telegraphy & Telephony*."—This work has been sent us for review, and we have much pleasure in recommending it to our readers. In it the fundamental principles of magnetism and electricity are clearly explained, and applied to the simpler methods of telegraphy—the Morse system, single and double-current, duplex, central battery working, &c. The later chapters deal succinctly with the work of construction of telegraph lines with overhead and underground, and with simple testing instruments. The little book will be equally useful to the telegraphist and to the general student.

TELEGRAPHIC MEMORABILIA.

THE *Daily Chronicle* recently asked, "Is the Post Office right in decreeing that the word 'alright' is all wrong? In other words, ought this word to be charged for as two which is the case when it is included in a telegram to-day. The telegraph operators have a black list of words and 'alright' is included amongst them. What is their justification for making the extra charge? The word, so spelt, is common everywhere to-day. One finds it in novels and critical articles and in private correspondence everywhere. If, strictly speaking, it is an obsolete word, why cannot obsolete words be sent by telegram as ordinary words?"

Well, there is no objection to the use of obsolete words in telegrams and certain members of the Press have no hesitation in utilising them. One meets nowadays "*un*wisdom" and other more or less archaic combinations made with the old negative "*un*." A London daily newspaper recently spoke of the *un*success of a movement, while certain shipping firms utilise "yestereve" (chargeable as one word) to denote that a certain vessel sailed on the previous evening, thus "*Arcadia* yestereve." One could continue with these *revelations* where the public score, but it must be admitted by all fair-minded readers that a line has to be drawn somewhere as to how far the usages of the language are to be ignored. Certainly, if no effort were made to place a check upon illegal combinations of words in telegrams, such illegalities would speedily grow into an abuse which would have an appreciable effect upon revenue. Unfortunately there is no Academy or literary *alma mater* in these islands of ours to look after its children and to definitely and arbitrarily settle points of this description. If there are anomalies in the counting of words and the fact may be admitted quite frankly, it is rather that our language itself is full of anomalies as the foreigner knows to his cost. There are, however, compensations of which perhaps our contemporary is unaware. If "alright" or "allright" counts two, "allround" may pass as one word, and the all but obsolete "ahungry" is also available. If "bargebuilder" must be charged as one word, "boatbuilder" need only cost the price of one, if "Copraoil" counts two, "Cocoanutoil," though a longer word, should only be counted one. "Wirenails" two, but then "wirerods" one. If you travel by "touristcar" it will cost you twice as much to telegraph that information than if you made the journey in a "touringcar" although should you fail to reach your destination your friends could cheaply indicate the fact by using "unarrived"! If your journey is up river then it would be better to call your "motorlaunch" a "motorboat" when wiring, as the latter is the more economical word. There are other words which again should you be one of those who prefer a lot for their money, you might, and the occasion offer, utilise: thus "threefarthings" may be signalled at the cost of one word though not so "one farthing." "Matroninchief," apparently as a concession to the feminists, costs but one third of "Engineer in Chief," while should you be personally interested in the house-agent business, however exorbitant may be the price per annum, for the cost of one word you may telegraph the indication "Annualrent." No! These decisions are not all against the senders of telegrams.

Our last issue noted the retirement of Mr. S. Coase, owing to ill-health, and this month it is our sad duty to place on record his passing away. The respectful and tender sympathy of the entire staff goes out to the wife and children of our beloved and heroic colleague.

Again the sad note must be struck, for death came with a sudden hand during the closing days of June to a well-known figure of the Cable Room staff in the person of Mr. W. Corfield, who expired while on duty. Among the wreaths placed on the coffin was one from ex-members of the Naval Brigade with whom he served during the war.

Within the space of a few days Jack Scott, one of the most respected members of the younger generation of Cable Room men, succumbed to post-war effects after months of suffering bravely borne. To his devoted wife, a native of *la belle* France, to whom England had indeed become a second and a very real *patrie*, the Room pays its respectful homage.

Still within the restricted circle of the same few days, came the news of the decease after practically a brief laying aside of one well known to many of the older members of T. S. Foreign, Mr. F. Charrosin, Sr., one time Superintendent, and formerly a member of the old Submarine Telegraph Company's staff. His bluff and hearty nature, his thorough straightforward dealing with those under his charge, had endeared him to all. At the ripe age of 77 years he also has left us and passed into the Great Beyond with the record of a white life behind him.

"And, O beloved voices upon which
Ours passionately call . . .
. . . We are strong.
Knowing ye are not lost for aye among
The hills, with last year's thrush."

The liberty is taken of lifting the following leaderette from a recent number of *The Electrical Review*, which should prove of more than ordinary interest to our telegraphist and telephonist wireless enthusiasts:—

Correspondence in *The Times*, following a letter by Sir John I. Thornycroft regarding the wave-lengths allotted to the broadcasting service, indicates that dwellers in towns near the coast are deriving but little benefit from the service, owing to the serious interference by telegraphy. In the neighbourhood of Portsmouth and Southampton jamming due to the Niton station transmitting on 600 metres utterly ruins the concerts broadcast on 350 to 425 metres, whilst the direction-finding stations operate on 450 metres. The Admiralty station at Horsea Island works on a wave-length of 6,000 metres, which should not affect the broadcasting service, but it emits such powerful harmonics that it defies all attempts at tuning out. Ships using spark transmission on 300 and 600 metres are also the subject of bitter complaints. The trouble is largely due to the use of old-fashioned transmitting apparatus, and in almost all cases could be avoided by the use of modern plant capable of accurate tuning.

In an art which progresses so rapidly as does radio-communication, difficulties of this kind must inevitably arise, and it would be unreasonable to require every authorised user of the ether suddenly to scrap apparatus the use of which has received official sanction, in order to meet the convenience of newcomers in the field. The problem therefore is a very knotty one, and as the days go by and practice in each branch becomes more firmly established the difficulties increase. The chief engineer of the British Broadcasting Co. suggests that the authorities should exercise effective supervision and require strict compliance with the regulations. Even so, however, interference would not be wholly avoided; the use of wave-lengths approximating to those allotted to the broadcasting service should also be banned, and this would mean some drastic changes in existing apparatus. Now that hundreds of thousands of receivers have been set up for use on the broadcast band, it is impossible to depart materially from that range—alterations must be effected elsewhere. The case of a 6,000-metre station jamming everything within its range, however, is in a different category. Important as its work may be, it is a public nuisance, and steps should be taken immediately to confine its operations to its normal wave-length. Unless order is strictly enforced in the ether, a most important medium of communication will be rendered, in many areas, useless.

The Times correspondent in Bombay states that the wireless news service between London and that city has been suspended since the beginning of June, owing to atmospheric difficulties and adds, "its striking inefficiency when the monsoon began furnishes an excellent argument for the transmission of news by a better system." It is, however, not the only wireless route which has suffered badly during these last weeks of electrical disturbances in this country and abroad.

The following interesting question and answer in the House of Commons on June 19 are also of interest to those interested in broadcasting—especially reception of the same:—Mr. Gray asked whether the traffic at the Leafield wireless station after 8 p.m. was exclusively British official news and American press news of a very general character; and whether, having regard to the nature of this traffic and the fact that at two other times of the day British official news was broadcast, this traffic after 8 p.m. could be discontinued in the interests of those in England who received broadcasting and in the interests of economy.

Sir L. Worthington-Evans said the traffic transmitted from Leafield after 8 p.m. included telegrams for Egypt and for ships at sea, in addition to the items mentioned by the hon. member. The traffic as a whole was of an important and remunerative nature, and its discontinuance for the purpose of preventing interference with broadcast reception in the immediate vicinity of the station where, unfortunately, interference was unavoidable, could not be justified.

Mr. W. Dawes, "Bill Dawes" as he was affectionately and more familiarly spoken of, Assistant Superintendent, C.T.O., quitted the latter office on Sunday, July 1, his sixtieth birthday. He leaves behind him a record of efficiency which anyone might envy, is followed by a host of good wishes from scores of colleagues and friends and, humanly speaking, leaves the service with a life expectation which many might well wish as their chief legacy.

The Birmingham broadcasting station was listened to recently under conditions which were somewhat remarkable and illustrate in an interesting way the possibilities of radio-telephony in the open air. With a portable valve set in his car a motorist entertained a party of Boy Scouts who were encamped on a large clearing in the heart of a wood. The aerial was a single length of wire slung from a tree and the "earth" connexion was made by fastening a wire to a tin-can, which was thrown into an adjacent brook. The filaments of the valves were lit from the car batteries.

Regardless of the very haphazard character of these arrangements, 5IT, approximately 50 miles away, was heard so loudly that the concert could be listened to well over a hundred yards away. This success was especially gratifying in view of the fact that the presence of many trees near an aerial is said to have a screening effect.

According to *Revista Telegrafica* the Argentine Government has established what would appear to be telegraphic communication of a permanent character between Buenos Aires and Rio Gallegos, a distance of over three thousand kilometres, by means of Automatic Wheatstone, at an average speed of 75 words per minute.

This communication is the more remarkable that it utilises some very old lines, which even now are badly in need of repair, if not entire re-construction.

Repeaters are installed at Azul, Bahia Blanca, Conesa, Rawson (Chubut), Commodoro Rivadavia and Bahia Laura.

The results obtained will, it appears, permit the acceleration of the heavy traffic between the two terminal offices mentioned, which is augmented by

the transit service of Punta Arenas and Santiago de Chili, which have frequently caused considerable delays and blocked traffic. Such has been the success of the trials that it is considered more than probable that either Siemens or Creed with automatic retransmission, which, in the case of either of these two systems (both are capable of automatic re-transmission), would definitely solve the problem of the exchange of Chilian traffic.

It is with the sincerest regret that the retirement of Mr. G. R. Adams (Superintendent), on account of ill-health is noted in these columns. The happy personality of our friend had endeared him to a large circle of friends, both inside and outside the office. As an executive officer of the Sunday School Union, his activities on behalf of the children made large claims upon his time, and it is feared no little strain upon his strength, though both were willingly given in service for the young life of the nation.

As a writer of no mean ability, he has written instructive articles involving considerable careful research and necessarily a wide knowledge of ancient history.

Yet he was one of those whose activities *outside* the office were never permitted to depreciate the value of duties performed inside the office. All the more, therefore, will the Service organisations with which he was connected appreciate the practical help rendered and which has always been forthcoming at the mere sign of its need.

It is earnestly hoped that premature though this retirement has proved it will yet result in the prolongation of his years, and a happy well-earned leisure enjoyed to the fullest advantage.

In case our telephone readers have missed the following, culled from the London evening press during the heat-wave, here is the gem : " The telephone of Messrs. Negretti and Zambra broke down yesterday, owing to the strain put upon it by the excessive number of calls asking for temperature readings. The line has now been restored." !

Economy.—Economy does not consist in the reckless reduction of estimates. On the contrary, such a course almost necessarily tends to increased expenditure. There can be no economy where there is no efficiency.—BEACONSFIELD.

J. J. T.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE number of new orders connected during May was again exceptionally large, the gross new stations totalling to 18,565 and the net new stations to 9,912. These are the highest monthly totals yet recorded, and compare with 12,299 and 4,837 respectively, in the corresponding month of last year.

The total number of stations in use at the end of the month was 1,065,951 ; 382,792 in London, and 683,159 in the provinces.

The net increase in the number of private house lines in May was 2,617, or 40 per cent. of the total increase for the month. The total number of residence rate subscribers at the end of May was 159,129, as compared with 138,453 at June 30, 1922.

The number of public call offices at May 31 last was 16,732, the net addition during the month of 158 being the best on record. The number of call offices increased during the 12 months ended May last by 1,275.

The rate of construction of new rural party lines has fallen slightly in recent months, nevertheless 183 rural party subscribers were added to the system in May, bringing the total at the end of the month up to 7,221.

A further 24 new rural exchanges were opened for service during June making the total number working at the end of the month 166. At that date, 390 exchanges had been authorised—29 in June—under the revised conditions announced last year.

There are still no signs of an improvement in the traffic, the calling rate in May being practically the same as in April, and the June figures are, if anything, down a shade, possibly 2 per cent.

Some statistics showing the general development of the service to date in the current financial year are given in the appenedd table :—

	At March 31, 1923.	At April 30, 1923.	At May 31, 1923.
Exchanges—			
(*a*) London	99	99	100
(*b*) Provinces ...	3,105	3,107	3,140
(*c*) Total	3,204	3,206	3,240
Stations—			
(1) EXCHANGE—			
(*a*) London	358,213	360,525	363,751
(*b*) Provinces ...	654,932	657,734	664,527
(*c*) Total	1,013,145	1,018,259	1,028,278
(2) PRIVATE—			
(*a*) London	18,789	19,027	19,041
(*b*) Provinces ...	18,738	18,753	18,632
(*c*) Total	37,527	37,780	37,673
(3) TOTAL EXCHANGE AND PRIVATE—			
(*a*) London	377,002	379,552	382,792
(*b*) Provinces ...	673,670	676,487	683,159
(*c*) Total	1,050,672	1,056,039	1,065,951
Public Call Offices—			
(*a*) London	3,793	3,808	3,817
(*b*) Provinces ...	12,716	12,766	12,915
(*c*) Total	16,509	16,574	16,732
Public call offices in street kiosks (*Provinces only*)	420	431	450
Rural Party Lines ...	6,916	7,038	7,221

Further progress was made during June with the development of the local exchange system.

Among the more important new exchanges opened was an automatic exchange at Southampton.

The following important exchanges were extended :—

London : Epsom and Woolwich.

Provinces : Didsbury, Gravesend, Heaton Moor, Harrogate, Southport and Torquay.

The main underground system was extended by the completion and bringing into use of new cables as follows :—

Coventry—Nuneaton.

Glasgow—Edinburgh.

Staines—Egham—Ascot.

Newport—Pontypool.

During June, 79 new overhead trunk circuits were completed and brought into use, and 102 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

A Baudot installation has now displaced Morse working on the Cardiff—Bristol—Exeter route.

THE ADVANTAGES AND DISADVANTAGES OF RELIEF SUPERVISING.*

BY H. WILSON, *Supervisor, Holborn Exchange.*

UPON cursory examination it would appear that the disadvantages of relief duties outweigh the advantages; but upon closer investigation this fallacy is removed.

Let us for a moment look at the work performed. Relief work, as the term suggests, is the substitution of an officer, during a period of enforced absence, in order that the work of the exchange may receive no interruption. In some cases the period covered is one of minutes only, such as a lunch or tea relief; in others, perhaps hours, necessitated by the rotation of duties; and in rare instances the relief may extend into weeks, as in the case of annual or sick leave.

I consider relief work to be advantageous, and content myself with the fact that it keeps one quite up-to-date in all departments of exchange work. What more could be desired than this general knowledge? It is impossible to become rusty. There are occasions when your general knowledge serves you in good stead if you are called upon to take a class on any special subject or instruction in the sectional supervisor's absence.

You feel yourself to be quite a Nomad and such an existence must be healthy. Nevertheless, you lack the usual accommodations that such travellers have on their journeys. Sometimes I wish I could avail myself of some convenience in which to place all necessary odds and ends; such as pencil, handset, mouthpiece, rubber and purse, &c. Then the travelling conditions would be complete and comfortable. When I further explain, you will not wonder why such accommodation would be appreciated. It would considerably help to clear the bad character relief supervisors generally acquire; for in their travels all unconsciously the habit is developed of picking up pencils, &c., belonging to others whom they relieve.

Before becoming a relief, I was rather shocked on detecting a relief supervisor who frequently ran off with mine and other people's belongings, but I found to my dismay I soon acquired the same habit. I find myself running away with supervisor's possessions. Could anything be more deplorable? When anything is missing they come to me as a possible culprit. One day I was even asked to produce my locker key to ascertain if a lost instrument was in my possession in spite of the fact I had pleaded "not guilty." It wasn't until the key was returned, accompanied by the supervisor's disappointment at being on the wrong scent, that my mind was again made easy, being all too conscious of the many pitfalls into which this unintentional development of character had hitherto led me.

On another occasion I was duly reminded: "Do you know Section B is not a home for stray handsets?" These had apparently been taken there by me, but, of course, not me alone, but also by others similarly afflicted, and who had relieved in this particular section.

One of the most important items to make reliefs a success is to be punctual. It was never easier to incur the displeasure of your colleagues than in this direction. If late attendance be persisted in, you are soon stigmatised with all sorts of appellations, and again your already bad character suffers depreciation. Even if it be necessary to curtail your own meal time it is safer to do so; because however valid or true an excuse may be, it doesn't alleviate the situation. Such is the weakness of human nature when one's appetite is involved and the relief fails to put in an appearance.

A puzzle often presents itself when a relief changes. It is only after enquiries have been made that you learn your correct destination. Should you fail to remind others with whom you've changed to carry on the reliefs which have of necessity been dropped, your blunder may lead you into grave straits. The more complex the change, the more puzzling to arrange the correct relief.

I need hardly say that the carrying out of these relief duties must receive careful attention. If you meditated indifference to responsibility (of course you never do), you would soon have to look to your "laurels" as the sectional supervisor would not fail to make your situation uncomfortable and even untenable. In order to gain the sectional supervisor's confidence, you soon learn to attend to her little idiosyncrasies and methods; and with a general knowledge of who's who in the rank and file under your supervision, you soon feel at home in managing equally as well as those whom you relieve. This experience of the capabilities of the operating staff is attained in quite a short period, and upon this you have confidence in arranging any section according to the traffic conditions. You know which telephonists will be your right hand in emergencies, and those who are not afraid of team-work; of course the contrary condition of dilatory workers is easily discernible.

Sometimes it appears that all the odd jobs have been relegated to you, the relief supervisor. First, pencils require sharpening, tickets are wanted, an instrument or fault has to be reported, a drop of water is desired by a thirsty telephonist, or you may be requested to speak to a troublesome subscriber or P. B. X. telephonist, another complains of a draught, and you go in search of its origin, or a change of leave form may be desired. You begin to wonder if all these numerous items have been especially saved for you. If on some occasions you find yourself up against some telephonists who think because they have a relief supervisor it is time for them to be relieved in their general attention to work, you need not express surprise or be discomforted. Altogether, the relief supervisor is not in for a very "cushie" time. She is never more decided, than on these occasions, that a "rolling stone gathers no moss, but adds polish." If she be very "fed up," she decides there and then to accept the next vacancy, even though it may take her as far as Belfast.

One manifest handicap is answering dockets regarding written complaints as authentic information can be culled only from the telephonists. You are unable to give the personal knowledge that would throw valuable light on difficulties.

Quite a delightful duty, besides affording a rest cure for weary feet, is that of being in the information desk for a short period. It offers pleasant relaxation from watching good and bad operating for that of alleviating the difficulties of subscribers and the staff. The breaking in of raw material in the coaching of learners also produces an interesting diversion.

There are rainy days and sunny days in the life of a relief officer: days when concentration goes, and you wonder why. I quite understand on these occasions that picture of Watt's "Hope," where the figure is blindfolded, and sits upon the globe, though it was once a puzzle to me. Try how you will the missing power will not return, and you put it down to the fact that your reliefs are so short: thus ends the rainy day in dissatisfaction. Luckily, there dawns a brighter day on the morrow. Then your usual powers to help, to stimulate interest, and extract the best from your staff returns; and you know the invisible magnetic force which induces telephonists to love their work has returned. You go nobly on again for the glory of it—to return home at the end of the day with the delightful satisfaction of "Something attempted, something done." Whatever caused the change in the situation? What was the means of the return of power? On analysis you know it was your will that came to your aid, and you recognised that on the sunny morning you commenced with the determination to love the work, and that all disturbing influences should be swallowed as medicine, and you'd keep smiling. Then it is you decide reliefs are not so bad after all. You wouldn't be anything else but a relief! Oh, the joy of it!

Consider the advantages there are to be gained over sectional supervising when knowledge necessarily becomes one-sided. You have a far greater field of experience and variety, and I thoroughly recommend it to all, especially those who are "fed up."

To obtain success in any enterprise it is generally accepted that a personal standard will secure the desired results, and this holds good in relief supervising. Your standard leaves indelibly its effects on the staff under your temporary control. The kind of influence maintained in a section is quickly discerned by the relief by its atmosphere and tone. While it is a delight to be in some sections it is equally distasteful to supervise in others.

* Prize paper read before the London Telephonists' Society.

CIVIL SERVICE SPORTS COUNCIL.

BY "THE UMPIRE."

WHEN the Civil Service Sports Council conceived the idea to hold a cricket match in Manchester, I imagine their main purpose was to encourage the pursuit of amateur sport amongst the large mass of Civil Servants in the Provinces, and particularly in the north western district, and to give an impetus to the new movement which is growing in strength in Manchester and district. The meeting, however, is likely to become historical, and will probably be pointed to as the initial visible effort in the development of the larger scheme for embracing the whole of the kingdom.

The match took place, by the generosity of the Lancashire County Cricket Club, on their famous ground at Old Trafford, two teams representative of London and the Rest of Britain being in opposition. C. S. Hurst (Kent) captained the London Eleven, and J. Tasker, the Yorkshire County Cricketer was in charge of the Rest of Britain team.

A fine sporting contest resulted in a draw. The Rest of Britain batted first, and were dismissed for 197. A. E. S. Rippon (Somerset) and J. C. Courtice opened the innings, and Courtice batted very stubbornly for 62. H. Horrocks imparted liveliness into the proceedings by a dashing 17. The London bowling was not impressive at times, and the later batsmen did not take advantage of many balls that merited punishment rather than respect. Shorland, a right hand slow bowler had by far the best analysis. He bowled a high deceptive ball and kept the batsmen constantly on the *qui vive*. Siddall was very reliable behind the wickets, and cleverly dismissed Rippon and Hargreaves.

London entered upon their task with confidence, but C. S. Hurst was dismissed by a clever catch by Chapman, when batting confidently. R. N. R. Blaker, after a quiet opening, commenced to on-drive and cut both bowlers to the boundary and his aggressiveness soon changed the aspect of the game. There was a time when it appeared likely that London would get the required runs, but in forcing the game Blaker was caught out, and three more wickets quickly fell without addition to the score. The character of the game had thus completely changed, and when Keen whipped in there was only 4 minutes to play. The onlookers were aroused to a high pitch of enthusiasm, and when Keen was missed in the slips in the last over, all hope for a victory for the " Rest " vanished, and the game ended in a draw.

The bowling of the Rest of Britain, for whom Chapman and Brooks were outstanding, was superior to that of the London team, and on the whole, this slight superiority tended to provide a good contest, as the London team's batting strength always impressed one as being of a higher standard than the opposition. Luncheon was presided over by Sir R. Russell Scott, K.C.B., C.S.I. Reference should be made to the work of the Area Association's Secretary, Mr. T. J. Henderson, who was responsible for the very adequate arrangements. After the match the cricket balls were presented to the Captains.

The scores were :—

Rest of Britain.		*London.*	
A. E. S. Rippon, st. Siddall, b. Shorland	28	A. Perry, b. Chapman ...	0
J. C. Courtice, c. Robinson, b. Shorland	62	C. S. Hurst, c. and b. Chapman	21
T. Hargreaves, st Siddall, b. Edwards	17	F. W. Musson, c. Tennick, b. Brooks	22
H. Horrocks, b. Shorland ...	17	F. Siddall, c. and b. Chapman...	12
A. H. Smart, c. Siddall, b. Keens	10	R. N. R. Blaker, c. Horrocks, b. Smart	67
J. Parker, c. Robinson, b. Shorland	16	C. J. Robinson, c. Horrocks, b Brooks	17
R. R. Brooks, c. Blaker, b. Shorland	7	G. W. Ball, b. Tennick ...	0
J. Tasker, lbw., b. Everett ...	3	W. Edwards, b. Chapman ...	11
A. G. Chapman, lbw., b. Shorland	16	A. P. Shorland, not out ...	2
L. Tennick, c. Edwards, b. Shorland	5	H. Everett, c. Smart, b. Chapman	0
J. R. Duckworth, not out ...	3	W. H. Keens, not out... ...	0
Extras ...	13	Extras ...	12
Total ...	197	Total (for 9) ...	164

WEATHER FORECASTS FOR TELEPHONE SUBSCRIBERS.

Arrangements were made by the Post Office, in conjunction with the Meteorological Department of the Air Ministry, for weather forecasts to be distributed in the afternoons as from May 1, each exchange being provided with the forecast appropriate to the area in which it was situated. Returns show that during the month named, 10,172 calls were made. A noticeable feature of the experiment has been the unexpectedly large demand for the forecasts in industrial areas. In London the majority of the calls were made towards the end of the week, the inference being that the special interest of inquirers related to the weather prospects during the week-end.

The forecasts, which cover the period from 6 p.m. on the day of issue until 6 p.m. on the following day, are available between 5 p.m. and midnight each day. Subscribers on rural party lines receive the information free of charge, a local call fee being charged in the case of other subscribers. The forecasts may also be obtained by inquirers at Call Offices on payment of the usual call office fee.

LONDON TELEPHONE SERVICE NOTES.

Temperature and Temper.

THE human species is very perverse. In June we were all shivering with cold and complaining that summer was overdue. We were going to buck up and be our bright, happy selves when the sun deigned to shine. July, and the sun are with us as these notes are being written; but are we so bright as we vowed to be ?—Not a bit of it. With the rising temperature, tempers kept pace with the mercury. If anything the thermometer was better behaved than human beings. It, at least, kept within bounds.

But what has this to do with telephones ? Just this : no matter what circumstance affects the community, it is reflected in the telephone exchanges. It is much too hot to walk about and call on people, so the telephone is used increasingly. There is no bureau to which complaints about the weather may be addressed (the meteorological office disclaiming all responsibility), so the thing nearest to hand, the telephone, is used as the vent.

In these circumstances, with rising temperature, rising traffic, rising tempers, and increasing indisposition, the service is carried on with difficulty, but it *is* carried on as it always is in face of any difficulties which may arise.

Not the least of our troubles is the damage caused by storms, and the thunderstorm on the night of July 9 was particularly severe. The damage to telephone plant put nearly 3,000 subscribers' circuits out of order and many junctions and trunk circuits. The faults were removed within a few days, but while they existed an additional burden was borne by the service in dealing with ineffective calls and enquiries.

* * * *

L.T.S. Dinner.

A movement is on foot to organise an Annual Dinner. Various sections of the staff hold their social functions at different times, but it is felt by many that an annual function, open to all, would meet with wide-spread support from all grades of the staff.

It is early yet to say whether the idea will mature, and, if so, when and where the affair will take place, but if all is well it will probably be at the close of the year.

* * * *

Culled from the Exchanges.

Central.

The Eldorado Swimming Club held its third annual Gala on June 29, at Pitfield Street Baths. A varied and interesting programme was forthcoming, and some excellent racing was seen.

The chief results were :—

67 *Yards Handicap. Open to L.T.S.*

Miss V. W. Willmott (Avenue) 1
Miss M. R. Millbank (Central) 2
Miss Powell (Trunks) 3

There were four heats before the final.

133 *Yards Team Race.* (*L.T.S.*)

VICTORIA.—(Misses Amos, Fern, Dowston and Johnston) 1
TRUNKS.—(Misses Hodden, Sutton, Powell and Harold) 2
HAMMERSMITH.—(Misses Marshall, Andrews, Hawlay and Jones) 3

A sealed handicap held in connexion with this race resulted in Avenue, Victoria and Regent being placed first, second and third respectively.

Plunging—

Miss Fern (Victoria) 46 feet 1
Miss Amos (Victoria) 42 feet 2

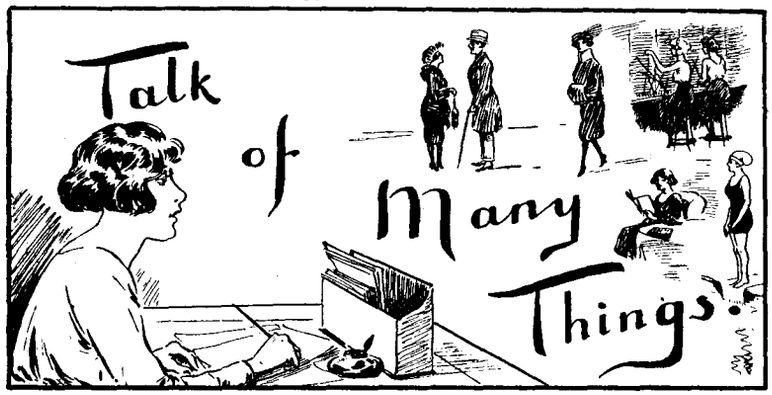
Supervisors' Handicap—

Miss J. Spalding (Regent) 1
Miss S. H. Mason (Avenue) 2
Miss Osler (Central) 3

Club Handicap—

Miss R. E. Cummings 1
Miss M. R. Millbank 2
Miss E. W. Morris 3

WE TELEPHONISTS



Committee Work.

MOST people nowadays either serve on at least one Committee or have something to do with the nomination or election of a representative, and it would be rather interesting to find out what general opinion expects of a Committee Member. If one judged from experience, "Nothing" seems the most likely answer! A mere man was heard to remark recently: "Women are a perfect nuisance on Committees. They either talk interminably and get nothing done, or they never turn up, and you can't rely on them for a thing!" While ready to defend my sex from such a sweeping indictment, on looking back over my own experience of Committees, I had to admit that, with few exceptions, he wasn't far wrong. Now why should this be? When women of all ages have taken such an active part in public life in recent years, it is surprising to find how very few appreciate their responsibilities when they are chosen to represent other people. Once a girl has been elected to the Committee of any society, association, or club by her colleagues, the latter very rarely make any enquiry as to how she is carrying on her duties; but surely it is up to her to see that she *does* represent them by turning up at as many meetings as possible, taking part in discussions, and then keeping her members advised of decisions and plans. But, unfortunately, very few do this. It is exceptional for more than half the possible number to turn up at a committee meeting, and girls are chosen year after year to represent an exchange and never come to even one committee meeting in a season. In consequence, those they represent never hear what is going on, and worried secretaries are greeted with "We didn't know the Society was going to do so and so or we should have come"! And then when things fall flat it is the secretary or chairman or anybody who is blamed rather than the representative who either failed to come to the meeting or, if she came, forgot to tell her people about it. This thoughtless apathy is very discouraging to the few who try to keep things going. Many of the girls who read these notes in our column will be elected to committees of various kinds for the autumn and winter seasons, and I would like to suggest that they make up their minds to do their best really to represent those who have chosen them and to make it clear that the women of the telephone service at least do take committee work seriously.

W. M. E.

The following was received in the middle of the heat wave. No other comment seems necessary.

Sex Equality.

We hear in these enlightened days
Of many new and better ways.
One thing some people doth perplex,
'Tis the "Equality of Sex."
Mere men think we women should our places keep,
But "the hand that rocks the cradle rules the deep."

Our Politicians often take
Two centuries one law to make;
Superior they'd have us know!
To us their grand ideas they show.
But mother guides the pram where the hills are steep,
For "the hand that rocks the cradle rules the deep."

The Universities are great,
But men will not with women mate.
Intelligence is but for men!
Women and brains! forsooth! but then
Men were taught by women how to walk and leap,
So "the hand that rocks the cradle rules the deep."

They dangled on their mother's knees,
These men who flaunt their wise decrees.
Sisters! this point I'd have you see,
Who taught these men their A. B. C.?
When they were babies they were hushed to sleep;
Ah! the hand that rocks the cradle rules the deep."

G. M. TURNER, Hop Exchange.

To-Day's Great Thoughts.

"*Know Thyself.*"—(Attributed to Solon of Athens, B.C. 638.)

"*Verily and indeed it hath been said 'Thou shalt not know thyself until thy half-yearly report is given unto thee.*"!—(Attributed to ? , A.D. 1923.)

A Pantoum.

Oh, Summer, full Summer, has come—
(The papers have told us quite plainly)—
No need then to sigh or look glum
And hope for the *next* day—quite vainly!

The papers have told us quite plainly—
And now it is here, we complain;
And hope for the next day—though vainly,
And dream of the cool of the rain.

And now it is here, we complain:
(In the switchroom it's "90" to-day!)
And dream of the cool of the rain,
With visions of skies that are grey.

In the switchroom it's "90" to-day—
Subs.' tempers are equally torrid;
With visions of skies that are grey;
They all seem quite needlessly horrid.

Subs.' tempers are equally torrid:
They vent their ill-feeling on us;
They all seem quite needlessly horrid—
Determined on making a fuss.

They vent their ill-feeling on us—
Poor us! we are blamed for it all;
Determined on making a fuss,
Whate'er the result of their call.

Poor us! We are blamed for it all
If some pet scheme of theirs goes awry;
Whate'er the result of their call—
If their funds—like the States—become dry!

If some pet scheme of theirs goes awry
The "telephone girl" gets the blame;
If their funds—like the States—become dry,
It is laid to our door, just the same.

The telephone girl gets the blame
For the weather—when summer was not;
It is laid to our door, just the same
That it's now so unbearably hot.

For the weather when summer was not
I sigh as each calling lamp glows;
That it's now so unbearably hot,
Puts the finishing touch to my woes.

I sigh as each calling lamp glows;
Each flash, as a sub. vents his spleen,
Puts the finishing touch to my woes,
And I long for the days that have been.

Each flash, as a sub. vents his spleen
Makes me think of the thunder that's near;
And I long for the days that have been
Before I knew summer was here!

ANNE ONYMOUS.

London Telephonists' Society.

"All's over, then," by luck forsaken, To Windsor we have *not* been taken. Our seemly though untimely mirth, Dried at its source, is dashed to earth. Our shipwrecked hopes, at this sad pass, Shrivel and perish as the grass. Mixed metaphor? It may be so! The fact is clear, we did *not* go. Our dreams are to Nepenthe tossed; *And oh, the copy we have lost!* Thus we remain, in deep distress, Your disillusioned Editress.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

THE WORK OF A LARGE TELEPHONE EXCHANGE.*

BY W. E. YARROLL, *Assistant Traffic Superintendent, Telephones, Edinburgh.*

IN a few words of introduction, Mr. Yarroll said the paper was written mainly to describe, as simply as possible, to those members of the telegraph side of the Society who had not seen a large exchange, what telephone exchange work was, and how it was performed.

With the aid of large diagrams Mr. Yarroll then described in detail the various parts of the switchboard, the "A" positions, "B" positions (order wire and jack-ended), trunk signalling positions, and the method of operating in each case and showed how it is possible for a telephonist to complete a call to Glasgow or Perth as quickly as it is to complete a call locally.

He then referred to "team work," "call values," "fault reporting procedure," monitors, exchange clerks, and ticket accounting telephonists' duties, and continuing said :—

"These then, briefly, and I am afraid inadequately, described are the principal duties of the telephonists in a large exchange. It cannot be gainsaid that the operating work is of a routine character, and one might be excused for assuming that, when an operator is familiar with the many details which must be memorised, and, through frequent repetition she has become more or less expert in making connexions, her work would be almost mechanical. But two people (in addition to the operators) are involved in every call, and although it is possible to predict what the telephonist, or telephonists will do, and how the apparatus will respond, one cannot foretell with any degree of certainty what the subscribers will do or say. In some cases they are very difficult to please. While one will complain that the operators are too slow, another will, with equal emphasis, assert that they are too quick. This may appear to be paradoxical. The explanation, however, is that sometimes the telephonists repeat numbers very quickly, at the same time completing the connexion, and before the subscriber has framed his remark to correct a mistake in the repetition of the number, he is "through" to the wrong subscriber. It is but fair to state, however, that, almost without exception, dissatisfied subscribers who visit the exchange rarely give any trouble afterwards. After their erroneous ideas of exchange work are dissipated, they generally take an interest in the human part of the telephone machine, and help rather than hinder its smooth working. It is a curious fact that the chronic grumbler and critic will seldom accept an invitation to visit the exchange."

Mr. Yarroll then referred to the temperament of a telephonist having an important bearing upon her efficiency and health, and to the application of motion and fatigue studies to improve the health and general well-being of employees in various industries. After describing many interesting features in connexion with operating and supervising in American telephone companies, he concluded :—

"Recently, in an interesting lecture on 'Modern Telegraphy,' Major Jayne referred to the development of machine telegraphy which has made such wonderful advances within a comparatively short period. This progress has a parallel in telephony. Slowly but surely preparations are being made to replace manual switchboards by automatic apparatus. The war arrested this phase of telephone work, but there is little doubt that in the future exchanges will be of the automatic type, and a few operators only will be employed to deal with trunk calls, inquiries, &c. Meanwhile, there are sufficient problems awaiting solution to give everyone food for thought, and in the consideration of these problems breadth of view is essential. It is so easy to regard exchange work from one point of view to the exclusion, or partial exclusion, of others. If I may be allowed to exaggerate a little, I will express this tendency in this way :—An ideal telephone exchange is, to the subscribers, one which provides a speedy and accurate service at a small cost ; to the operators, one which offers good duties, high pay, few restrictions, and not too much work ; and to the Department, one which, while satisfying the needs of subscribers, works smoothly, and at the same time produces sufficient income to cover expenses. I think you will agree that no important telephone problem can be justly solved without keeping these three ideals in view.

Let us hope that as time goes on we shall progress steadily towards the ideal telephone exchange where all these aims will find full satisfaction, where complaining subscribers will be unknown, and where those who, working together, form the telephone machine, will be completely happy."

Major Jayne, in throwing open the meeting for discussion, took the opportunity of welcoming Mr. Abbott, Traffic Superintendent, to the meetings of the Edinburgh Telegraph and Telephone Society.

In response to the Chairman's invitation, Mr. Abbott, opened the discussion. After thanking Major Jayne for welcoming him to the meetings of the Society, Mr. Abbott said he wished to compliment Mr. Yarroll on his very-clearly expressed paper, put popularly and without too much technical detail. The psychological aspect of the subject, Mr. Abbott remarked, was of very great interest, and one, although not yet receiving much attention in this country, had assumed important dimensions in America. Mr. Yarroll had referred to the effect on the subscriber of being told, for instance, that his number was engaged before the telephonist—as it appeared to him—had had time to test the number, on being given the number before he had had time to correct a mistake; and Mr. Abbott, while agreeing that there was risk of error owing to indistinct speaking on the part of the subscriber, emphasised the fact that it was possible for the telephonist to find and test the number while she was repeating it. Mr Yarroll had stated that, under ideal conditions, it would be possible for twenty minutes of a telephonist's hour to be spent in waiting, but Mr. Abbott pointed out that this time was technically described as "indirectly occupied time," *i.e.*, time spent in operations indirectly connected with operating, but which did not figure in the valuation of the call.

Mr. Davis expressed appreciation of the lucidity of the paper, and the success with which Mr. Yarroll had avoided technical details, not of so great interest to those not working in an exchange. There were, however, many problems which had not come under review in the lecture. There was the great problem of organisation under a variety of headings. There was, for instance, the study of the conditions under which subscribers' lines are distributed around the switchboard in order to ensure that no particular operator has too heavy a load, and which entails a careful examination of all the calls made. Mr. Davis emphasised the importance of the Traffic Section in ensuring smooth working and careful management of a large telephone exchange, both in the interests of the staff and in those of the Department.

The proceedings terminated with a hearty vote of thanks to the lecturer and the Chairman.

* Paper read before the Edinburgh Telegraph and Telephone Society.

EARLY SUBMARINE TELEGRAPHY.

BY SIR CHARLES BRIGHT,
F.R.S.E., M.INST.C.E., F.R.A.E.S., M.I.E.E., F.S.S.*

(*Continued from page* 188.)

Mishaps soon occurred ; for it was only 4 miles that had been paid out when the cable broke. Another start was made ; but, after 226 miles had been laid, it again broke—this time, however, at a depth of 2 miles. So ended the first attempt to connect America with Europe electrically. Morse, who was on board in an honorary capacity, recorded the circumstances as follows :—"The cable parted just before daybreak. The machinery having stopped, all hands rushed on deck and gathered in mournful groups ; their tones were sad, their voices low, as if a death had occurred on board."

The next year (1853) more cable was made, and a second expedition started. The two vessels were this time to meet in mid-ocean and make a joint, and then sail in opposite directions, laying the cable towards their respective shores. This they did, but the joint broke. They made a second, and again it broke. They made a third, and then one ship sailed towards Ireland and the other towards America.

On her way, H.M.S. *Agamemnon* encountered a whale, and though the ponderous monster made commendable attempts to carry off the cable, these attempts were attended with no evil result. The *Niagara*, however, had not gone far before another break occurred which ended in the loss of 500 miles of cable. Sufficient yet remained on board for a third trial.

Meanwhile, however, both ships had run out of stores ; and it was therefore necessary to put into Queenstown. On the way, a terrific storm was encountered, and the *Agamemnon* nearly "turned turtle," while the cable and the coals got terribly mixed up. The whole proceedings were graphically described by *The Times* correspondent who accompanied the expedition.

Matters were in the end righted ; and after stores had been procured, the telegraph fleet once more met in mid-ocean to make the splice, and again set forth on the respective work. The first expedition created considerable excitement but when it came to the second and third—everyone—except the shareholders—merely pitied those that were continuing such a futile errand. The pity was, however, now beginning to be misplaced ; for this time the entire line was laid successfully.

Though having comparatively little to do with the actual work, our American cousins were more demonstrative on the subject, and wild excitement prevailed on the landing of the end at Newfoundland station. But even *The Times* remarked : "Since the discovery of Columbus nothing has been done in any degree comparable to the vast enlargement which has thus been given to the sphere of human activity."

* Reprinted from the *Journal of the Institution of Electrical Engineers.*

It was on Aug. 5, 1858, that England spoke for the first time electrically with America.

The cable never worked very satisfactorily from the outset, for the message from the United States President to Queen Victoria occupied over 30 hours in transmission, though only containing 150 words. Moreover, the utmost speed achieved was some 6 words a minute.

Though doing useful work for over 2 months and carrying 732 messages, the line was gasping under its efforts throughout, and gradually reached the sinking age. It was suffering—and ultimately succumbed—from the effects of mistaken electrical views, in which even the great Faraday shared. The line was, indeed, an electrical failure, though a complete engineering success. It had been proved that such a length of cable could be laid in really deep water; and, though various mishaps had occurred before final engineering success was achieved, these were only due to unavoidable accident on the one hand, and lack of perfection in manufacture on the other, such as could be improved on by the experience gained. As engineer-in-chief, my father was knighted when but twenty-six years old.

From the next cable, however, that laid by the Government in the Red Sea in 1859—nothing useful was learned. The sections failed one after the other, and it is doubtful whether a message was ever sent through the whole of the cable; but it is certain that the British public continued to pay, until the year 1908, £36,000 per annum for the privilege of having put some copper wire, gutta-percha, and iron sheathing at the bottom of the Red Sea.

There were several other cables laid soon after—from Malta to Alexandria, to India and elsewhere—and these proved a complete success; indeed, the line to India via the Persian Gulf is usually regarded as the pioneer in the matter of full and satisfactory arrangements for testing previous to, and during, laying.

It was not until 1865 that the question of re-spanning the Atlantic took active shape. My father with his partner the late Latimer Clark—a past president of this Institution—had, in the interval, persuaded the financiers that a larger and more costly insulated conductor was essential. Moreover, the electricians were also better advised in regard to the generating power and apparatus for signalling purposes. Indeed, Prof. William Thomson (afterwards Lord Kelvin)—three times President of the Institution, *i.e.*, in 1874, in 1889 and again in 1907—and not only introduced his mirror-speaking instrument, but became the electrician in place of Dr. Wildman Whitehouse. The Thomson mirror apparatus proved the turning point, commercially speaking, in ocean telegraphy—both as regards signalling and testing—though since superseeded by the Thomson "recorder" for the former purpose.

Then, again, at this stage in the history of submarine telegraphy, the improvements in manufacture, due to experience, were altogether encouraging, and the late Willoughby Smith, Past President of this Institution, as well as Cromwell Fleetwood Varley had done much toward developing the electrical side of submarine telegraphy.

The larger-sized core meant a larger-sized cable, and this could not have been got into any other vessel than the *Great Eastern*, which, as it chanced, happened to be available. The paying out and picking up machinery—fitted with Appold brakes—was of a high order, being largely due to the mechanical skill of the late Henry Clifford.

In the 1865 cable several faults occurred, and once, while attempting to haul it back to repair a fault, the cable snapped, after 1,186 miles had been laid. For 9 days they made strenuous efforts to pick it up; but though they grappled it many times, the rope broke, and thus the 1865 cable had to be abandoned. A new cable like that of 1865 was then made by the Telegraph Construction Company.

The new cable, after a few further misfortunes, was eventually laid. From an engineering standpoint, however, this was really work that had already been effected eight years previously, with about the same number of misfortunes, though with no applicable experience to go upon. The work to come—that of recovering the 1865 cable—was, indeed, the matter of the moment.

For thirteen days they alternately hooked and lost the cable. Once they brought it to the surface, but it slipped away from them like a great eel. On lowering the grapnel, however, for the thirteenth time they succeeded—thanks mainly to Mr., afterwards Sir Samuel, Canning, the chief engineer to the contractors; and, thus, two good cables were laid between England and America.

Numerous other cables to the East and Far East, as well as across the Atlantic, followed; and these, thanks to the commercial foresight and enterprise of men like the late Sir John Pender, originally a great Manchester cotton spinner, have all proved highly profitable.

The idea of a trans-Pacific cable, running into 4-mile depths, used to be derided just as the Atlantic cable was. Ultimately, however, two lines were laid across the Pacific and have proved entirely successful.

By far the larger proportion of the cables at the sea bottom have been made and laid by British hands, though the present state of things in this respect seems unlikely to prevail for long.

We cherish the memory of many great names associated with submarine telegraphy, but the greatest of all may be seen perpetuated on the walls of our Lecture Hall—William Thomson, Baron Kelvin, of Largs—who, perhaps, on account of his real greatness, was also throughout life so generous regarding the work of others and so simple-minded and good in every respect.

The pioneering of submarine telegraphy was very thoroughly thrashed out in connexion with the proposed "International Memorial to the Inception and Extension of Submarine Telegraphy" in the year 1896. It was then ultimately agreed that Submarine Telegraphy only became a matter of commercial development and profit by the efforts of engineers and electricians.

In addition to the various meetings of the executive committee, the subject was exhaustively discussed in the Press. Attention may be especially called to *The Times* of Oct. 12, 13, and 15, and Nov. 28, as well as to the *Morning Post* of Oct. 14, also of that year, 1896.

Owing to his supreme position, the late Lord Kelvin may, perhaps, be quoted as an authority above all others who worked in this field. He expressed himself very definitely on the subject of where credit was in the main due, not only at the meeting of the Committee just referred to, but also in the course of his I. E. E. Presidential Address of 1889, when he expressed himself thus regarding the pioneering of ocean telegraphy:—

"To Sir Charles Bright's vigor, earnestness and enthusiasm was due the successful laying of the first Atlantic cable. We must always feel deeply indebted to our late colleague as the pioneer of that great work, when other engineers would not look at it, and thought it absolutely impracticable."

Though at that time rather a youthful member of the executive committee in connexion with the aforesaid proposed International Memorial, I had the satisfaction in the end of carrying my amendment unanimously. It was seconded by the late Sir John Wolfe-Barry and warmly supported by Lord Kelvin and Sir John Lamb, afterwards second Secretary of the Post Office.

Some years ago I contributed to the Institution's Library several volumes of newspaper cuttings, all relating to the early days of telegraphy, land and submarine, and in these much information on early cable work may be found.

In this connexion attention may also be called to Haydn's *Dictionary of Dates*, where, under "Electricity," all the main features in the pioneering of submarine telegraphy are set forth in their chronological order.

These additional matters are mentioned only because a doubt seems to creep up occasionally as to where credit was mainly due for the early pioneering of ocean telegraphy.

Having been asked to deal, in this "Discourse," with "Early Submarine Telegraphy," I have naturally confined myself to that subject, and have, therefore, refrained from giving any personal reminiscences of a later period.

WHERE TO STAY.

The attention of our Readers is directed to the following list of Boarding and Apartment Houses.

CORRESPONDENCE.

IMPERIAL SERVICE ORDER.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—I should be glad if one of your readers could give, in outline, the onstitution and history of the above order for the benefit of your readers.

Has not the time arrived when the Order should have its chapel and annual service of institution, say, at St. Botolph's, Aldersgate, London ?—Yours faithfully,

H. P. STEED.

Central Telegraph Office, July 7, 1923.

CONVERSAZIONE OF INSTITUTION OF CIVIL ENGINEERS.

DEMONSTRATION OF TELEPHONE TRAFFIC CONTROL APPARATUS.

A MODEL set of the Western Electric Telephone Traffic Control Apparatus was demonstrated to represent a typical railway equipment and consisted of a Controller's signalling and telephone apparatus at one end of a model railway telephone line and three typical sets of apparatus for use in signal cabins, &c., bridged at intervals across the line, all sets being in simple multiple. It illustrated on a small scale equipments which are in use on many of the large railways in Great Britain, and a number of the principal railway concerns in the British Colonies and the United States of America, &c., for the regulation by telephone of railway traffic in its many phases such as marshalling goods traffic, arranging reliefs for enginemen and guards, obtaining stock reports, &c., &c. In addition to its uses on railways, the apparatus has been successfully employed in the regulation of tramway traffic, mines, and in other connexions where interworking is required between a number of stations, and where for economic reasons only one pair of line wires is practical.

The principle of the apparatus is well known, whereby a set of apparatus under the control of a controller and situated in a convenient position with respect to the railway or tramway, &c., sends out to the telephone line a series of coded reverse current impulses, which, by a special step-by-step method, step round all the receiving selectors, one in each of the way stations in bridge across the common telephone line. By a process of elimination depending on the particular code setting of the way station to be called and that of its associated key which is operated by the controller, only one station is rung and no other station is called or interfered with in any way. By this means as many as 78 stations in bridge across a common line can be rung selectively.

The operation of calling a desired station is extremely simple, and all that is necessary is to give a quarter turn to a selector key bearing the name of the station to be called and this operation causes the bell at the station required to automatically ring. A particular feature of the system is that the operation of a selector bell in any way-station produces a tone on the line from which the controller can be certain that the particular station has been rung. The operator at the called station answers in the usual way, but owing to the heavily-loaded nature of the telephone line compared with most other telephone lines with one instrument per line, a special telephone circuit has been devised which makes it possible under the most heavily-loaded conditions of some 78 telephone stations on a long line, for all telephone sets to be simultaneously receiving a message from the controller.

A new loud speaker recently developed for use on traffic control lines was also demonstrated, its object being primarily to obviate the necessity of the controller having to wear a head receiver for hours at a time as is usual practice on large railways or tramways. The loud speaker operates in conjunction with a special valve amplifier the operation of which adds very little to the duties of the controller, and it was only necessary to operate a switch to bring in the loud speaker or to change over to the operator's normal head set. The controller can then, by listening to the loud speaker, hear the conversation of the operator at a distant way-station.

PERSONALIA.

COVENTRY.

Mr. C. S. Weston, of the Coventry District Manager's Office, was presented by the staff with a very handsome gold half hunter watch and chain on his transfer as Chief Clerk to the Southampton District Office. The presentation was made on Saturday, July 7, by Mr. J. Mewburn, District Manager, who voiced the feeling of the whole staff at losing Mr. Weston. The latter suitably responded, thanking the staff for the support they had given him since his arrival in October, 1912.

GLOUCESTER.

The second annual excursion of the Gloucester District Office staff took place on Saturday, June 23, when a party of 37 members and their friends had a most delightful tour through the Wye Valley.

Starting from the office at 1.30 p.m., the route was through Newnham-on-Severn, Lydney and Chepstow. A halt was made at Wind Cliff and a large number of the party ascended the 300 feet hill to observe one of the finest panoramic views in the country. The journey was then continued to Tintern Abbey. Tea was provided at the Royal George Hotel, Tintern. At 8 p.m. a return was made *via* Monmouth and Ross, a stop being made at each place for sight seeing. The weather was beneficently propitious, and it was agreed by all present that this was the most completely successful and enjoyable summer gathering ever held by the staff.

CENTRAL TELEGRAPH OFFICE.

INLAND GALLERY (MEN).

Mr. H. R. REED, Mr. D. E. CARTWRIGHT, Mr. H. A. BETTERIDGE — Assistant Superintendents, promoted to be Superintendents, Lower Grade.

Mr. F. GRAFTON, Assistant Superintendent, I.D., promoted to be Assistant Superintendent.

Mr. E. F. POOLE, Mr. A. H. BELL, Mr. W. C. PEAPELL, Mr G. E. DAY, Mr. H. E. CULLUM, Mr. G. E. TAYLOR, Mr. A. F. SIMMONS — Overseers, promoted to be Assistant Superintendents.

Mr. J. W. ATTWOOLL, Mr. E. T. EATHERLEY, Mr. F. C. WHITAKER, Mr. W. R. G. JAMES, Mr. L. M. UMPELBY, Mr. W. R. FRANCIS, Mr. D. H. SPALDING, Mr. F. W. HALSEY, Mr. H. J. PULKER, Mr. A. HARDMAN, Mr. A. BLACKMAN, Mr. F. HACKETT, Mr. T. W. PALLETT, Mr. E. H. HOUGH — Telegraphists, promoted to be Overseers.

INLAND GALLERY (WOMEN).

Miss A. E. GOWER, Assistant Supervisor, promoted to Supervisor.

Miss A. C. WHITTERIDGE, Miss F. L. WOOLFORD, Miss O. M. GORDON, Miss N. GUNN — Telegraphists, promoted to Assistant Supervisors.

CABLE ROOM.

Mr. J. R. F. CROFT, Telegraphist, promoted to Overseer.

LONDON TRAFFIC STAFF TELEPHONISTS.

Resignations on account of marriage :—

Miss E. W. E. WILLIAMS, Assistant Supervisor, Class II, of the Victoria Exchange.

Miss A. E. SPENCER, Assistant Supervisor, Class II, of the London Wall Exchange.

Miss M. F. MCLAUCHLAN, Telephonist, of the Victoria Exchange.
Miss D. E. SPENCE, Telephonist, of the Victoria Exchange.
Miss A. D. EMERY, Telephonist, of the Victoria Exchange.
Miss J. L. R. CARDY, Telephonist, of the Victoria Exchange.
Miss M. E. JONES, Telephonist, of the Victoria Exchange.
Miss E. M. JONES, Telephonist, of the London Wall Exchange.
Miss D. L. HOOK, Telephonist, of the City Exchange.
Miss B. M. N. SUTTON, Telephonist, of the City Exchange.
Miss W. M. AVERY, Telephonist, of the Sydenham Exchange.
Miss E. E. GODDARD, Telephonist, of the Trunk Exchange.
Miss N. C. LILEY, Telephonist, of the Trunk Exchange.
Miss M. E. BARTLETT, Telephonist, of the Trunk Exchange.
Miss E. A. CLARK, Telephonist, of the Trunk Exchange.
Miss O. A. JEWKES, Telephonist, of the Trunk Exchange.
Miss J. H. GROOM, Telephonist, of the Chancery Exchange.
Miss M. A. CASE, Telephonist, of the Chancery Exchange.
Miss F. B. MASON, Telephonist, of the Gerrard Exchange.
Miss H. F. C. BROWN, Telephonist, of the Gerrard Exchange.
Miss O. E. WISE, Telephonist, of the Holborn Exchange.
Miss A. MALTBY, Telephonist, of the Holborn Exchange.
Miss M. A. LEE, Telephonist, of the Holborn Exchange.
Miss V. E. FOXTON, Telephonist, of the Greenwich Exchange.
Miss F. Z. BURTON, Telephonist, of the Paddington Exchange.
Miss D. BEVAN, Telephonist, of the Museum Exchange.
Miss A. M. HERMITAGE, Telephonist, of the Mayfair Exchange.
Miss L. M. BRYANT, Telephonist, of the Mayfair Exchange.
Miss J. E. EBDON, Telephonist, of the Regent Exchange.
Miss F. G. BIRCH, Telephonist, of the Purley Exchange.

THE

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DEVELOPMENT AND OTHERWISE.

BY EUSTACE HARE.

DEVELOPMENT is a word very much to the front just now, permeating generally the active telephone mind and steadily forcing its meaning into every village and hamlet of this country in a manner undreamt of by those responsible for the advancement of any utility prior to telephone times.

But at this holiday season of the year it would be unseemly to agitate the jaded spirits of the readers of this JOURNAL with a raw and tiresome treatise on a topic which, rightly absorbing in its place, is not one which would appeal to all of us at a period of mental and physical recuperation. It is in a broader sense that this sketch is outlined, touching lightly on a few inventions and innovations which have influenced civilisation and have developed at a greater or less rate of progress.

Sometimes steady, sometimes marking time and sometimes spasmodic, the rate of development is one of the most uncertain and inconsistent features of any new thing. What man will do with it is as problematical as what a child will do with a new toy. There is no knowledge as to how it will "catch on." It may be discarded after the first rush of novelty; the inventor may die and take his secret with him; it may remain crudely incomplete for generations until a genius is born to give it new life and meaning or a clown to stumble accidentally on its hidden virtues.

It is a long way back to the Middle Ages. Incidentally, why a particular period of some five hundred years among millions should be dignified by so marked a title is uncertain. So far as we are concerned the end of the so-called Middle Ages coincided with the beginning of our national progress, active during five hundred following years and fast developing into headlong haste. By whom the term was invented, history, so far as I know, is obscure, and whether it accurately represents the position is one of Time's secrets. The period, however, produced two remarkable developments widely differing in aim and substance, and yet in five hundred subsequent years scarcely improved: Gunpowder and Printing.

There are tokens that at first, gunpowder was not a popular engine of destruction; for, does not Shakespeare tell of a certain conservative gentleman who pestering that more practical warriorr Hotspur, with his bald, disjointed chat declared that "but fo, these vile guns, he would himself have been a soldier"; preferring doubtless to transfix a friend with a lance in the tilt-yard rather than bowl over an enemy with a cannon-ball in the battlefield. But that by the way.

From Hotspur's time to my own, roughly five hundred years, gunpowder was the pre-eminent weapon in warfare. On more than one occasion, as a boy, I was taken to see reviews of troops on Woolwich Common in honour of the Queen's birthday. A salute of twenty-one guns; seven fired from one end of the Common,

seven from the other and seven elsewhere; with a long double line of soldiers manipulating a *feu de joie* in each interval, with admirable precision. Highly spectacular and very stirring; but it often occurred to me that with so much white smoke it should not be a difficult matter to get out of the way. Smokeless powder was then unknown, and I believe I am right in saying that in my earliest years neither dynamite nor cordite had been invented. Since then, but only since then, has terrible chemistry revolutionised the means of life annihilation, as we all very well know. Such is the quick march of civilisation during the passing and current generation, after ages of quiescence.

Much the same may be said for the Printing Press; and it is a little curious to note that two such extremes as gunpowder and printing should have commanded attention round about the same epoch; one to destroy the body, the other to enlighten the mind. It would almost seem as if in those ages there was no intermediate state between violence and monastic calm: peaceful ploughing one day, uncivil war the next. Once the printing press was established, and tedious, but often very beautiful, manuscript work declined, the opinion would appear to have been generally held that the last word in improvement had been said; for progress has been very slow. Entertaining testimony of this is to be found in Balzac's "Lost Illusions" where, with his marvellous aptitude for detail, he describes the rough machinery and laborious process associated with the business of an obstinate old country printer. And Balzac died in 1850. Modern science has vastly improved the machinery, but it is very doubtful if the results are such as to justify congratulations from the aesthetic outlook.

I have books printed a hundred years ago which are far more gratifying to the eyesight than many published to-day; but the art of the oculist and the optician was then in its infancy, which may account for much. Again, wonderful as is the machinery and organisation for the production of our morning newspaper, unless my observation is at fault, printing errors are far more numerous now than they were a few years ago.

The supply of water on scientific principles for domestic use is not precisely a modern luxury so far as the large towns in this country are concerned—the New River was cut during the period 1609-1613—and yet, fifty years ago, the number of houses, even in Greater London, fitted with pipes to carry water to a bath room was surprisingly few. Bath rooms and fixed baths were the monopoly of the well-to-do, of the better educated, those in whom a spirit of cleanliness is inculcated before they are able to reason, and who need no encouragement in the practice of such an elementary duty. For the rest, it was useless to preach of the efficacy and virtue of hot water when the article itself was so rarely seen in its pure state. No wonder the healthful advantages of that fetish, the cold tub, were constantly urged upon us by doctors and Spartan mothers in those days: and how some of us used to hate it—and boast about it.

But how do country districts fare in this twentieth century? There are places to-day less than 30 miles from London where the only water available comes from the well or from a passing cloud. The irony of soap advertisements in rural England must appeal to anyone with a sense of humour; for what is soap without water? It would be an advertisement indeed if some enterprising soap manufacturer undertook to provide a water supply to any village or hamlet in return for a perpetual order for his particular brand of the article. It is odd that while Nature provides us with inexhaustible material, civilisation lacks the enterprise or the means to adapt it to the universal need.

Another prominent utility is artificial light. From 1893 to 1896 my official duties as travelling auditor forced me to live in hotels. It was no uncommon thing even in such recent years to see in quite important establishments a table at the foot of the staircase on which a number of candle sticks were placed, and above them a small jet of gas; and as each guest retired for the night, he lit his candle at the gas jet and carried it to his bedroom. And this was a hundred years after coal gas had first been used (by Mr. Murdoch, of Redruth, Cornwall) for domestic lighting. One would have thought that with the introduction of such an improved method every "dip" in the land would, in a short time, have been scrapped. But no; the medium whereby the ingenious mind of King Alfred urged him to reckon the passing of hours as well as illumine his palaces, still survives, and, next to the Sun, is the one never-failing and safest source of light to-day.

It is not by way of preference that one clings to the gusty, guttering candle, or the malodorous smoky oil-lamp; but up to the present no better or more satisfactory portable light has been invented. Ancient methods may have been crude but they were undeniably substantial and enduring.

We harness the elements but we do not tame them entirely; and in any case it is a costly process. Otherwise, why should not gas have been used in railway carriages from the very first? Years after Dickens introduced "Lamps" in a Railway Sketch, I would watch frequently and admiringly the skilful way with which the glass oil vessels were thrown up by "Lamps" on the platform to his mate on the carriage roof; and the painful endeavour to read the *Echo* (the halfpenny evening journal of the period) by the dull, unsteady light shed from above—sometimes it flickered out—was a trial unknown to the present generation.

It was somewhere about the year 1882 that gas first appeared in suburban railway carriages to be followed later by electric light. There now appears to be some uncertainty as to the merits of electric light *versus* incandescent gas; but our lamps of oil and our composite candles are still with us for emergencies and we are not disposed to let them go.

There were many discomforts connected with railway travelling in the nineteenth century which have happily passed away; but the railways were slow, as it were, to get up steam. This was due, I imagine, mainly to two drawbacks, the ever-present financial question and the complications of the vast machine. Even my unscientific mind can grasp such a difficulty as that of adjusting curves to wheels fixed in a rigid framework—until the bogie system was introduced and solved it. Again, picture the stopping of a railway train of to-day by a hand-brake. It saves steam, of course, for formerly steam had to be turned off midway between two stations, but the waste of human energy in thus bringing the train to a standstill is tremendous.

There has probably never been an invention so dependent upon the development of accessories, or which has been so well served by inventors as the railway; no utility so obstructed by the conservative mind and by vested rights, and certainly no undertaking at once so vast and delicate in its operation that but for the competency and alertness of those responsible for it, the lines of millions would be in daily jeopardy. It is perhaps the consciousness of this that makes the public so much more tolerant of little blemishes in the railway service than they are when the telegraph or telephone service is concerned.

All the same, it was steam that let loose upon us the genii of speed, that killed the sleepy contentment of the old coaching days and created a feverish desire to "get there" at express rate. Since the introduction of steam power there has been no looking back, no pause in the adoption of any newly-invented machinery making for speed of action, speed of communication or speed of acquisition. As each new development has appeared it has been seized upon more eagerly than the last provided it promised to gratify the growing, feverish desire to move quickly to some spot, some condition other than the present. The railway at its slowest is a vast improvement on the horse, and so is the electric telegraph on the mail; but neither is wildly exciting in action; you take your ticket and seat or hand in your message and your part is done. How different from the bicycle, the telephone, the motor-bike and the motor car; for here you work the machinery yourself and become part of a machine, in the age of machinery into which you were born.

I had a nephew five years old at a time when the horse-drawn fire engine was still to be seen in London. I told him a tale of how I had watched the outbreak and development of a fire in a small private house in the Regent's Park district; how, one by one, four engines appeared; how a policeman had gone in and brought out an old woman, and how a fireman had gone among the flames and rescued her little dog. My young relation made two comments:—(*a*) was there a motor-driven engine among them? and (*b*) if so, was it a "Merryweather"?

About this time, also, I had a dog, a fox-terrier; one of the intelligent kind, who always knew Sunday morning, and to whom the word "walk" was the signal for intense excitement. He lived about sixteen years; during the first ten we rarely missed our Sunday walk, but there came a time when even the narrow country lanes, by reason of the ever-increasing motor traffic, became impossible for a dog accustomed from puppyhood to roam from side to side unrestrained; when to his wistful, questioning look, I could only say "no"; and creep out by back ways to take my walk alone. The dog has had his day, and so has the pedestrian; likewise many an owner of horses, who has taken to motoring in self-defence.

Unfortunately it would appear that every modern innovation is more costly than the thing it should supersede; and, consequently, we find that, though the taxi-cab has very nearly swept the hansom and the crawler off the street, the unhappy transport and carrier horse is still with us. It is an every-day sight to see these wretched animals, obviously overloaded, either struggling to get up the incline on the south side of Blackfriars Bridge, or resolutely refusing to attempt it; and, strange to say, the railway companies, the very pioneers of machine traction, seem to be among the last to abandon their horse-drawn vehicles in favour of more modern methods.

It is this question of cost which no doubt has both retarded the development of many new and useful inventions and made impossible the total abolition of less satisfactory devices; the cheap paraffin lamp, for example. But in the long history of the world there has probably never been such a complete revolution of ideas and of the ways of humanity in so short a time as that brought about by the ever-increasing methods and speed of locomotion, and there probably has never been an idol to which so much has been sacrificed in money, time, prudence, good manners and life as motor traction.

One could go on moralising and philosophising indefinitely on the vain efforts of man, to reach, not finality—nobody wants that, for it would not pay—but perfection in any one thing at any one time. Ponder over it as we may, we have to confess that our civilisation is far from complete even with such delights as prize fights, tennis tournaments, cinemas, broadcasting and fox trots; and some of us who remember quieter, more simple and more courteous times may wonder if the summit of civilisation has not been reached and passed.

As I write, my fountain pen—still a very imperfect invention—gives out. Some day, perhaps, a satisfactory substitute will be found for pen, ink and blotting paper. In the meantime, a quill in reserve is very desirable.

H.M. OFFICE OF WORKS SPORTS MEETING.

H.M. Office of Works Social and Athletic Club are holding their Second Annual Sports Meeting on the Club Ground, Coombe Lane, Raynes Park on Saturday afternoon, Sept. 22 next, commencing at 2.15 p.m. Tickets of admission 1*s.* 3*d.* (including tax). Cheap return railway tickets from Waterloo, 1*s.*; Clapham Junction, 7*d.*

Two events open to Civil Servants are on the programme: (*a*) three furlong ladies' relay race (220, 110, 110,220) open to *Telephone Exchanges, Post Offices*, Government Departments, &c. Entrance fee, 2*s.* per team, or 3*s.* for two teams from same department; (*b*) two miles man's relay race (1 mile, ½ mile, ¼ mile, 220, 220 yards), *open to Government Departments affiliated to C.S.S.C.* Entrance fee 2*s.* 6*d.* per team, or 4*s.* for two teams from same department. Mixed events, such as wheelbarrow race, three-legged, egg and spoon, thread-the-needle, blind horse (gentleman) and driver (lady) are open to anyone attending the sports. Entrance fee 6*d.* each event. All entries close on Sept. 8 to Hon. Secretary, Annual Sports, H.M. Office of Works, Room 66*b*, Ground Floor, King Charles Street, S.W.1.

HOW THE TELEPHONE WORKS.

By ARTHUR CROTCH,

M.Inst. P.O. Electrical Engineers, Silver Medallist and Honorsman in Telegraphy and Telephony.

XII.

THE RELAY AUTOMATIC SYSTEM.

Recorder.—The function of the recorder is to receive the impulses sent out by the calling subscriber, and then to "mark" or select the wanted subscriber. These impulses are set up, by disconnexions of the caller's loop in obedience to his dialling. The connexions of the recorder are given in Fig. 49, and we must refer to this diagram a little in advance before we consider the effects of the reception of the impulses shown in Figs. 44, 45 and 46; where they are shown with as little complication as possible so as to indicate the principle of the recorder movements.

In Fig. 44 are shown the five unit counting relays U1 and 6, U2 and 7, &c.: the five impulse relays I 1.6, &c., and the five tens counting relays TN 1.6, &c. Taking these three sets, it will be seen that they are connected with each other both horizontally and vertically, so that U 1.6 is intimately connected with I 1.6 and the latter with TN 1.6. As soon as the battery is put on it energises RG which is to earth *via* contact of IH. (In the operations we shall refer to "back" or normal contacts simply as "contacts," and to those made by the pulling up of armatures as "make contacts"; also, where a relay is shown full black it indicates that the relay is actuated.) The battery is also on all the U relays, finding earth *via* the left hand contacts of the I relays; all the former at once respond and pull up. The first front contact of U 5.0 is connected to the impulse wire IW, which goes to one of the armatures of A. When the calling subscriber lifts his receiver and gets through to the coils of A, the latter pulls up and IW is left disconnected. When the loop is broken by the dialling the armature of A falls back and earths IW. This at once provides earth for the coils of the first (lowest) impulse relay, I 1.6, the other end of the coils being connected to battery. I 1.6 responds and disconnects U 1.6. That is the net or final result, but the series of operations which finishes with this result should be carefully analysed. We will assume that subscriber No. 37 is required. First figure or digit is 3, and we will consider the effect of the reception of these three impulses, as detailed in Fig. 44.

Dialling. 1st Digit.—First, I 1.6 is traversed by the current, which finds earth *via* the make-contacts of all the U relays and the IW. This is shown at *a*—leaving the armatures as yet unmoved. The effect of pulling up the latter is shown at *b*. The current now finds earth *via* the front make-contacts of the U relays, the contacts of all the TN relays and coils of IH, which pulls up. In addition to this, the battery on U 1.6 is now earthed *via* the IW. At *c* is shown the result of the "make." Earth is taken off the IW and this releases U 1.6 which latter then puts IW to the coils of I 2.7 ready for the next impulse.

The energising of IH substitutes the earth on IW for the direct earth formerly in use on RG. The latter, being coppered (a copper "slug" on its core as previously explained) will hang on continuously although its earth is broken by the spaces between the impulses but will release at the end of each shower.

It will be seen that each impulse really consists of a "break" and a "make"—that is, the breaking of the circuit of the loop

by the subscriber and its restoration at the end of the break. Thus we have two movements : at break, an I relay is actuated, at make, a U relay is released. The second and third impulses follow and at the end of the first train the circuit is at rest for a sufficient length of time to allow RG to release. Its armature falls back and puts the battery, *via* TNH contacts, to the coils of TN 3.8, to earth *via* front contacts of I 3.8. This actuates TN 3.8 which then locks *via* its own contact and holding coil, through TNH coils and earth. The function of TNH is now seen—to hold the TN relay until the end of the dialling.

The pulling-up of TN 3.8 breaks the line of contacts to IH : both IH and I 3.8 release in consequence and the release of the latter, in its turn, re-energises U 3.8. The unit counting and impulse relays are thus reset for the second digit. The path to IH broken by the locking of TN 3.8 is re-established *via* TNH make contacts so that all is ready for the second series.

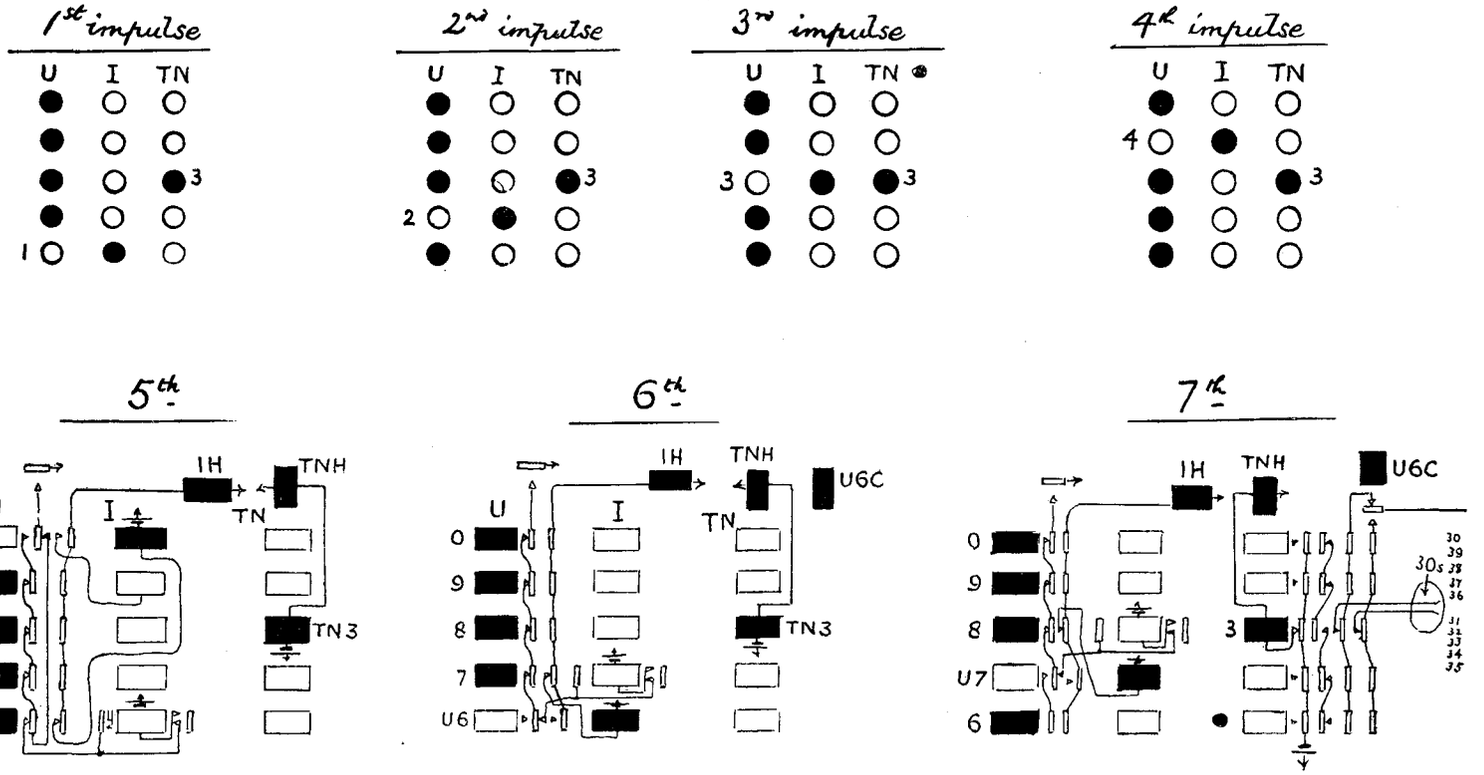

FIG. 45.—SECOND DIGIT (FIGURE 7).

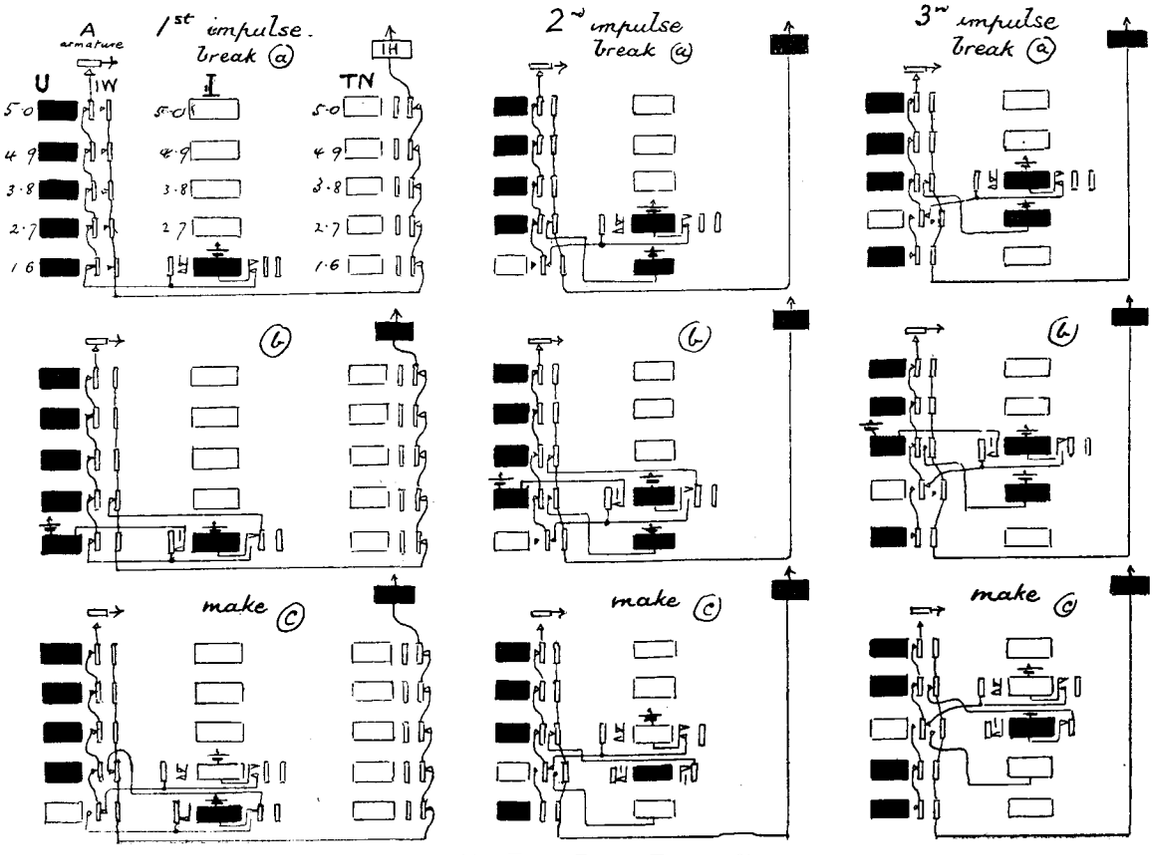

FIG. 44.—FIRST DIGIT (FIGURE 3).

Here we may remark that the progression of the impulses may be easily seen in the three *c* sketches of Fig. 44. Starting with all the U relays actuated and all the I relays at rest, the first impulse (end of) results in the first U being released

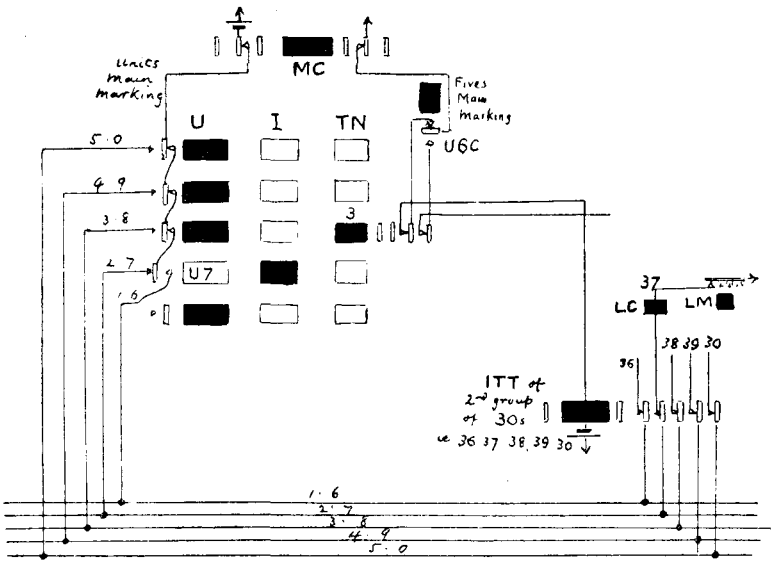

FIG. 46.—MARKING WANTED SUBSCRIBER.

and the first I actuated: the second impulse results in second U being released and second I actuated (the first U being re-energised and first I released): the third impulse results in third U being released and third I actuated, and so on. Further, as the board we are considering is but a 50-line one (numbered from 20 to 69), only five tens figures are required, and the five U relays are sufficient for this purpose. Ten units figures are required for the next group, but we shall see later how this is arranged.

2nd Digit.—With the release of IH, RG is again put to earth *via* IH contacts; RG is again energised, and the apparatus is ready for the next series of impulses. These are shown in Fig. 45. The first, second and third will be the same as in the first operation, and the fourth is easily understood. The final result of each of these is given at the top of the figure. At the end of the fifth impulse I 5.0 is actuated and U 5.0 released. That is, we have used the whole of the series of five relays. If we had *ten*, we should have gone on in the same way as before, but having only five we now proceed to use them *again*. How the 1.6 relays will serve, not as No. 1, but as No. 6, will be seen from the following.

Change-over Relay.—U 5.0 being at rest, the IW is disconnected from its make-contact. A connexion, however, exists between its front contact and the contact lever of U 1.6; I 1.6. is connected to the make-contact of U 1.6 and thence to the IW. By this path, therefore, I 1.6 is switched to IW. Further, the coils of the relay U6C—"units-6-change-over"—are connected *via* the make contacts of TNH to a fourth contact on U 5.0, thence to the outer front make-contact of I 1.6 (earth), so that when the latter is energised this contact will earth U6C, and cause it to pull up. Thus, at the sixth impulse we have restarted the counting relays, and energised U6C. (The effect of the latter is shown at the seventh impulse for convenience.) At the seventh impulse I 2.7 is energised, and U 2.7 released as shown in Fig. 45. The dialling now ceases, so that the position last indicated in Fig. 45 is permanent, until "marking" commences. That is, we have TN 3.8 and U6C energised and U 2.7 released: these are now ready to indicate the required subscriber.

The dialling having been completed the circuit is again at rest. RG slowly releases, its armature returns to the back stop and puts the battery on to the coils of the "marking control" relay MC. This is indicated in Fig. 46.

The "fives marking wire" has been earthed at MC and by the combined operation of TN 3.8 and U6C, this wire has been put through to the ITT relay of the second group of 30s, *i.e.*, 36, 37, 38, 39, 30. The battery on this ITT will thus energise the relay. Further, battery has been applied to the "units main marking" wire at MC, and this wire is put through by the release of U 2.7 to wire 2.7.

By the operation of ITT the five unit marking wires have been put through to the respective five subscribers. The current sent out by MC is received on wire 2.7, which is connected to No. 2 of the group, *i.e.*, subscriber No. 37—the other four wires being unaffected. The wanted subscriber is thus marked, or selected. The LM relay of a disengaged link having operated (we assume this), the LC relay of the wanted subscriber is to earth and is actuated by the current from MC. The subscriber has thus been selected, the ringing current will be applied and his attention called by other members of the apparatus.

Progress of a Call.—Subscriber No. 44 requires No. 37. Fig. 47 gives a skeleton of the connexions of one subscriber to a single link, with its accompanying relays. Our subscriber (No. 44) is the fourth of his group. With this diagram we will commence the operation of a call.

No. 44 lifts his receiver, and the battery on LE has the circuit of the loop, *via* LE coils, F contact, CO contact, loop, CO contact, LE resistance coil, pilot relay and earth: LE is actuated. By means of the battery on ITT contact and LE make contact, current is passed through the coils of OTT which pulls up. The office of this relay is to find a disengaged combination of link and out-trunk. If the out-trunk be free, the negative pole of an earthed battery will be connected to the test wire T: if busy, T will be disconnected. When OTT pulls up, therefore, and a free out-trunk is found, a curren

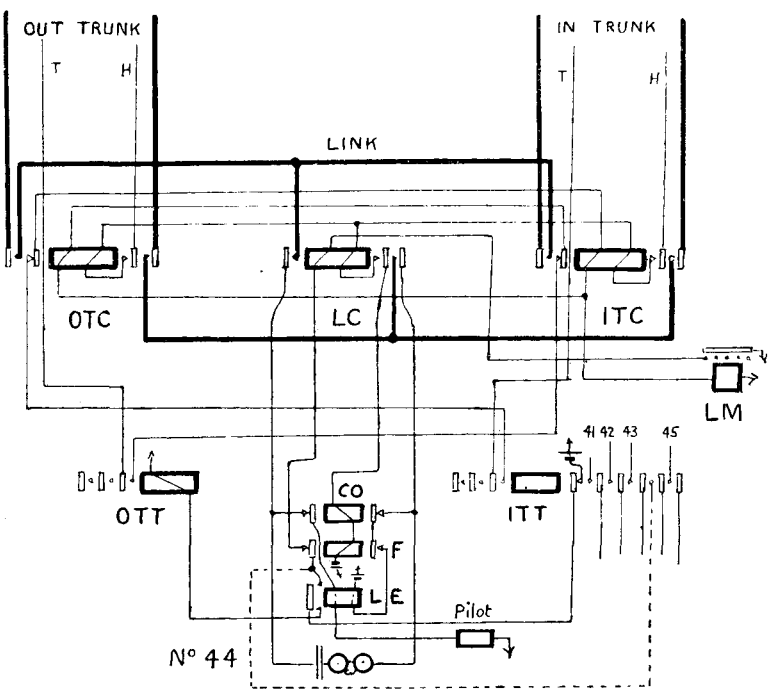

FIG. 47.—CIRCUIT TO CALLING SUBSCRIBER.

will pass from the test wire through the make-contact of OTT, contact of ITC, OTC coil (actuating it), coils of LM (actuating LM) and earth. OTC having pulled up, the out-trunk is connected to the link. Further, the battery on ITT contact energises another circuit *via* LE make-contact, F contact, LC coil (actuating LC) to earth *via* the armature of LM, the latter having been actuated as we have seen. The subscriber is, therefore, now through to an out-trunk.

Fig. 48 gives the complete connexions of the out-trunk, together with the recorder connector. A is the impulse relay, G a guarding,

and BBM the busy back marking relay. The circuit whence the current on the test wire T originates, can now be seen. The battery is connected to the thermostat, thence to G contact, coil of BBM (which it actuates) trunk-engaging switch, T wire, and to earth, as we have seen, *via* OTT make-contacts, ITC contacts, OTC and LM. The operation of A over the caller's loop earths G (slow releasing), G pulls up and breaks the circuit of the test wire by its upper armature, thus disconnecting T and rendering the trunk "busy" and releasing LM. G also earths the lower armature of A. Further, BBM having operated, its make-contacts establish the holding circuit H by means of battery on subscriber's F relay, actuating the latter and CO and holding LC and OTC by their holding coils to earth at BBM make-contacts. The operation of CO cuts off the loop from LE; this and the pilot relay are then released as is also OTT, their work being done.

The next step is concerned with seeking a recorder. We have already dealt with the principle of the latter, but a little additional consideration is now necessary to fit in with the actual scheme of the exchange.

The first is the addition of the "busy" relay BY, which is to secure the engaged recorder from interruption. The second is the omission of the figure 1 as the first digit. This is to ensure that an accidental impulse, such as the knocking up of the receiver hook, &c., shall not be accepted by the recorder as the first figure of the wanted subscriber. Hence, the recorder is arranged so that the first impulse of a genuine series shall be properly received in its place, but a single impulse prior to dialling shall be rejected. A false impulse will, therefore, not result in mutilating the call. This is the function of the "first impulse" relay FI, shown in the recorder connector Fig. 49, which latter also gives the connexions of the recorder. The circuit of BBM is now shifted to its holding coil; the battery on the recorder-preparing relay RP finds a circuit through RP, actuating it, contacts of FI, holding circuit of BBM, make-contacts of latter, G make-contacts, earth. Then follows the earthing of RC by RP make-contacts. This sets up the following circuit:—battery, MC contacts, P coils, BY contact, RC coils, RP make-contacts, earth. By this, both P and RC pull up and the battery is applied by P make-contacts, to all the apparatus of the recorder.

By this application of the battery, all the U counting relays are at once actuated. At this stage the difference between the simple arrangements of Figs. 44 and 45 and the actual arrangements of the recorder are seen. As soon as the U relays pull up, the earth on I 1.6 coil by way of BY contact actuates this relay, and liberates U 1.6. When, therefore, the IW shall be earthed by the first impulse (break), the work usually done by that impulse will already have been accomplished; I 1.6 having functioned and U 1.6 released.

1st impulse: break. It will be noticed that the IW, from the contacts of U relays, MC and RC, is disconnected at the contacts of RP. The earthing, by the release of A, now provides a circuit through the holding coil of RP to the battery on FI. The latter is therefore energised. Following on this the following circuit is arranged: Battery on P's make-contacts, BY coils, (actuating BY), RC1 holding coil, FI holding coil, BBM, earth. The battery on MC extreme right hand contact is now earthed through P, BY make-contacts, P's own make-contacts and earth. The breaking of BY's contacts "busies" the recorder and secures it from interruption. Further, the breaking of the extreme left hand contact of BY takes off the earth from I 1.6 coil, but the latter now finds earth *via* U 2.7 make-contacts, the series of TN contacts, coils of IH to earth. The actuating of the latter puts RG to the IW.

1st impulse: make. This releases RP and puts IW to normal, *i.e.*, *via* the make-contacts of all U relays to coils of I 2.7 ready for the next impulse.

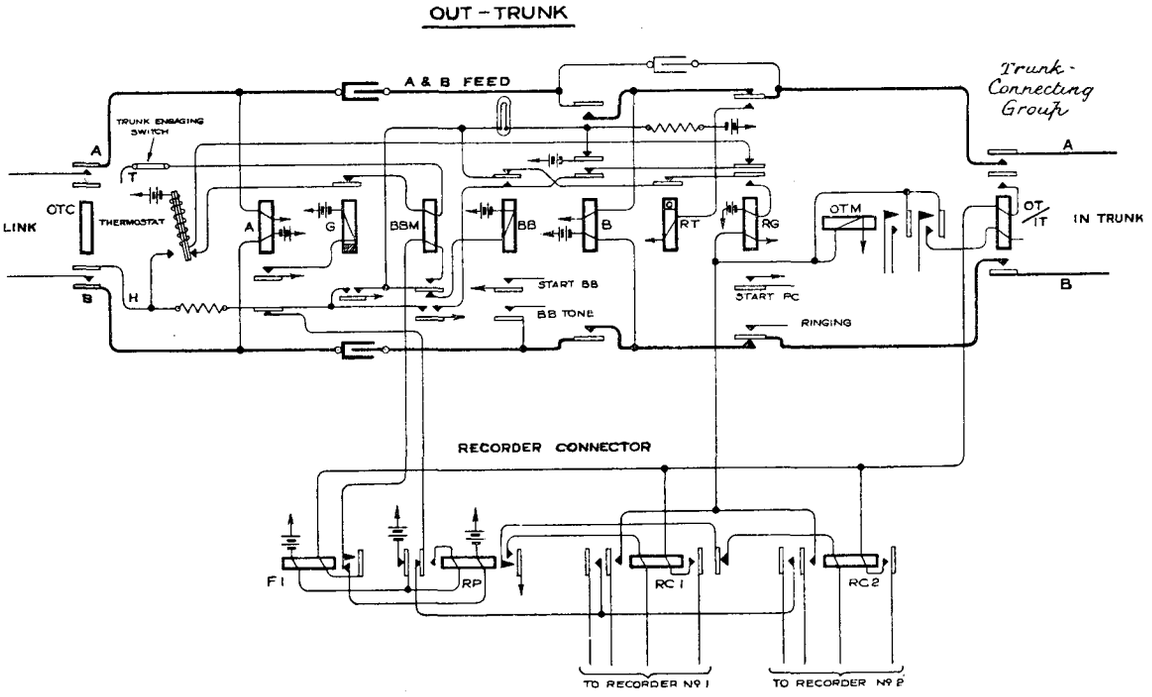

FIG. 48.—OUT-TRUNK CONNECTIONS.

The impulses then follow in the usual way, as already detailed in our description of the recorder. At the end of dialling we find U6C and TN 3.8 locked and U 2.7 de-energised, ready for the operation of MC. The latter then energises and selects the subscriber. We then need an in-trunk and link to complete the connexion. This is the subject of Fig. 50.

Relay MC, in addition to putting the battery on to the 2.7 units-marking wire, and earthing the 36-30 ITT wire, puts the battery *via* TCG main marking wire, make-contacts of RC, to the coils of the ringing relay RG and the coils of OTM—these two relays being in parallel. RG pulls up and locks. We now follow the operation of OTM.

In pulling up, OTM puts battery on to the coils of OT/IT actuating latter, then one coil of the "in-trunk busy" relay ITB—but this is insufficient to pull up ITB—then contact of ITB, make-contact of ITT (which has been pulled up by the action of MC), OTC contact ITC coil (actuating it), coil o f LM, also actuating that. This, of course, assumes that the in-trunk is disengaged. OT/IT connects the out-trunk to the in-trunk, and ITC the in-trunk to the link. The battery applied at MC now finds a path by the units marking wire 2.7, ITT make-contacts, F contacts, LC coil, LM make-contacts, earth. LC is thus actuated and completes the connexion by putting the link through to the wanted subscriber.

Further, as soon as LC pulls up, it establishes the following holding circuit: battery, F and CO coils, actuating both, LC make-contacts and holding coil, ITC holding coil and make-contacts, ITB coils (current is now flowing in both coils of ITB, but differentially), OT/IT make-contacts, FI holding coil, and make-contacts, BBM holding coil and make-contacts, G make-contacts and earth.

If the wanted subscriber were busy, his F relay would be actuated, and the path through its contacts would be broken. The

call could not then mature, and the busy tone would be sent to the calling subscriber.

Assuming the subscriber to be disengaged, it is now necessary to ring him up. Ringing current (generator and battery) is therefore applied to the loop by the outer make-contacts of RG and RT coils

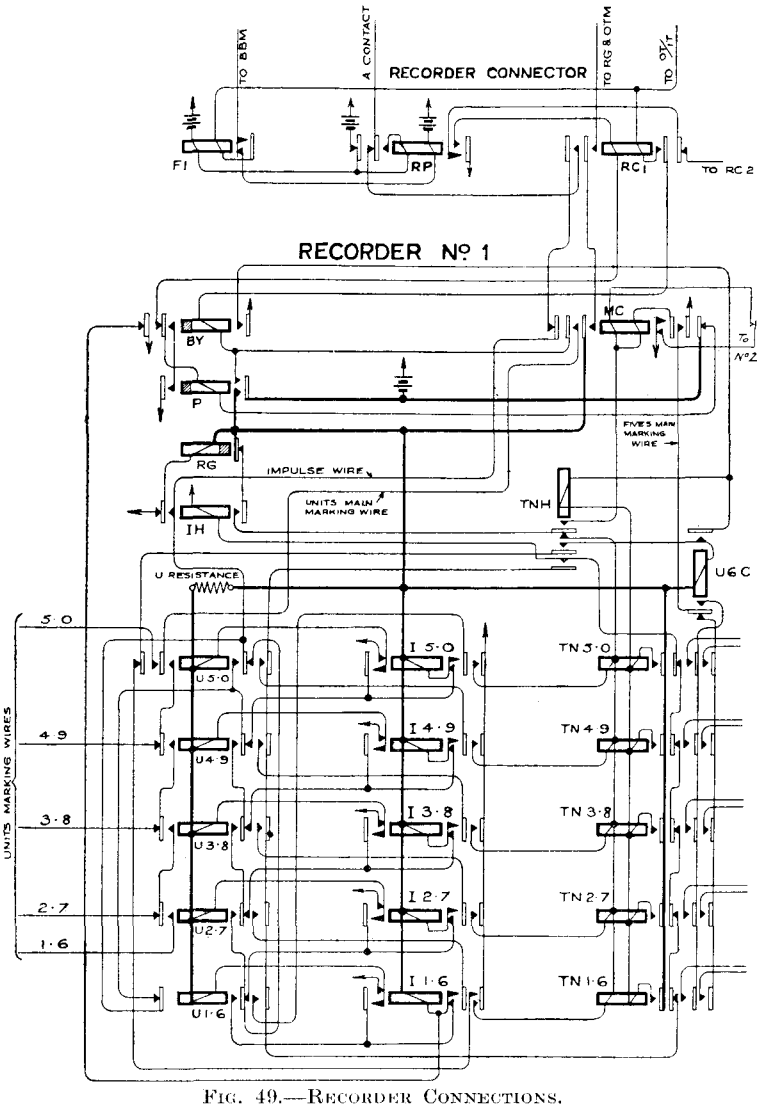

FIG. 49.—RECORDER CONNECTIONS.

(slow *acting*, so as not to pull up with the pulsations of the ringing current through the subscriber's condenser). When subscriber replies he completes the loop, the current is established and RT operates, releasing RG and putting the loop through to the feed relay B. The subscribers are now through.

Just previous to this stage, the recorder is released. P relay it will be remembered, was held by current from MC contact. When MC functions, the battery is disconnected, but P (slow releasing) delays. When it does release it de-energises MC, I 2.7, which was in series with IH (other I's already at rest) all U relays, except 3.8 already at rest, U6C, TN 3.8 in series with TNH, BY in series with RC. BY is slow-releasing and it is the last relay to let go, its release rendering recorder available for another call.

The release of P, by de-energising MC, also liberates OTM and opens the IT test circuit, releasing LM and disconnecting test coil of ITB. The holding coil of ITB now operates and the relay is energised. The release of TN 3.8 also liberates the ITT relay.

Fig. 51 gives a skeleton of the circuit with the two subscribers through to each other, showing the various relays in circuit, &c.

With a system so entirely automatic it is necessary to guard against the accidental holding-up of common apparatus. The A and B feeds of Fig. 42 are protected by the thermostat shown in the figure. This is a strip of two dissimilar metals which normally makes on a contact. On being heated by the current passing through its surrounding coil, it curls away from the contact and makes on another. This is set for a certain time, and when this time is exceeded, say, by a subscriber neglecting to get on with his call, the thermostat automatically releases the feed. The subscribers' fault relays F co-operate with the thermostats to prevent common

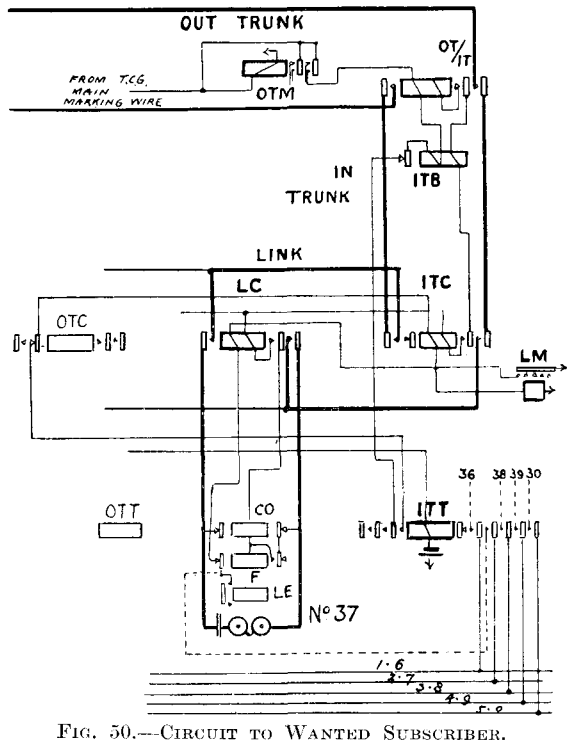

FIG. 50.—CIRCUIT TO WANTED SUBSCRIBER.

apparatus being retained after an interval of one minute on the occurrence of line faults or other abnormal conditions.

The above slight sketch is intended to show the main principle of the system which it will readily be seen, differs entirely and fundamentally from the other systems we have described. It is hoped that sufficient detail has been given to furnish the key to a most ingenious and well-thought-out plan of automatic telephony. To show this principle, clear of all complications, we have purposely kept to the very smallest of installations—a 50-line board. But 50 subscribers do not exhaust even a two-digit plan. Allowing for the omission of the 19 initial numbers we get a possible 80, *i.e.*, 20-99. For this, we shall require a change-over relay TN6C for the tens figures as well as for the units. Further, as soon as 50

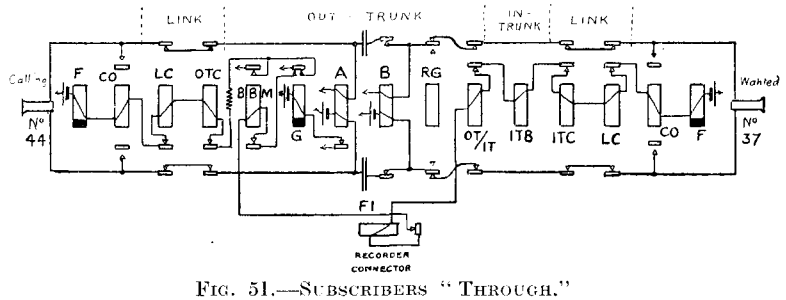

FIG. 51.—SUBSCRIBERS "THROUGH."

subscribers are exceeded, another group of relays entirely devoted to the operation of marking is installed, and the recorder lightened to this extent. We shall then have, not only a units and fives marking wire, but a fifties as well. Again, for a three-digit system, hundreds relays will be required, with their holding relays, &c., and for a four-digit plan, thousands relays, &c. The fundamental principles of the system, as applied to small and large public exchanges, including multi-exchange working, are, in the main, the same, but there are many variations in detail to secure economy of plant and the flexibility that is such an essential feature of public practice. Subscribers' meters, progress lamps, auxiliary traffic distribution over groups, &c., are all incorporated in the Relay system for public exchanges.

END.

The
Telegraph and Telephone Journal.

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Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

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HISTORY AND PROPHECY.

THE dictum that History repeats itself may be open to question. It is perhaps as valid as most proverbs are and as uncertain. In the realm of Telephony history may be said to repeat itself with a conspicuous regularity. In the pages of the *Telephone*, a short-lived but interesting journal published in 1889, you may find articles and paragraphs which have quite a topical air. There is the usual conflict of opinion on State and private ownership, on the merits of monopoly or competition. There is the usual criticism of high rates, and the comparison of London and Stockholm—quoting, of course, inaccurate and unfavourable figures in the case of London. There is correspondence on the wanted word for a telephone message with the usual distressing suggestions. It will not be denied that these are at least sidelights on the history of telephony, and that they are constantly recurring topics. In the first number of the *National Telephone Journal* (1906) there was a satirical reference to an "Old Oxonian" who complained that his privacy was invaded by the telephone. This subject was agitating the Press quite recently. A few months ago a Postmaster-General made a public reference to the developments in automatic telephony which were in hand, and this was supplemented by some information given to the Press that it was likely that the first automatic exchange in London would not be opened for another three years, and that the conversion of the whole London area would take at least fifteen years. History immediately repeated itself, and a provincial paper uttered this time-worn prophecy: "In the not far distant future the Hello girl of the telephone will seldom be heard in the land." We imagine that similar utterances have accompanied the opening, or rumoured opening, of every automatic exchange in the century. In 1909 the *National Telephone Journal* said: "The operator will go on being doomed periodically until she has left the service, married, and possibly brought up daughters, who, if they become telephonists, will no doubt be doomed in their turn when some newspaper discovers that there is an automatic system in full swing at Timbuctoo or Tehuantepec."

We claim that this latter prophecy is approaching plenary fulfilment. Telephonists who married in 1909 should soon have daughters nearly old enough to enter the service, and assuredly if they make their entrance about the time the first large London automatic exchange is opened, they will find themselves styled "Doomed Hello-girls," whether in the year 1926 or 1930.

We will not compare New York (where the conversion has commenced) or London (where it is authorised) with Timbuctoo and Tehuantepec. We merely maintain that any smaller place will as in the past always serve the prophet for pointing his moral. Automatic telephony is indeed making great progress, and it is claimed by a trade journal that there are over 1,200,000 stations, or about 5% of the total telephones in the world, working on this system. What seems not to be generally understood is that the conversion of any public service, which is firmly established on a well-tried and generally satisfactory system, must necessarily be gradual. The displacement of perfectly good and comparatively recent plant by a new invention not in every case more suitable for the work to be performed must be a matter of time. A parallel case may be found in electric traction. The first electric railway in this country was, we believe, opened in 1890. To-day, more than 30 years later, only some few hundreds of miles of local lines are converted to electric working and not a single express train in this country is electrically driven. Great developments in automatic telephony will take place in the immediate future, and conversion to that system will probably grow at a greatly increasing rate, but we hazard a guess that another fifteen years will hardly see half the telephones in the world converted to automatic working and will find some hundred thousand operators still "undoomed."

We need hardly say that we welcome very warmly the news that a start is about to be made with the conversion of the London telephone system to automatic working. The replacement of manual work by machinery is an inevitable evolutionary process towards more perfect service, which cannot—and should not—be stayed in favour of any particular interest. It is a fortunate position in this country that the development of the telephone system will prevent any necessity for the actual displacement of telephonists, for automatic working will be introduced and extended in such a way that the numbers of telephonists can be adapted to the changing conditions. Machinery, therefore, will be introduced in such a way that the normal process of wastage will be able to meet the reduction.

HIC ET UBIQUE.

THE gradual process of converting the London telephone system to automatic working is about to begin, and orders will shortly be placed for several large local exchanges and an automatic trunk exchange. It is expected that the first of these will be opened in about three years' time. The complete conversion of the system will probably occupy from ten to fifteen years, and present plans are designed to serve upwards of a million subscribers.

EVEN if some Power gave us the giftie to see ourselves as others see us, we might not always benefit much by the gift. For instance, an American telephone paper's views of why the telephone is backward in Europe are rather quaint than instructive. For one thing it pictures the wires being so loaded with "official" and "priority" messages that the poor public only gets the "leavings" of the service, as it were. For another, it imagines the public of this country as looking on the telephone as something intended only for its betters. The small farmer, we are given to understand, dares not aspire to what is reserved for "the squire and his relations."

ACCORDING to the *Calcutta Statesman*, which a correspondent sends us, considerable progress is being made in the telephone system of that city. Two new exchanges are being equipped which will provide for about 6,000 subscribers' lines. There are at present some 10,000 stations in Calcutta.

MR. J. W. SWITHINBANK, A.M.I.E.E., C.I.MECH.E., who retired on the age limit on July 31, entered the telephone service on Aug. 15, 1881, at Leeds. He was appointed District Manager of Middlesboro' in December, 1898. On Dec. 1, 1910, Mr. Swithinbank was transferred to Hull and thence to Sheffield on Aug. 16, 1914, where he has just completed his long career as a telephone engineer and manager. During his service in Sheffield he earned the respect and goodwill, not only of his staff and post office colleagues, but of the subscribers and public, and on his retirement was presented with a cabinet of cutlery and leathern wallet by the former.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE new business in June, whilst slightly below that for the previous month, was again exceptionally good, the gross new stations added being 16,192 and the net additions 8,838 stations, with the result that the new business for the first three months of the current financial year easily constitutes a record. The large increase in the new business in the past quarter is clearly seen by the following comparisons :—

Quarter ended	Gross new stations.	Net new stations.
June 30, 1923	51,023	25,756
March 31, 1923 ...	45,574	22,414
June 30, 1922	37,192	14,425

The total number of stations in use on June 30 last was 1,074,789 ; 386,148 in London and 688,641 in the Provinces.

Residence rate subscribers increased during June by 2,000, making the total at the end of the month 161,129 as compared with 138,453 a year ago, a growth of 22,676 or 16 per cent. The net increase in the number of business rate subscribers in the same period was 30,963 or 7.5 per cent.

The net addition to the number of call offices in June was 106, bringing the total in use at the end of the month up to 16,838. Of these 3,838 were in London and 13,000 in the Provinces. Public call offices in street kiosks numbered 474, the net addition of 23 during June being the best so far recorded in any one month. 158 rural party lines were added to the system in June, the number of subscribers to this class of service now being 7,379.

The following statistics give some indication of the general development during the June 1923 quarter in rural and urban areas separately. It will be seen that the growth in rural areas was again proportionately better than that in urban areas :—

	No. of Exchanges.	Exchange Lines.	Stations.
Rural Areas.			
March 31, 1923 ...	1,698	39,190	49,830
June 30, 1923	1,756	40,988	52,191
Increase during quarter	58	1,798	2,361
		=4.6%	=4.7%
Urban Areas.			
March 31, 1923 ...	1,506	605,884	1,000,842
June 30, 1923	1,510	618,903	1,022,598
Increase during quarter	4	13,019	21,756
		=2.1%	=2.2%

Whilst the calling rate generally remains practically at the same level there are indications of an increased use of the Trunk Service. The number of trunk calls originated in April last was 5,231,500 and in May 5,678,600, compared with 4,261,500 and 5,032,000, in April and May respectively of last year. For the five months January to May of this year the trunk calls numbered 26,124,000, an increase of 3,822,000, or 17 per cent., over the total for the corresponding period of 1922.

The following statement showing the proportion of the different types of equipment in use in 1914 and at the present time may be of interest :—

At	Stations Connected With :—							
	C. B. Exchanges.		Magneto Exchanges.		C. B. S. Exchanges.		Automatic Exchanges.	
	No.	% to Total	No.	% to Total	No.	% to Total	No.	% to Total
31/3/1914	369,694	51%	321,654	44%	35.361	5%	947	—
31/3/1919	435,836	54%	287,735	36%	54,124	7%	23,240	3%
31/3/1923	612,356	61%	277,257	27%	93,329	9%	30,203	3%

Further progress was made during July with the development of the local exchange system.

A new exchange was opened at Esher, and among the more important exchanges extended were Bradford and Ipswich.

The following new cables were completed and brought into use as extensions of the main underground system :

London—Dartford—Gravesend—Chatham.
London—Weybridge.
Southampton—Shedfield—Portsmouth.
Canterbury—Ramsgate.
Bolton—Bury—Heywood.

During the same month 48 new overhead trunk circuits were completed and brought into use, and 91 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

The Liverpool-Birmingham quadruple Baudot circuit has been extended to Swansea.

The following new Baudot circuits have been opened :—

Cardiff—Bristol—Exeter.
Bristol—Swansea—Milford Haven.

A Morkrum Teletype duplex circuit serving London and Margate was opened on Aug. 4.

SUBMARINE CABLES AND OCEAN FLOORS.

(*Concluded.*)

BY J. J. T.

PERHAPS I may be permitted to supplement the information given in last month's issue regarding the severance of the Jamaica-Colon cable by earthquake early in 1907 as the actual wording of the exhibit before the Royal Society at their conversazione in May of the same year has now become available. It reads :—

> " Exhibit 2, by the Rev. R. Ashington Bullen. Cable broken by the Jamaica earthquake of Jan. 14, 1907. This cable had remained intact for 20 years. It rested on a muddy bottom in a depth of 700 fathoms, about 17 miles S. of Kingston. The probability is that, at this place, it crossed the line of a geological fault. Exhibit received from Lieutenant Rupert Jones, R.N.R."

Old charts show that between 25° and 35° W. there was, *circa* 1582, an island of considerable size in the North Atlantic known as Busse Island. An account of " Busse Island, one of the Lost Islands of the Atlantic," by Miller Christy, London, Printed for the Author, 1897, 42 pp., contains a fairly complete collection of facts concerning Busse Island, but the author does not give weight to the two soundings taken by H. M. Brig *Lion*, Lieutenant and Commander Pickersgill, in 1776, possibly because the latter was courtmartialled in February, 1777, and dismissed his ship for drunkenness, *vide* Captain James Cook, by Arthur Kitson, 1907, p. 352-3. But it must not be overlooked that Captain James Cook was relieved by a Surveying Officer whose work stands to this day a grand monument to his skill—Grand Point to Shicatica (coast of Labrador in the Gulf of St. Lawrence), by Michael Lane, Master R.N., 1768; this chart was originally published by Jeffereys and sold separately; it is to-day incorporated in the Admiralty Charts of the St. Lawrence Gulf. See also St. Lawrence Pilot, 7th edition, 1906, p. 180, published by the Admiralty; and we learn from " Voyages, Discovery and Research into the Arctic Regions," by Sir John Barron, Bart., F.R.S., London, 1846, who gives Lieutenant and Commander Pickersgill's M.S. Instructions dated May 14, 1776 : " The Master, Mr. Lane, to be employed in surveying, making charts, and taking views of the several bays, &c."

It was the master's duty to navigate the ship—and when Sir John Barrow (who, as Secretary of the Admiralty, has access to the Journals of this officer) informed us that the position of the soundings was 57° N', Latitude 24° 24' W. Longitude, we have no right to question Michael Lane's work. The entry in the Log Book read : " June 28, noon, Lat. 56° 38', Long., by last observation, 17° 44' ; by ship reckoning, 22° 20'."

" June 29, 3 p.m.—Calm. Tried soundings, and got ground at 230 fathoms ; drifted to N.E. about 2 miles, and sounded again in 290 fathoms ; fine, white sand. At the same time saw a shag, gulls, and other signs of land not far hence. By running about 19 miles N.E.×N., lost soundings ; so bore away, calling it the 'Lion's Bank.' "

The positions assigned to Busse Island on the old charts was somewhat vague, and it has been assumed that the Lion Bank was an extension of the Rockall Ledge ; although vessels have sailed over the spot and no reports have been made affirming the existence of soundings since the soundings of Michael Lane, with the exception of one sounding—and bearing in mind the fact that indications of a ridge show as an " S " shaped back-bone from Iceland to the Azores and southwards to Ascension and St. Helena (the southern portion of which was discovered by the *Challenger*, the northern portion by cable steamers and various expeditions), it is not only possible but indeed hopeful that when sounded the area where the Busse Island was first roughly charted will develope a bank upon which, maybe, we may find the codfish breeding place.

Seller's English Pilot, 1673.—A chart of the Northern seas places Bus Island East South-East from Greenland Southpoint, about 130 leagues (English and French).

In 1592, Molyneux's globe showed Busse Island in the same latitude but further West. Molyneux's maps also show Brazil Islands, A.D. 1582-1592 to south-west, also Verde Island farther to south, and just north of the Azores with Maidos Island a trifle to the north-west of Verde, about the same date. Present-day soundings plumb at 1440 to 2440. St. Brandon Island shown A.D. 1582 (53½ N., 34 W.) now gives shells and volcanic stones, and soundings of 1,300 fathoms.

In approaching the Azores where, at a depth of 1,285 fathoms volcanic mud has been dredged up, it will be noted that there are wide differences in the depths of the waters which immediately surround these islands, and in laying a cable, say from Land's End to Fayal, ocean depths varying from 20 to 3,000 fathoms, would need to be considered. The latter figure is exceeded by the Peake Deep, 3,284 fathoms, but covering a comparatively small area in 57 N., 20 W., could be easily skirted.

Almost in a direct line westward from Fayal are the Suhm Deep, 3,549, and Thonlet Deep, 3,154 fathoms, but swinging gently northward, these could be avoided, should Halifax, Nova-Scotia, for example, be the destination of our cable.

South-west from the Azores the ocean bed falls away even more considerably over the huge area covered by the Narges Deep, which gives us close upon four thousand fathoms towards the West Indian shores.

The Pacific provides even greater depths than these, some reaching what may be fairly described as the *unfathomable*. The following may be classed as duly registered examples of ocean depths and if an hydrographic chart of these waters be studied showing the close proximity of certain islands to some of these dips in the ocean bed, the island of Yap, for instance, the difficulties of cable-laying and repairing in such localities will certainly be the better realised, thus :—

Swire	Deep	...	...	5,348	fathoms,	off Mindanao*
Nero	,,	...	...	5,269	,,	South of Ladrones†
Kermadec	,,	...	...	5,155	,,	Tonga Group
Tuscarora	,,	...	...	4,643	,,	Japan
Nares	,,	...	...	3,825	,,	West Indies
Sumatra	,,	...	...	3,825	,,	Sumatra
Tizard	,,	...	...	3,450	,,	Off Brazil.

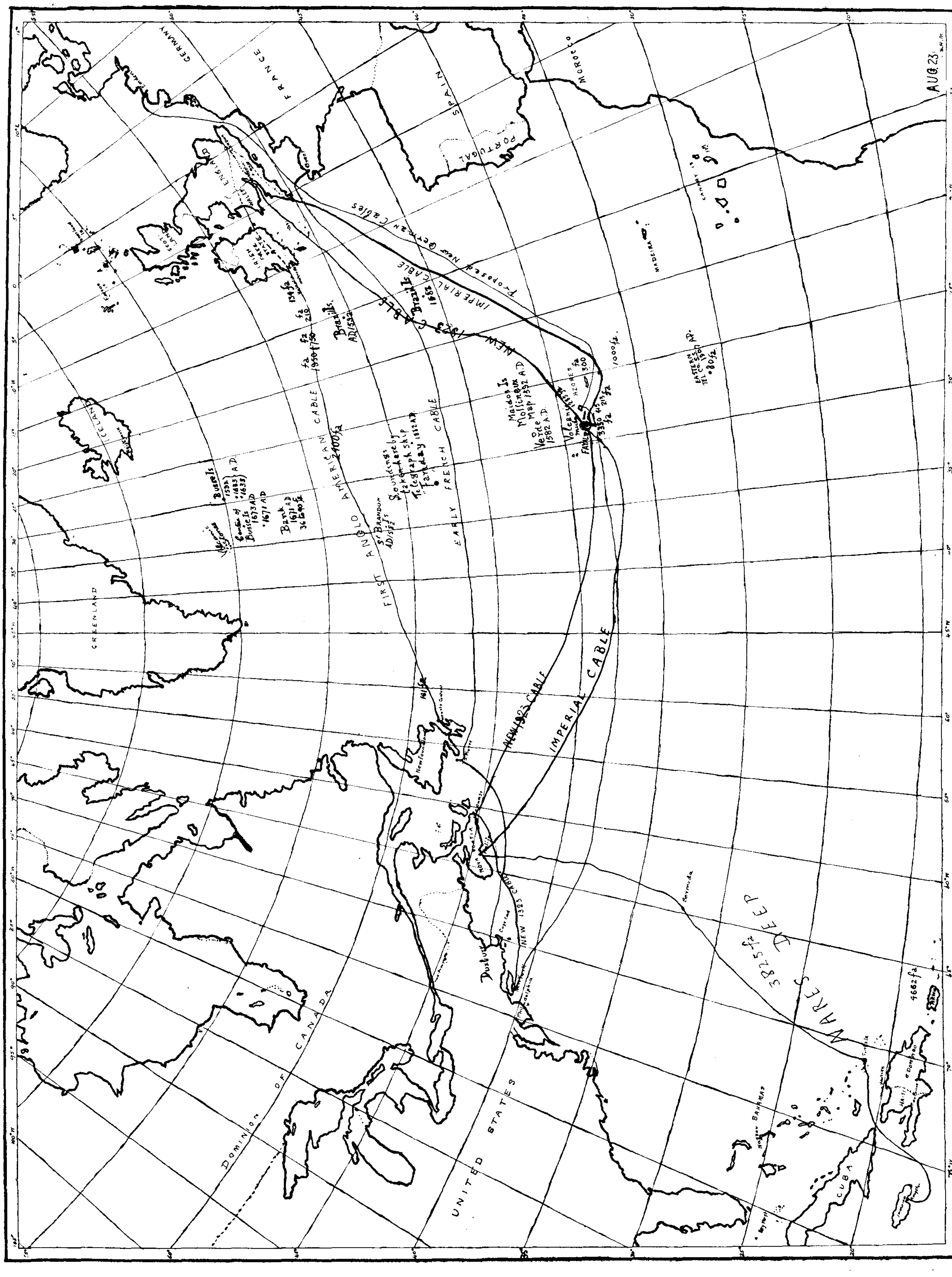
* Recorded by the German ship *Planet* in 1912, and exceeds the depth of six miles by 409 feet.

† By the U.S.S. Nero.

One depth of over 4,000 fathoms is also recorded off Puerto Rico.

Bearing in mind these depths and the maximum height of the highest mountains of our globe, we have, therefore, a difference in level between the depth of the Swire Deep and the top of Mount Everest of eleven and-a-half miles.

The map which accompanies this article makes no pretension to cartological exactitude. It has been prepared from duly authenticated sources, but has of necessity been drawn with the sole view of displaying and even accentuating certain facts which the writer has thought would prove interesting to readers of the T. & T. Thanks, however, are due to a retired officer of the Hydrographic Department of the Admiralty, who prefers to remain anonymous, but without whose kindly aid this article could hardly have been written. All the writer would venture to write further in this connexion will be to remind those more intimately connected with the Hydrographic Department that the father of my esteemed friend was an authority on Foramanifera and that *Rupertia stabilis* was named after him !


AUG. 23
GERMANY
FRANCE
SPAIN
PORTUGAL
MOROCCO
MADEIRA
Proposed New German Cables
IMPERIAL CABLE
NEW 1923 CABLE
FIRST ANGLO AMERICAN CABLE
EARLY FRENCH CABLE
GREENLAND
DOMINION OF CANADA
UNITED STATES
NEW 1923 CABLE
IMPERIAL CABLE
3825 fa
DEEP
CUBA

When reading these formidable lists of soundings it is well to remember that sounding in deep water is not quite so easy as it looks on paper. The surface current may move the ship steadily in one direction, while an under current or under currents may carry the line in other directions. It is, therefore, always open to question whether the verticality or plumb of *sounding machines, wire and weight* is ever maintained, for the time of the descent of the weight is considerable, and the error in position but unknown. This can best be illustrated by anchoring the vessel in very deep water, by grappling ropes or buoy ropes attached to "mushroom" sinkers weighing several hundredweights, and then sounding. Even then the line on the sounding weight when reaching the bottom is bulged out in any direction rather than in the vertical. The error is considered *small*, but it may be *great* for all that is really *known*.

Some progress has been made in obtaining soundings by hydrophonic means, sound echoes, depth charges, &c., and as recently as 1920 Mr. De Graaf Hunter, of the Indian Survey, opened a discussion on the matter. At this meeting it was stated that Professor Hecker had obtained some measurements by these methods, but *forgot* to *allow for the motion of the ship*.

Other more recent experiments by the United States Government are stated to have given more satisfactory results, but it is evident that considerably more has to be done before perfection is reached in this direction.

An opportune and up-to-date confirmation of what has been written in these articles came to hand from the public press while the proofs were waiting correction. It reads :—When the company laid the Cape cable in 1899 the route between St. Helena and Cape Town was surveyed, soundings being taken every 50 miles. The cable recently parted, and the repair ship, which is now on a spot where the chart shows a depth of over three miles, has found that the ocean bed has risen to within three-quarters of a mile of the surface.

The bed of the South Atlantic consists of ranges of mountains, of which St. Helena and Ascension are the highest peaks. The discovery suggests a recent submarine convulsion, and those on the spot are asking whether there may not now be a new range of under the sea starting as far north as the Cape Verde Islands."

(*Finis.*)

DEVELOPMENT STUDY RESULTS.

BY G. E. NICHOLLS (*London Telephone Service*).

Now that a reasonable period of comparison is available to prove the value of development studies in the provision of plant the duty will become better understood, instead of being the vague term which it still conveys to many persons engaged in the telephone industry.

In the early days of telephony the engineer would arrange the provision of his cables as and when he thought necessary, and his plans were necessarily influenced by his own measure of the economic conditions of the day. It subsequently became evident that a longer view was necessary, and, like our American cousins, we set about placing a future telephonic value on all properties in order to determine at an early stage the capacity of the cable routes and exchange accommodation to meet the ultimate requirements. The word "ultimate" is perhaps out of place as our vision threatened to outrun our view of economics, but it may be taken roughly that the word ultimate is limited to that period of time which represents the economic life of the plant to be provided.

A year or so prior to the war, studies were put in hand throughout the United Kingdom, but the war period of business stagnation and war demands set aside all plans which were earnestly being pursued to bring our British service into comparison with the advanced system across the Atlantic.

We are now approaching a period of five years since the Armistice, and hope to have experienced the worst of the oscillations created by the departed war. During this period we have been on the crest of a trade boom with which we were unable to cope through lack of plant, followed by acute depression, and now we are beginning to take courage by the gradual return to progress.

Our machinery is in full swing with the provision of additional cables and new exchanges, but the enormous expenditure makes the responsibile Government officials apprehensive, and as a result increasingly inquisitive as to the basis of our estimates. It seems somewhat difficult to persuade the authorities to appreciate the expenditure involved with the same optimism that a business man would display in view of the future yield which such expenditure would produce. It is, of course, gratifying that so keen an interest is displayed in a duty which, for a long period, seemed insufficiently appreciated.

We who make the basic development studies are also unceasing in our investigations respecting the estimates furnished, in order to apply the latest knowledge to any scheme which may be in hand to ensure an economical and adequate provision of apparatus to meet the public demand.

A review of the growth in the number of lines which has taken place since the Armistice brings to light several points of interest when compared with the rate of growth forecasted by the development study. The following instances are given of a few London Exchange areas of different types which have remained constant in extent during the period. The growths have been attained with scarcely any canvassing effort, and cover the time of acute depression and many adverse conditions such as rate revision and plant difficulties.

Area.	Lines at date of Armistice.	Lines at July 1923.	Net Increase for 4½ years (Excluding Transfers)	% Increase for 4½ years.	Forecasted Increase.
Dalston ...	2,699	5,007	2,299	85	2,322
East Ham ...	592	1,079	482	81	310
Hammersmith	1,486	2,639	1,139	77	1,111
Palmers Green	651	1,209	558	86	666
Richmond ...	1,457	2,296	893	61	1,021
Streatham ...	1,895	3,540	1,617	85	2,083
Walthamstow ...	659	1,080	466	71	432
Willesden ...	1,696	2,907	1,213	72	1,471

At the time of writing these notes there is no sign of any diminution of the progressive growths and we have now to determine whether the future increase is likely to continue in proportion to the larger number of lines existing or at the average rate attained during the past 4½ years. It will be seen that the annual geometric percentage increase for the exchanges quoted is round about 12, and if this rate is maintained the present figures would be doubled in six years.

The future growth as estimated is covered by the plans already made, and we are aware that the long period of suspended canvassing activity is now coming to an end. A future growth at the percentage rate previously experienced is clearly possible, but we have to face the fact that the anticipation would necessitate a serious revision of our estimates.

It is, of course, possible that we have been making good some of the loss occasioned by the war period, but the situation, nevertheless, is one which needs very careful consideration and judgment.

TELEGRAPHIC MEMORABILIA.

AT the end of last month there quitted the Telegraph Service—prematurely owing to ill-health—an unique character in the person of Mr. E. Purkiss (Teddy), Assistant Superintendent of the Cable Room. Originally in the service of the Post Office he left it and joined the staff of the late Submarine Telegraph Company only to be re-transferred to Government employ in 1889 by the taking-over of that company owing to the expiration of the latter's lease. An athlete and sportsman of the cleanest type, with a free and independent spirit not over well understood by the earlier day administrator, he was yet silently admired by many of those whose duty it then was to officially deprecate any tendency in the direction of what is nowadays defined as self-expression. To do good by stealth and to hide the act under a fund of humorous cynicism was with "Teddy" a principle, while any thanks attempted by a recipient were usually met by one or two forceful phrases that always proved effectual. In or out of the office, at work or play he had one great aversion: it was for the man or woman who "did not play the game." Sincere indeed is the hope that the needed rest which his present disability necessitates will mitigate before very long the doubly irksome conditions at present entailed.

Certain official memoranda on the organisation of the C.T.O. have been edited, slightly amplified, and now appear in pamphlet form for the use of administrators, superintendents, supervisors, overseers and staff.

It conveys in concise form necessary information regarding the duties and functions of each class of official, and defines his or her place in the complete organisation of the office mentioned.

These definitions, while marking the limitations of function, are in no way defined so as to restrict initiative on the part of any individual or of any individual class.

There are, I am given to understand, sufficient spare copies to permit of a few being available to any responsible provincial official who may wish to compare the organisation of his own particular office with that of the London centre. A request to the Controller, C.T.O., G.P.O. West, London, E.C.1, will no doubt meet with a prompt reply.

July 24 must have been a red-letter day in the history of the Indo-European Telegraph Company, for upon that date direct telegraphic communication between their London office and Karachi *via* Warsaw was re-established, having been interrupted for exactly nine years owing to the Great War. It is hoped that now telegraphic communication between Warsaw and Berlin has so far improved as to permit of this re-establishment the projected new direct communication between the British and Polish capitals will not be long in materialising.

True, the wireless service between London and Posen is a really good one, but it is quite inadequate to cope with the increasing flood of traffic, especially as is the case of so many other European radio communications, it is only a part-time service and is inoperative during the chief traffic peak periods.

The statement in the House of Commons regarding the future of British Government long-distance wireless and its relationship with the Marconi and other interests is viewed with considerable satisfaction by those in the Government service who have had every opportunity of looking at matters from a public and national point of view. That the Government should maintain control over so potent an instrument for good and evil in times of international stress is self-apparent, and this can be written without imputing anything but the most patriotic desires to any private enterprise or administration. Facts are more convincing than theories, and the experience of the years 1914-18 have left indelible imprints upon the mind as to the dangerous possibilities of permitting "communications" to pass out of national control. That much said there should be no difficulty in obtaining a frictionless working between the Government and whatever private staffs may from time to time be granted licenses.

The C.T.O. staff in a distant way, has already been in daily touch with the Marconi *personnel*, and whatever mutual scheme may ultimately be decided upon, it will be only the gradual enlargement of that daily touch.

The Stores Department has a little-known but very useful organisation known as The Studd Street Library of Business Books and Magazines, under the Chairmanship of J. Robson, Esq., aided by quite a formidable Committee of Management. Mr. A. S. Flyn is the Librarian. The list of books and magazines covers a wide field and from the list may be mentioned Sheldon's *Philosophy of Management*, Thiselton's *Efficiency Ideals*, Spooner's *Wealth from Waste*, Sidney Webb's *The Works' Manager of To-day*, and Beveridge's *Public Service in Peace and War*. There is no clear information to hand at the moment as to whether members of departments other than the Stores are eligible for membership, although the quarterly fee of 1*s*. 6*d*. induces a longing look in the direction of Islington, N.1.!

The wireless staffs in London and Leafield are likely to become somewhat puffed up with pride should another shower of compliments reach them simultaneously from at home and abroad, first the Foreign Office and then Nova Scotia congratulating them upon their excellent work.

It is difficult to say which style of praise pleased them best, the staid phraseology of the Senior Service or the colloquialism of HX. "The men your side are always on top of their job." Soft words butter no parsnips and mere compliments do not pay the rent, but when the offices of origin of appreciation are of recognised sincerity—well letters such as those mentioned above *do* help and encourage the best that is in us.

Among the recent promotions in the C.T.O. none perhaps has given more satisfaction for a long time than that of Arthur Avery to the Superintendent's Class. This is not a valedictory paragraph or one could expatiate on "Arthur's" many virtues, his modesty, his geniality, his never-failing courtesy, and his helpfulness to subordinates equally with that to those officially above him. His close connexion with the I.C. has perhaps overshadowed his capacities in other directions telegraphic, but to those who through many years, though at times afar off, have watched his conscientious thoroughness the wonder has been that the Selectivity of those other years did not "discover" him at least a decade ago.

AUSTRIA, according to financial authorities, has ceded the exclusive right to the Austrian Marconi Company to conduct radio-telegraphy between Austria and *all other countries* for a minimum period of 30 years. The registered capital of the company is £133,000; of this the Austrian Government has subscribed £40,000 and the Marconi Wireless Telegraph Co., Ltd., London, the sum of £93,000.

JAPAN; according to official information received, has laid down in four very definitely worded articles the principle which she insists must govern wireless exploitation. Article I states that, "Radio Telegraphs and Telephones shall be under Government management." For a time newspaper installations were permitted "for the purpose of spreading knowledge of wireless." These are no longer in actual use.

BRITISH WEST INDIES.—The *Financier* informs us that, "through the enterprise of a local newspaper, the *Trinidad Guardian*, which has set up a wireless receiving station at Port of Spain, Trinidad is picking up news from American broadcasting stations." Query: Is the *Trinidad Guardian* a pirate?

Mr. Robert Stelling, F.C.W.A., in an article on "The Wireless Craze in the Factory," complains of the loss of stores in certain works owing to the acquisition of "odd material" by enthusiastic if not over-scrupulous employees, but points out that Perpetual Control properly carried out and ensuring daily comparison of the figures of the Bin Card with the Material Ledger Card, should prove an all-efficient check upon these irregularities. While recognising the moral and material seriousness of the situation, he recalls the story of a Birmingham aeroplane manufacturer during the match shortage of the war period, who, when engaging a new hand first asked the question: "Have you made your petrol lighter? If not go back and make it and then come here and repeat your application!" "Have you made your wireless set?" may therefore become one of the sterotyped questions demanded of electrical appliance apprentices in the future!

The C.T.O. has had the double honour conferred upon it this year by two of its technical students who in the recent Telegraphy examinations have respectively secured the First and Second Prize Medals in the Final Grade of the City Guilds. Modest as they are both known to be it cannot be conceded that their names should be concealed. They are: Mr. C. W. J. Martin of the Cable Room who secured the First Prize with Silver Medal and £3, and Mr. S. G. Lewis of the F. Division TS., who came an excellent second with Silver Medal and £2 10*s*. Both were students of the Northampton Institute.

The much-discussed submarine cable between Italy and the United States to be laid in two sections, the Azores being the meeting place of the respective Italian and American portions, at long last appears to have reached a definite point by the signing of a contract in New York between the Western Union Telegraph Company and the Italian Submarine Telegraph Company, by which these two organisations have agreed to lay the sections terminating on their respective national shores.

Before these lines appear in print it is expected that the new fast speed submarine cable between this country and the United States will have been laid. The new C.S. *Faraday* will carry 4,000 tons of this cable, or a length of about 1,000 miles which will be placed in position on behalf of the Commercial Cable Company between New York and Canso, Fox Bay, Nova Scotia. The contract for the cable was placed in the hands of the Telegraph Construction and Maintenance Company and Messrs. Siemens Bros. & Co. of Woolwich. As will be recalled the present *Faraday* belongs to the latter firm and was only recently launched at Jarrow. Ten excellent illustrations of this vessel and various items closely connected with cable-laying appeared in the *Electrical Review* of Aug. 3.

The weight of the copper conductor between New York and Canso is given by the *Review* as 450 lbs. per mile, but I rather question the speed to be as high as 600 *words* per minute and would suggest that *letters* are intended. This, especially when worked duplex would mean an immense advance upon anything hitherto known in Trans-Atlantic working speeds. The copper conductor of the Canso-Azores and Azores-Weston-super-Mare sections is a huge affair when compared with the comparatively thread-like conductors of less modern deep sea cables. Having seen a section of the conductor with its six copper tapes one is not surprised to learn that the weight per mile of the conductor alone turns the scale at 1,100 lbs. Our contemporary made one very apposite remark in closing their description, viz.:—"The fact that an English firm has manufactured and is laying this important cable needs no comment."

It may also be permissible to add the further information that more than one English firm of submarine cable manufacturers is busy with submarine cable manufacture. One at least of these is installing new cable-making plant.

The Annual Meetings of the Eastern and the Eastern Extension, Australasia, and China Telegraph Companies have always proved interesting to Cable-ites. This year is no exception. In the case of the former the

developments in connexion with direct transmission so that it is now a matter of daily routine to transmit direct from London to Sydney or Melbourne by means of automatic re-transmission without the intervention of the human element, is in itself one of the world's wonders, while the steady confidence of the directorate in the strong position still likely to be held and maintained by cable telegraphy is a sign of the times worth noting as is also the decision to enter into the competitor's camp by applying for long-distance wireless licences. At the meeting of the second company there were items no less interesting. The developments of the Penang sort and the company's measures to meet and anticipate such progress by laying a direct cable from Colombo in March last has already been mentioned in these columns. This and the anticipated duplication of the Singapore-Batavia cable are items of expenditure totalling very serious amounts and only justified by that quiet confidence which comes of clear-headed grasp of new situations.

The repair of the Anglo-Russian cable by the British cable steamer *Monarch* was a welcome event. There were practically no difficulties in re-starting traffic, good duplex conditions being at once obtained and up to the moment of writing are still being maintained. The co-operation of our Russian colleagues appears to be excellent.

There has long been a movement on foot in favour of " grouped language " for telegraph purposes which, however, the writer is prepared to say will meet with no small opposition should such a project come before the next International Telegraph Conference wherever that may be held. " Grouped language " all readers may not know is a proposal by means of which any number of words could be combined as one word irrespective of the ordinary usage of the language utilised for telegraphing—a letter limit, ten, let us say, being fixed. Thus, the scheme if legalised would permit the public of to-morrow to despatch telegrams such as the following :—" Iamcomingt omorrowand shallbeome byninefive luvdearest," instead of " I am coming to-morrow and shall be home by nine five love dearest." Cleverly applied as it will be by astute merchants and press men—phonetic spelling is to be permitted in addition—the telegraphist of the coming years and the poor counter clerk will be compelled to count every letter in every telegram with scrupulous care, while the public with more or less patience wait in queues behind the grille ! In exchange for this *concession* the addresses and possibly the signatures of telegrams are likely to be subject to the same letter-limit for account purposes.

The scheme has already the support of one or two countries but with all due respect to those who may have sponsored the idea it does not strike one as a scheme likely to fulfil the purpose for which it has been devised. That purpose is apparently the desire to discourage the use of the ten-letter codes which has grown so tremendously these last few years.

That it is likely to do so is by no means probable. The writer's opinion for what it may be worth, is rather that the business public will use the new scheme as far as it suits them and will skilfully intertwine it with their present cable codes. It is urged by some that the coding and de-coding of telegrams is a laborious process and one which would not pay if the present new system of counting came into force.

It is feared that supporters of the latter view have a very restricted knowledge of the annual saving in hard cash which hundreds of firms obtain by the use of cleverly arranged codes, a saving which would certainly not in any way be equalled by the new proposals. In these codes whole sentences of eight and ten words are sometimes represented by two, or at most three, letters.

Many of his old Cable Room colleagues will join in the heartiest congratulations to Mr. Davey upon being raised to Executive rank on the Engineer-in-Chief's staff.

From the *Electrical Review*.—Messrs. F. B. Young and W. Jevons describe in the July issue of the I.E.E. *Journal* a method of locating submarine cables and faults by means of a pair of towed electrodes, the cable section between fault and shore being energised by alternating or interrupted current. Simple approximate formulae are derived for the range of the gear, and numerical values are calculated for three typical cables. It is shown that the device should be sufficiently sensitive to locate an earthed break in a modern cable up to 360 nauts from shore and an insulated break up to 100 nauts, though on account of the difficulty of handling the gear in deep water the useful ranges would often be much less.

The apparatus consists of two metallic electrodes, which are towed at the ends of two insulated conductors, of unequal length and twinned throughout their common length, by means of which they are connected through a suitable transformer to a three-valve amplifier. The electrodes may consist of lengths of copper or phosphor-bronze braiding, threaded over the end of the cable and soldered to the conductor. This should be protected by a covering of some stout, porous material, such as hessian or a hemp pile, since friction between the metal and the sea-bottom produces serious electrical disturbances. For maximum sensitivity the towing cable should be loaded with a weight so that the electrodes are towed near the ground.

If an alternating current of audible frequency is passed through the cable the oscillating magnetic field and eddy currents produced round the latter may be detected by means of the electrode circuit. Hence, by towing the electrodes obliquely across the track of the cable and changing course each time the sound heard rises to a maximum, the ship may tack along the cable until the total failure of the signals indicates that the break has been passed.

The towing cables and deck loads must be carefully twinned in order to eliminate as far as possible electro-magnetic disturbances which are almost invariably produced by the ship's machinery. These disturbances may, however, be conveniently utilised for testing the condition of the electrode circuit from time to time. Either electrode may be replaced at will by the ship's steel hull, which then forms, together with the remaining electrode and its lead, an inductive circuit whereby the ship's disturbances are picked up. The sensitivity of the detector depends upon the distance between the electrodes, increasing up to a certain limit as that distance is made greater. There is little advantage, if any, in increasing the length beyond 40 or 50 yards. It is quite possible to utilise " leader-gear " coils for the detection of cable faults, but electrodes, on account of their comparative independence of the depth, give a much more extended range. The term " range " denotes the distance from shore up to which the cable may be detected. In view of the very limited currents which are permissible this consideration proves to be of great practical importance. Port-starboard indications, which enable the vessel to follow a more direct course, may be obtained from electrodes by towing two pairs on the ship's quarters.

The first trial was made at the invitation of Messrs. Clark, Forde & Taylor on a cable belonging to the Commercial Cable Co., which had broken near the shore-end at Waterville, Co. Kerry. A special feature of the case was that, owing to the large number of cables converging on Waterville, to drag for any given cable was a delicate and difficult operation. The actual break was located at 1.7 nauts from the supposed position. The significance of this lies in the fact that between the supposed and the actual position of the break the cable was crossed by three more recent cables. Hence the electrode detector undoubtedly saved considerable time and expense.

Another trial was carried out at the invitation of the Telegraph Construction & Maintenance Co. by arrangement with the Commercial Cable Co. off the coast of Co. Kerry. In this case the points indicated by the electrode gear lay consistently to the north of the charted position of the cable, the discrepancy at places amounting to half a mile, and afforded data for the recharting of the position of the cable.

Electricity.—The day must come when electricity will be for everyone as the waters of the rivers and the wind of heaven. It should not merely be supplied, but lavished, that men may use it at their will as the air they breathe.—EMILE ZOLA.

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

Storm—July 9.

IN common with everyone else in London the night of July 9 will long be remembered by the Engineering Department. Anticipations on the part of engineering officers that the storm would result in a large number of faults and interruptions to the telegraph and telephone services were quickly realised, for, on the morning after, the number of faults reported in the London engineering district was about 3,000. The actual material damage to the department's plant was not great. The faults in a large number of cases were on the underground plant, and were due to the excessive rainfall during the night. One or two large cables were broken down from this cause. There were also a considerable number of faults due to fused leads and wires caused by lightning.

The house of Mr Justice Russell, at Walton Heath, was burnt down, and the telephone installation was badly damaged by the fire. In another case where the telephone service is underground the internal wiring was burnt and the bell coils of two instruments fused. The chimney of this house was struck by lightning. The path of the discharge can be traced *via* the electric light wiring and thence to the telephone wiring. In several instances the covers of the lightning protectors at subscribers' premises were blown off.

As an instance of the zeal on the part of the department's officers in dealing with the faults in connexion with the storm, we may mention that one skilled workman, Class I., cleared no less than 40 faults on July 10, using his private motor cycle. He visited subscribers' premises with a good supply of fuses and heat coils in anticipation of the requirements.

In Holborn, a 52-pair aerial cable was struck by lightning ; approximately three yards of the lead sheathing was stripped, and the lead sheathing of 40 leads was melted by the discharge.

In Highbury a window frame of a house was burnt out and the lightning protector fused.

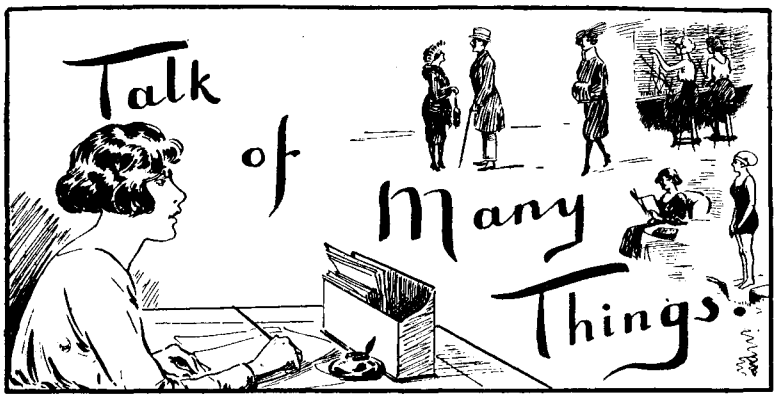
At Battersea Exchange, owing to rain getting through the roof, some of the cables between the main frame and the switchboard were damaged.

Practically the whole of the trouble due to the storm was cleared by the 14th July.

Pneumatic Tube Extensions.

One of the earliest methods adopted for the transmission of telegraph messages in the vicinity of the Central Office was by means of carriers driven through underground tubes by air pressure, and it is interesting to note that this method is not only still being used, but is being extended very considerably. At the present moment the Engineering Department is engaged in laying additional tubes which will enable messages to be sent direct from the C.T.O. to the War Office, Admiralty, and most of the post offices in the Whitehall area. Similar provision is being made between the C.T.O. and the principal newspaper offices in Fleet Street. In addition to the outside work which is very considerable, a great deal of work in the C.T.O. itself is involved. It will be necessary to rearrange entirely the existing tube terminations in order to accommodate the new ones which are to be brought in under the schemes to which we refer.

WE TELEPHONISTS



The Corporate Sense.

AN American economic journal has been analysing the different attitude of women shareholders to the enterprises of which they hold a share as compared with the attitude of men shareholders. It has been a most interesting analysis. The editor of the journal in summing up declares that women have a more definite sense of corporate responsibility than men. He sums up the statistics of letters which were received by a public lighting company from their shareholders. In the proportion of four to one these letters come from women and they are suggestions as to the possibility of removing difficulties and deficiencies in the performance of the work. There is no reason to believe that the women shareholders are in any such proportion to the men; on the contrary the editor in question says that men shareholders are twice as numerous as the women. It is a rough approximation, therefore, to say that in the appreciation of the responsibilities of ownership the corporate sense of women is eight times that of men.

We may give an instance from the journal in question. The public lighting company had undertaken the task of laying a main cable in a very difficult district where certain rocks had to be blasted. On the face of it the work seemed to be very slowly done. A number of letters were received from shareholders complaining that the men were not working with sufficient "pep." Very few letters were received from men to this effect. It may be that the men realised the technical difficulties of the task and that the women had not realised the technical difficulties of the task. It may also be that the stimulus was not so much the corporate sense as the financial sense. The editor, while making allowance for these complicated factors, still thinks it is his duty to sum up that in the corporate sense the women are much more acute than men.

The whole discussion is very interesting though for my own part I am not disposed to agree that the conclusions are fully proved. I do think, however, that one thing is proved and that is that our old-fashioned ideas that women are necessarily lacking in what is commonly called the business-like instinct is hopelessly wrong. For my own part I am not at all certain that I would draw any conclusion as between sex and sex in this comparison. It seems to me that if we supported a similar discussion to the one I have mentioned above but based it upon the number of letters received from red-haired persons as compared with letters from persons with other colours in hair, we might find that the corporate sense was very much more definite in those with red hair than in those who have not red hair, whether they are men or women. Any comparison based on the division of human beings into two classes may bring the most curious results. We are on safer ground, I think, in reaching the conclusion that where there is an opportunity for the exercise of business-like capacities human beings will rise to it. Beyond that we need not go.

J. L.

"Idiosyncrasies."

Subscribers' chance remarks and requests are often very quaint and reveal an ignorance of the L.T.S. which, though perhaps natural, is still a little surprising. The Supervisor, for them, has a wide range of names. She has been called the Manageress, the Head of the Operators, the Mother Superior, and the Guardian Angel. One jovial individual once asked for the lady who ruled his destiny (because he said she could always "get him through" or not, at her pleasure). An obvious student ponderously demanded the *deus ex machina*, one day; whilst less exalted individuals have often demanded the Lady Ganger, the Overseer, and the Forewoman. In their demands for the Information desk, they are no less original. Often they ask for The Complaints, the Information Bureau, the Trouble Department, the Faults, the Public Enquiries, and the Inflammation Department. Can anybody add to this list of queer things, I wonder?

DOROTHY TURNER.

THE CABLE ROOM ANNUAL SPORTS.

THIS annual function is generally the most enjoyable of all the C.R. functions. This is due to the family nature of the gathering, and is the one at which the younger generation of very tender years is able to take the earliest possible interest in Athletics. Toddlers of 5 and 6 years, unscared by the pistol shot were seen to start well off the mark, generally speaking, encouraged by their veteran sires, who have been known to carry chocolates in their pocket as a special incentive, we will not say *bribe* to success. Of course it rained, but not enough to mar the proceedings. In fact while those on duty were witnessing an almost tropical deluge in the City, Wembly was smiling in the sunshine and laughing merrily as the black clouds scudded away south-eastwards. The Committee are to be congratulated upon their happy selection of the Metropolitan Railway A.A. Ground which with its large hall, its well-equipped stage, its dancing floor and not least the excellent refreshment arrangements went far to give the general satisfaction repeatedly expressed.

It was a pleasure to see the number of T.S. competitors, and if the Cable-ites were somewhat greedy in the way in which they carried off the prizes it is up to the former to endeavour to remedy this weakness next year. The work of the handicapper must have been a difficult one but it was carried out with almost perfect judgment, a verdict which the defeated were only too willing to recognise.

It was by a happy coincidence that the date (Aug. 17) coincided with the retirement of Mr. E. Purkiss, Assistant Superintendent, so that it became possible for Mr. H. J. Broughton, the *doyen* of the Cable Room Superintendents, to present a gold watch to our respected friend on behalf of the staff and supervision.

Mrs. Broughton very gracefully performed the very pleasant duty of presenting the very handsome prizes to the successful competitors. It must have been this lady's special personality which encouraged the very youngest of girls and boys to toddle fearlessly up to the table and carry away the booty.

Numerically the attendance was better than one would have expected, considering the weather in others of the London suburbs, which undoubtedly deterred a number from venturing across the metropolis. One could have wished that the supervision had been more adequately represented. It does not, however, appear to be understood that this particular gathering is specially organised as a means for obtaining a better knowledge of one another, and what better occasion than a sports day which winds up with a concert and dance, the soul of which two latter items is Leonard Coomb's Bon Accord Orchestra? Now that after many trials and no little tribulation a most suitable ground has been discovered it is hoped that the committee will with more confidence be able to continue their excellent policy of opening wide the doors of welcome to this function.

J. J. T.

OBITUARY.

Mr. George Hey, Contract Manager, Rochdale.

We regret to record the death of Mr. George Hey in his 62nd year. This sad news came as a great shock to his old colleagues at the Castlemere Office, who had fondly hoped that their old and highly popular colleague would have enjoyed many years of well-earned retirement.

It was only so recently as September, 1921, that the late Mr. George Hey retired from the responsible position of Contract Manager of the Post Office Telephones Department for the Rochdale area.

In all he had 34 years' wide and varied experience, first with the old National Telephone Company and at a later stage under the Post Office, the first being, naturally enough, an excellent training ground for the second. He was born at Leeds in 1861, and worked for a time in the drawing office of the North-Eastern Railway Company.

In 1887 he entered into the telephone service by engaging himself as a clerk with the National Telephone Company, and although he was the only one of his kind there at that date, there is now a very large staff. Then, in 1892, he went to the district manager's office as cashier. A year later he passed on to Hull as chief clerk, and 1900 found him occupying a similar position in the big Welsh seaport town of Swansea. There, he found things somewhat lively, for he was up against keen Corporation competition, and at first it was a losing battle all along the line, so much so that in 1903 the Swansea Corporation established a telephone exchange of their own. The struggle waxed and waned, but four years later the National Telephone Company had the satisfaction of buying out the Corporation.

Between 1907 and 1913 Mr. Hey was stationed at Oldham, and in the last-mentioned year he became Contract Manager for the Rochdale area, where he remained until he reached the retiring-age limit. The Rochdale, area embraces a very wide section of country including for telephone purposes Huddersfield, Halifax, and Oldham. With the Rochdale staff Mr. Hey was ever *persona grata*; his treatment of his staff always represented the essence of kindness, the members of the staff turning to him for help and advice in difficult circumstances.

Mr. Whitelaw, the District Manager, represented the staff at the funeral, which took place on July 4. As a mark of their sincere regard the District Manager and staff sent a wreath of roses and carnations.

LONDON TELEPHONE SERVICE NOTES.

Further Education Scheme.

THE lecture courses arranged by the London County Council in connexion with the City Literary Evening Institute are due to commence again on Sept. 24, and it is hoped that they will be well attended. The programme is exceptionally attractive, and there are 34 subjects to make a selection from. Even if only one evening a week can be spared, it is possible to take up as many as three subjects and the time is well spent.

Some idea of the scope of the lectures may be gathered when it is seen that the following subjects are included :—archaeology ; elocution ; music ; literature (several distinct courses) ; art ; social, industrial and political subjects ; hygiene ; photography ; &c.

The main idea underlying the lectures is best expressed in the words of the Principal of the Institute who says :—

> "The lectures are purely humanistic in character and aim, and are not designed, at any rate, directly, to meet examination requirements. They will be appreciated by those who are seeking opportunity to extend their knowledge, to refine their taste, to enrich their leisure and to achieve a wider culture. Discussion and self-expression are encouraged, and there are numerous opportunities of participating in self-governing associations of students for special purposes and of enjoying social intercourse."

The organisers have done their work excellently, and it remains for the staff to take full measure of the opportunity presented.

* * * *

Post Office Sanatorium Society.

An interesting conference was held at Harrogate on May 25 and 26 last, attended by 70 delegates representing 34,379 members. Matters of considerable interest were discussed and delegates were impressed by the keen anxiety of the Committee of Management to make the Society a centre of real benefit to the staff.

The decrease in the percentage of arrested cases, due to an increased number of relapsed cases, and to the continued effects of the war, was commented on by the Secretary, Mr. F. E. Durrant, who urged the importance of applying for treatment at an early state of the disease. The need of increased membership was emphasized, and it is hoped that all who can will help the Society to this respect.

A proposal to build a Sanatorium of our own was discussed at length, but, although no definite steps are to be taken at present, the possibilities are being considered.

The present Management Committee includes Miss Nurse of the L.T.S., and Miss Jamieson, Mr. R. H. Davis, and Mr. W. H. Jayne of the C.T.O. The fact that 181 cases were dealt with in 1922 (including 17 telephonists and 44 sorting clerks, telegraphists and counter clerks) shows that their office entails hard work, and our thanks are due to them for all their efforts.

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Swimming Events.

Two galas are announced already and no doubt more are to follow. The first is the Trunk Exchange Gala to be held at Holborn Baths on Sept. 11. The other event is the Annual Gala organised by the L.T.S. Swimming Association, and will be held as last year at the Pitfield Street Baths, Hoxton.

Both affairs promise good sport, and, judging by past experience, will have packed attendances, so those who intend going will be well advised to get their tickets early.

* * * *

The Choral Society.

Arrangements for the forthcoming season are well in hand, and rehearsals will be held as usual on Tuesdays at the Ranger's Hall, Chenies Street, Tottenham Court Road. The first rehearsal will be held on Tuesday, Oct.2.

All those interested who are not already members are invited to attend at any rehearsal, and the Secretary, Mr. W. R. Child, of the Contract Branch, whose address is 102, Dean Street, W., will be glad to give particulars of membership.

Instrumentalists are especially invited and, of course, male voices are wanted.

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London Telephonists' Society.

This Society, with Miss E. A. Cox as President, will commence its session on Oct. 5, when the Presidential address will be read.

An interesting programme for the session is promised, and it is hoped to give full details in these notes next month.

A Staff Marriage.

Many old friends of Mr. R. W. Gregory of the Traffic Branch will be interested in the news that he was wedded to Miss Agnes E. Weller, a member of the Museum Exchange staff, on Thursday, Aug. 16. Although the bridegroom has been in the telephone service for very many years, it came as a surprise to hear that "young Greg." was to be married. In spite of his envied youthful appearance we shall now have to regard him as "grown up." Actuated by the highest motives, his colleagues presented him with gardening implements, which, if he uses them diligently, will keep him vigorous and in good health and incidentally, of course, they furnish him with a good excuse for staying at home in the evenings and during the week-ends.

PERSONALIA.

LONDON TRAFFIC STAFF. TELEPHONISTS.

Resignations on account of marriage :—

Miss L. CHAPMAN, Assistant Supervisor, Class II, of the Regent Exchange.
Miss G. F. BOWMAN, Telephonist, of the Trunk Exchange.
Miss H. M. BOWE, Telephonist, of the Trunk Exchange.
Miss C. E. CROWDEN, Telephonist, of the Trunk Exchange.
Miss A. H. WELLS, Telephonist, of the Holborn Exchange.
Miss F. A. VANHEGAN, Telephonist, of the London Wall Exchange.
Miss G. A. COLE, Telephonist, of the Putney Exchange.
Miss E. GARRETT, Telephonist, of the Regent Exchange.
Miss W. F. WEEDON, Telephonist, of the Regent Exchange.
Miss I. V. E. HARRIS, Telephonist, of the Regent Exchange.
Miss G. I. E. ARMSTRONG, Telephonist, of the Streatham Exchange.
Miss W. M. F. HYDE, Telephonist, of the Streatham Exchange.
Miss G. E. BOWYER, Telephonist, of the Museum Exchange.
Miss O. B. CUTTS, Telephonist, of the Gerrard Exchange.
Miss K. I. BRIDGLAND, Telephonist, of the Victoria Exchange.
Miss Q. M. REVIS, Telephonist, of the Victoria Exchange.
Miss L. PHILLIPS, Telephonist, of the Victoria Exchange.
Miss P. M. POTTER, Telephonist, of the Hampstead Exchange.
Miss E. G. TOMKINS, Telephonist, of the Hampstead Exchange.
Mrs. F. L. WALTON, Telephonist, of the Hampstead Exchange.

Miss D. M. COBDEN, Telephonist, of the Hampstead Exchange, has resigned on account of private reasons.

LEICESTER.

Mr. E. W. CRAFTER, Assistant Superintendent, has been appointed to Superintendent Telegraphs, Leicester.

Mr. A. W. WALKER, Overseer, has been appointed Assistant Superintendent, Leicester.

MANCHESTER.

A Telegraph and Telephone Society has been formed at Manchester with an initial membership of approximately 200. It is proposed to open the session with a social evening on or about Oct. 23, to be followed at monthly intervals with lectures on various matters.

The following officers and committee has been elected :—

J. G. MADDAN, Esq., Postmaster-Surveyor, *President.*
ARCHER SMITH, Esq., District Manager, *Vice-President.*
T. G. GIBSON, Esq., Assistant Postmaster, *Vice-President.*
J. R. JEWELL, Esq., Chief Supt. (Tels.), *Vice-President.*
Mr. G. F. STAITE, *Chairman of Committee.*
Mr. E. C. GATES, *Vice-Chairman.*
Mr. R. H. CLOUGH, *Secretary and Treasurer.*

Committee.

Miss A. TALBOT.	Mr. J. C. RHODES.
Miss E. A. FOX.	Mr. M. GRAINGER.
Miss R. BARRODALE.	Mr. B. J. H. BITTON.
Miss M. RICHARDSON.	Mr. A. M. CAMERON.
Mr. A. C. GODFREY.	Mr. G. R. BARLOW.

The intention is to run the Society on popular lines and it is anticipated that a very successful season will be the result.