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CONTENTS.

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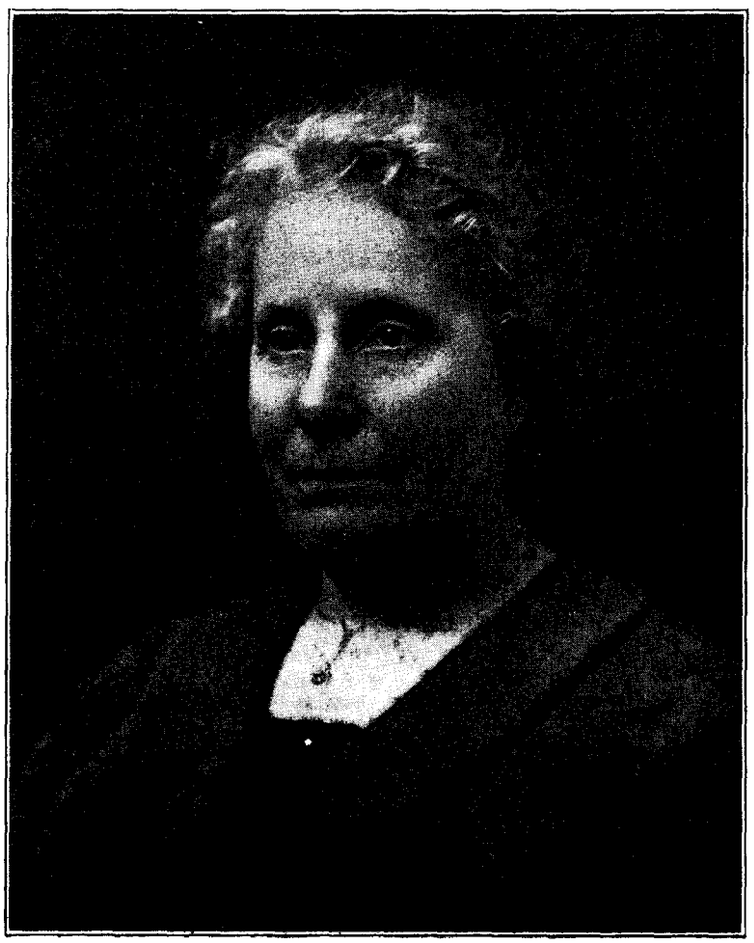
TELEGRAPH AND TELEPHONE MEN AND WOMEN.

XXXVII.—

MISS H. E. WALLIS.



WE present this month the portrait of Miss H. E. Wallis, who, as Chief Supervisor of the Central Telegraph Office, occupies the most important post open to women in the British Telegraph Service.

The staff of the Central Telegraph Office includes over 1,200 women, and to rise to the headship of this large body is no mean achievement. Miss Wallis—to employ a phrase sometimes used by men, rather arrogantly perhaps, in expressing admiration of a woman's business capacity—has a "man's head," but her gifts of judgment, impartiality, and energy have not effaced or even weakened her possession of those qualities of the heart which are regarded as the special attributes of women.

Her responsibilities are heavy, but she would be the last to make any such admission. She faces her duties with a sanity and a sense of humour which lighten the heaviest load and which refuse to make molehills appear other than as molehills.

These days are fateful for women. They are entering fields of employment hitherto reserved for men and taking a greater hold on fields to which they have already had an entry. The telegraph service cannot be exempt from this tendency of the times and Miss Wallis, more than any other telegraph woman, has the opportunity to prove the capacity of her sex for a larger share in the responsibilities of the Service. Those who know her know also that the women's cause could not be in better hands.

NOTES ON TELEGRAPH PRACTICE.

By G. T. ARCHIBALD.

(*Continued from page* 71.)

XXIV.—*Concerning Phonogram and Telephone-Telegram Organisation.*

AT first sight it may seem reasonable to assume that the ordinary telegraph procedure should suffice for the efficient working of the phonogram and telephone-telegram system. A moment's consideration will, however, dispose of any such postulation. In telegraph working there is no intermediate switching operation at a point remote from the operating sets, whereas the reverse is almost universally the case in phonogram and telephone-telegram working. It is important to remember in this connexion that the telephone switchboard operator, unlike the telegraph concentrator switchboard operator—who controls the traffic—is not in a position to visualise the traffic position at the phonogram sets and her aloofness or remoteness is a factor of considerable importance in the organisation.

It will be clear, therefore, that the development of phonogram and telephone-telegram working has called for the creation of a new technique and for that reason, if for no other, the service is of particular interest to those occupied in traffic organisation.

It has to be borne in mind that telephonic transmission is slower than telegraphic transmission and that it is necessary to repeat every telegram sent over a telephone circuit because of the greater liability to error, i.e., sound and spelling errors. These two factors would probably be sufficient to render the telephonic disposal of telegrams uneconomical; other considerations tend, however, to throw the balance in the opposite direction. As was pointed out in the preceding chapter upwards of 50% of the phonogram traffic would be tendered at sub-post offices for telegraph transmission if the phonogram service were not available, and the saving in this respect alone is sufficient to make the service economical.

There are equally important considerations in relation to the telephone-telegram system. Originally telephone-telegrams were dealt with only over direct circuits, i.e., in cases where the volume of traffic was sufficient to justify independent circuits. In 1913 it was decided to develop the use of what are called "jointly used" circuits which are provided at small offices where neither the telegraph nor the telephone load is sufficient separately to justify the facility. The great advantage of this arrangement is that combined facilities can be given at a large number of remote places which would not otherwise be so served and that the cost of maintenance, &c., is shared equally by the telegraph and telephone services. Telephone calls receive precedence on jointly used circuits unless a telegram has been waiting disposal for ten minutes.

This arrangement proved so successful that it was decided to extend the use of the telephone system as a means of linking up small offices with a larger telegraph transmitting centre in order to save telegraphic transmissions provided that—

(1) ordinary telephone traffic was not prejudiced;

(2) not more than two short trunk circuits or two junction circuits or one short trunk circuit and one junction circuit was employed;

(3) the number of telephone switchings involved was not excessive in comparison with the number of telegraphic transmissions saved;

(4) the whole of the traffic between two places, in each direction, was disposed of as far as possible by the same route.

It was also laid down that routes worked by telegraph upon which the traffic did not exceed 50 telegrams a day with a busy hour load of 10 should be converted to telephone working.

The arrangement was a great boon to Sub-Postmasters who were no longer compelled either to become expert Morse telegraphists or to engage as assistants persons who were trained telegraphists. The difficulty in finding suitable assistants which had by that time become rather serious in many districts was lessened and the cost of special training was saved.

In 1914 a further extension of the telephonic disposal of telegrams was decided upon and in 1920 it was laid down that this form of working should be established in order to save one or more telegraph transmissions within the following radii:—

(i) where two switchings at two terminal offices only are necessary—20 miles;

(ii) where switchings are necessary at an intermediate telephone exchange in addition to the two terminal exchanges—15 miles.

Switchings at terminal exchanges where the telegrams are dictated from or received at the switchboard are ignored. If switchings at four or more exchanges would be necessary telephone circuits are not used in normal circumstances.

The distances are measured radially between the exchanges to which the sub-offices are connected.

The result of this development has been not only to save telegraphic transmissions but also to expedite the disposal of local telegrams which can be dealt with in this way.

Previous to 1913 the executive control and supervision of phonogram and telephone-telegram work was indefinite. In that year, however, it was decided that the immediate supervision of phonogram and telephone-telegram work done by telephonists, and where a separate supervising officer was justified, should always be performed by an assistant supervisor on the telephone establishment.

At the same time it was laid down that general control of the work would depend upon local circumstances: when performed in the telegraph instrument room or in a separate phonogram room adjacent to the telegraph instrument room and practically part of it, the general control should be exercised by telegraph officers. As, however, the question of junction loads arises from time to time, telegraph officers are expected to keep in close touch with the telephone District Managers. Where the work is performed in a telephone exchange or in a phonogram room more closely associated with a telephone switchroom, general control should be exercised by the District Manager who is expected to keep in close touch with telegraph officers on telegraph questions. This arrangement is still in operation.

At the outset phonogram work was performed by telegraphists, but except in a few isolated instances it is now done by telephonists. Telephonists so employed perform phonogram duties for periods varying from three to six months and then revert to telephone duties in order that they may maintain their all-round qualifications. It is open to question whether a rotary system is satisfactory and fully efficient either from a telephone or a telegraph point of view, now that the traffic has reached such large proportions. It has recently been decided to form a separate establishment of telephonists for phonogram work at the Central Telegraph Office, London, but whether similar steps will require to be taken at the large provincial towns is a matter for consideration. The chances of promotion of operators employed solely on phonogram work may be less favourable than those of their colleagues engaged in the ever-increasing telephone service, but a greater measure of specialisation would seem to be necessary if further expansion takes place.

It will be obvious from the information furnished in the preceding chapter that the unit of standards of load cannot

be based entirely on the number of messages handled per operator in an hour. The time occupied depends upon (i) the length of the message; (ii) the number of outgoing telegrams (the time taken to secure connexion must be added to the working time) and (iii) the number of occasions where more than one telegram is passed during one connexion, and in order to meet these conditions the staff is based on standards of directly occupied time per operator hour.

This question was very ably dealt with by Mr. W. C. Griffiths in a paper read before the Edinburgh Telegraph and Telephone Society in 1922. Mr. Griffiths pointed out that in order to preserve a uniform standard of service in towns of all sizes variation in the standard of directly occupied time were necessary. In a large installation the chances that an operator is free at the moment a call is received are greater than in a small installation; it follows, therefore, that if every operator is engaged when a call is received, the chances are that one will be available sooner at the larger installation. If the average duration per call is three minutes a second call received at an installation of only one position would be kept waiting for about 90 seconds, whereas the eleventh call at an installation of ten positions would have to wait only 9 seconds.

In order to maintain a uniform standard of service it is necessary, therefore, to reduce the waiting time at the smaller installations, and this is accomplished by reducing the load so that there shall be a quick speed of answer on calls received when a telephonist is free, compensating the inevitably slower speed of answer when all the operators are engaged.

The standards at present in use are :—

1 position	staffed	27	minutes	occupied	time	per	operator	hour.
2 positions	,,	33	,,	,,	,,	,,	,,	,,
3 ,,	,,	38	,,	,,	,,	,,	,,	,,
4 ,,	,,	42	,,	,,	,,	,,	,,	,,
5 or more ,,	,,	45	,,	,,	,,	,,	,,	,,

It will thus be seen that the variations mentioned above are provided for not only at offices of different sizes but that the varying conditions throughout the day within any one installation are provided for. The fact that a large installation can be staffed more economically and more efficiently than a small one with a similar quality of service is of great importance. If the efficiency attainable when one position and five positions or more is represented by 60% and 100% respectively for the same quality of service, it is not unreasonable to argue that there is a sound case for concentrating phonogram work on the larger offices.

A load of 100 messages of an average duration of 2.2 minutes can be handled within the standard of permissible delay by five telephonists at one installation. Six telephonists would be required if the work were divided between two offices and ten if it were divided between five offices.

There can be little doubt that telephone development will be reflected in phonogram traffic, and it is necessary therefore that traffic officers shall keep closely in touch with the work of phonogram rooms. In London a new equipment of 230 positions estimated to suffice for years was installed in September, 1923, the question of further accommodation is already under consideration.

(The End.)

TO THE EDITOR, "TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—I cannot allow the last of the series of articles on Telegraph Practice to appear without acknowledging my indebtedness to Mr. John Lee, Mr. J. Stuart Jones, Mr. J. W. Plackett and my colleagues in the Telegraph Division of the Headquarters Telegraph and Telephone Traffic Section for their kindly help, advice and criticism.—Yours,

G. T. ARCHIBALD.

TELEPHONE DEVELOPMENT OF THE WORLD IN 1925.

BY W. H. GUNSTON.

(Continued from page 61.)

NORTH AMERICA.

	No. of Telephones.	Population (thousands).	Inhabitants per telephone.
United States (16,159,550) ...	16,935,924	113,200	6.6
Canada (1,072,454)	1,144,095	9,160	8
Mexico (50,980)	53,000	16,000	302
Cuba (54,918)...	60,000	3,000	50
Other West Indies (2,500) ...	3,000	2,000	—
Central America (17,930) ...	19,500	6,000	—
Total ...	18,216,000	149,000	8

The total for the *United States* is made up as follows :—

	Telephones.
American Telephone & Telegraph ("Bell") Co. and Associated Companies	12,035,224
Independent Companies having connexion with above system	4,685,000
Entirely independent (estimated)	215,700
Total ...	16,935,924

The increase on last year is at the rate of 4.8%.

CANADA.

The following statement shows the distribution of the telephone in the Dominion :—

	Telephones.
Ontario	508,513
Quebec	223,227
Saskatchewan	100,096
British Columbia	99,346
Alberta	70,073
Manitoba	69,000
Nova Scotia	39,242
New Brunswick	28,945

Telephone development in Canada increased at the rate of 6%.

The figures for Cuba, Mexico and Central America are from an American source.

SOUTH AMERICA.

	Telephones.	Population (thousands).	Inhabitants per Telephone.
Argentine (173,605) ...	186,000	9,839	54
Bolivia (1,824) ...	2,000	—	—
Brazil (98,564) ...	103,000	30,900	300
Chile (30,895) ...	31,000	4,500	145
Colombia (14,923) ...	17,000	—	—
Ecuador (4,518) ...	4,500	—	—
Guiana	2,500	—	—
Paraguay	500	—	—
Peru (9,552)	10,000	—	—
Uruguay (24,184) ...	26,000	1,640	63
Venezuela (11,047) ...	11,500	—	—
Total	394,000	69,000	176

AUSTRALASIA.

Australia (343,151) ...	384,563	5,633	14.6
New Zealand (115,549)...	125,372	1,320	10
Haiwaii (17,707) ...	18,500	256	14
Other places	1,500	700	—
Total ...	530,000	8,000	15

The 384,563 telephones in the Australian Commonwealth are thus distributed :—

	Telephones.
New South Wales	146,866
Victoria	120,749
Queensland	46,007
South Australia	39,901
Western Australia	19,783
Tasmania	11,257

Development in Australia in 1925 was at the rate of 12% and in New Zealand at 9%.

CITIES WITH 75,000 TELEPHONES AND UPWARDS.

	Telephones.
New York	1,415,108
Chicago	790,711
*London	476,813
*Berlin	415,871
Boston	392,381
Philadelphia	359,000
Los Angeles	280,954
*Paris	255,561
Detroit	240,696
San Francisco	215,464
Cleveland	184,694
Pittsburgh	181,385
St. Louis	176,847
Toronto	154,740
Cincinnati	140,547
*Hamburg	139,107
Montreal	138,225
Washington	129,405
*Copenhagen and suburbs	127,742
Kansas City	124,427
Milwaukee	120,924
*Tokyo (1924)	119,885
Minneapolis	115,833
Baltimore	115,427
*Stockholm	107,173
Buffalo	103,628
Oakland	100,883
*Vienna	98,226
*Buenos Aires (1924)	97,838
Seattle	96,981
*Sydney	87,504
Portland (Oregon)	84,432
Newark, N.J.	81,754
Denver	76,440
*Osaka (1924)	76,426
Indianapolis	76,254

All these cities except those marked * are in North America.

CITIES WITH 10,000 TELEPHONES AND UPWARDS.

Of these 261 Cities 159 are in North America, 76 in Europe, 10 in Asia, 8 in Australasia and 4 each in Africa and South America.

United States :—(The principal cities are mentioned in the foregoing table.)	145
Germany :—(Berlin 415,871, Hamburg-Altona 139,107, Munich 61,537, Leipzig 57,586, Cologne 57,563, Frankfurt-Main 50,980, Dresden 50,139, Breslau 36,486, Düsseldorf 33,919, Stuttgart 34,538, Hanover 30,897, Nuremberg 30,633, Bremen 27,161, Mannheim 22,212, Chemnitz 20,785, Essen 21,273, Magdeburg 18,892, Königsberg 18,730, Duisburg 18,510, Stettin 16,915, Dortmund 16,391, Elberfeld. Barmen, Halle and Crefeld each over 10,000)	25
Great Britain :—(London 476,813, Manchester 63,630, Glasgow 50,160, Liverpool 48,593, Birmingham 40,515, Edinburgh 20,882, Leeds 17,700, Newcastle-on-Tyne 17,007, Bradford 16,539, Sheffield 15,013, Hull, Bristol, Cardiff, Belfast, Nottingham and Leicester all over 10,000)	16
Canada :—(Toronto 154,740, Montreal 138,225, Ottawa 33,547, Vancouver, Winnipeg, Quebec, Hamilton, London, Victoria (B.C.), Halifax, Edmonton and Windsor all between 10,000 and 30,000)	12
Japan :—(Tokyo 119,885, Osaka 76,426, Kobe 22,156, Kyoto 20,890, Nagoya 18,617, Yokohama 13,421—all in 1924)	6
France :—(Paris 255,561, Marseilles 18,528, Lyons 18,501, Bordeaux 12,579, Strasbourg 10,187)	5
Australia :—(Sydney 87,504, Melbourne 73,694, Adelaide 24,838, Brisbane 18,477, Perth 11,628)	5
Switzerland :—(Zürich 26,775, Geneva 15,778, Basle 15,042, Berne 13,537)	4
Netherlands :—(Amsterdam 39,644, Rotterdam 32,523, The Hague 29,070)	3
Belgium :—(Brussels 53,893, Antwerp 23,046, Liége 11,209) ...	3
Sweden :—(Stockholm 107,173, Goteborg 28,993, Malmo 14,893) ...	3
New Zealand :—(Wellington 14,686, Auckland 14,655, Christchurch 10,055)	3
Russia :—(Moscow 49,897, Leningrad 38,860)	2
Spain :—(Madrid 16,000, Barcelona 17,000)	2
Italy :—(Rome 14,000, Milan 18,000)	2
India :—(Calcutta 12,171, Bombay 10,061)	2
China (Peking about 40,000, Shanghai 23,000)	2
Egypt :—(Cairo 13,822, Alexandria 10,112)	2
South Africa :—(Johannesburg 21,343, Cape Town 12,917) ...	2
Argentine Republic :—(Buenos Aires 98,000)	1
Austria (Vienna 98,226)	1
Brazil :—(Rio de Janeiro 34,000)	1
Chile :—(Santiago 10,000)	1
Cuba :—(Havana 38,000)	1
Czecho-Slovakia :—(Prague 27,000)	1
Danzig :—(Danzig 10,986)	1
Denmark (Copenhagen 127,742)	1
Hungary (Budapest 32,005)	1
Ireland :—(Dublin 13,867)	1
Mexico :—(Mexico City 27,000)	1
Norway :—(Oslo 39,682)	1
Poland :—(Warsaw 33,000)	1
Portugal :—(Lisbon 13,893)	1
Roumania :—(Bucarest 11,584)	1
Turkey :—(Constantinople 10,325)	1
Uruguay :—(Monte Video 15,000)	1
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THE MAN WHO LETS THE NEW YEAR IN.

[Reprinted from the *Westminster Gazette*.]

IT may be that he does not fully realise the responsibility, for he has other responsibilities. It is his function to let the New Year in, not to one particular house or to one particular town or village, but to the whole Planet on which we live. At midnight he stands, as no one else stands in the whole world, on the threshold of the New Year, for he lives and moves on that particular line where the New Year begins. Twelve hours before you and I have finished our midnight resolutions he has lived half a day in putting them into practice. For he is to be found (if you go and search for him) at Suva, in the Island of Fiji, where the New Year begins. He is as English as you and I are English, and he fulfils the solemn responsibility of conducting the business of a long submarine cable which connects Canada with Australia. So he is awake at midnight, for his are affairs which go on night and day. He is passing all sorts of messages for the Press, all sorts of tender greetings of good wishes for the New Year, which comes to him first of all the human race. So Fiji, as at this time, is a place of thrilling importance.

* * * *

Let us get hold of the romance of it before we interview him. Suva is a romantic spot. It has nowadays a vast trade with Australia and New Zealand, and about a year ago was the scene of celebrations of rejoicing when the native drum was brought forth to sound the jubilee of the establishment of the Crown Colony. The native drum will not sound for the coming of the New Year. But our friend, having assured himself of the kindly arrival, will announce to his friends at New Zealand and Australia that they may expect 1927 in an hour's time, for it is on the way. So time marches on and the Empire sets itself for a 24-hours' welcome of the little stranger. We ourselves are half way in this prolonged greeting, as we ought to be, but we must give our friend the credit of being first.

Someone will say that all this is arbitrary, and that one, Einstein, with the bludgeon of relativity, has knocked it endways. So I ask our friend at Suva what he thinks of it. "Yes," he says, "this group of islands, with all their tropical verdure, with their history of weird ceremonies of whale's teeth, and the like, have the honour of presenting the first front to 1927. Were it not for the means of communication, cables and wireless and the like, it would not be possible. You, in your conventional way, choose a dark-haired man (for luck) to let in the New Year, but it is I, on night duty in Suva, who really let it in. I do it well and in a seemly way. I tell the New Year what the world wants at its hands. I speak for all of you—black, and white, and yellow. It is a solemn moment, for all real hospitality is based on the kindliness of the first words. I am the Man who lets the New Year in."

* * * *

This lonely watch of our friend, with his little company of colleagues, is a real Watch-Night Service, as one may say. He is the first to put "1927" at the head of his paper. Presently the force of habit may drive him to "1926" again, but we may be sure that at the beginnings he is invariably accurate. When New Zealand and Australia have awakened to the New Year and the crowds in Melbourne and Sydney have finished their cheering in the hot night (so different from home), already the New Year is to him a familiar friend. He was the very first to let in the New Year, and the Vancouver to which he is closely connected must wait yet twenty hours before its turn comes. We may hope that he will fulfil his mission with unusual tact and kindliness, for the civilisation which he represents on this august occasion has much to expect from the New Year which he will let in. J. L.

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New Zealand :—(Wellington 14,686, Auckland 14,655, Christchurch 10,055)	3
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TELEGRAPHIC MEMORABILIA.

One could have confidently prophesied that it would happen, and it has happened. In my peregrinations through the daily Press I found the confirmation of my previous conviction which months ago was that if, soon after Jan. 1, 1927, some undesirable change in program or method were to be made by the new British Broadcasting Corporation, such change would be placed to the discredit of "Government Control."

Therefore, the writer was not surprised to read that the disappearance of the "Aunts" and "Uncles" from the "Children's Hour" is all due to the narrow rules and regulations which one is led to expect from a State Department!

The critic did not go so far as to say that it was a result of "grandmotherly" legislation, or to bring matters right up to date, "avuncular" government.

Even *The Electrical Review*, in its really handsome tribute to the Wireless Branch of the Post Office Engineering Department on the success of the Trans-Atlantic Radio Telephone Service, cannot refrain from just one little touch of "back-lash" which will be obvious on reading the following :—

"Great credit is due to the wireless branch of the Post Office Engineering Department, which has displayed not only technical ability of a very high order, but also a degree of enterprise which is not usually associated with a State undertaking. The design and construction of the Rugby station—the most powerful in the world, and the first long-distance station to be wholly dependent upon valves for the high-frequency current—was in itself a first-class engineering feat, and it has been worthily followed up by the later developments, which, moreover, are not likely to represent the limit of the Department's ambition."

The *Review* also points out what is a very interesting fact, namely, that Dr. J. A. Fleming, the inventor of the thermionic valve in 1904, predicted as early as 1907 that speech would one day be possible across the Atlantic and repeated this prediction in 1914.

That this, the most recent radio achievement, was only possible as a result of Dr. Fleming's pioneer work, can best be realised perhaps by the mere citation of the fact that the power amplifiers in use at Rugby to-day are capable of giving an amplification well in the neighbourhood of 500,000,000 times. This development has been possible by the very close co-operation of the Post Office Engineering Department and the Standard Telephones & Cables Ltd., New Southgate, London.

Thirty-four water-cooled valves are used, one thousand gallons of water per hour being required for cooling the valves in each of the two units into which the amplifier is divided.

The following item provided by a special correspondent of the *Westminster Gazette* in Berlin, is of particular interest in view of the repeated direction of our readers' attention to the development of undirected short-wave radio telegraphy. It may, perhaps, be permissible to emphasise—if not over-modest, maybe, to mention—that it has also been maintained that the telegraphic speed of radio telegraphy is apparently only limited by the capacity of the human brain to devise and human skill to construct the necessary receiving and transmitting telegraph apparatus.

It is hoped that either in the present number of this *Journal* or in that to be issued in March next, it will be possible to publish a short illustrated description of certain German apparatus, which is quite capable of transmitting telephotographic messages at the maximum rate mentioned in the first paragraph of the communication which now follows :—

"Experiments made this year (1926) between the German wireless station at Nauen and Rio de Janeiro with wavelengths of 40 and 25 metres respectively proved that over this distance it is practicable to transmit over 1,000 words per minute in the form of radio pictures.

"This means that instead of using Morse signs, which lead to many errors, the actual handwriting of the sender will be transmissible.

"At present the chief item of cost in overseas cabling depends on the time taken to make the transmission. Up to now the greatest attainable speed has been 1,600 letters, or about 300 words, per minute. This speed is, however, never attained in ordinary work, a rate of 100 words per minute being a good average."

Inter alia, and with well over forty years telegraph experience behind one, it may be very safely said that it would not *always* prove to be an unmixed blessing for the receivers of telegrams to get their messages "in the actual handwriting of the sender"! Stubby or scratchy lead pencils or smudged originals or the erasures of a sender's *first* thoughts might one and all prove—well, let us say—inconvenient. However, the transmission of a letter telegram of hundreds of words at a very rapid rate is to-day a practical proposition. What an examination of the economic position would be likely to result in cannot be stated at the moment, for such telegrams would have to be charged *not* on a word rate but on the superficial area utilised for the telegram.

Atmospherics.—Sir Ernest Rutherford, the President of the Royal Society, in his anniversary address to the members of the Society at Burlington House at the close of 1926, made some interesting references to the extent to which magnetic storms and weather vagaries which so often accompany sunspots, are induced by the projection into the atmosphere of matter. The President referred to the striking advances which had been made in radio-communication, and to the new avenues of research into the electrical state of the atmosphere that were opened up by the study of the mode of propagation of wireless waves over the earth. Sir Ernest observed that while the study was of much interest in itself, the observations now being made by the Radio Research Board of the Department of Scientific and Industrial Research, and others, were of even more value as giving to scientists a new and powerful method of attacking the problem of the electrical state of the atmosphere, particularly at heights where direct observations were impossible.

Sir Ernest anticipated that an extension of such experiments will provide us with much valuable information not only on the degree of ionisation of the upper atmosphere, but on its diurnal and seasonal variations. Although only preliminary observations have so far been made on this question, the results obtained show that there is much promise in this new method of attack on a difficult problem. The phenomena of the aurora and the diurnal variation of the earth's magnetism have long been supposed to indicate that the upper atmosphere is highly ionised and an excellent conductor of electricity. The origin of the ionisation is a matter of much interest. Part, no doubt, is due to the ultra-violet light emitted by the sun, but there may be other important contributory causes. During this year, Mr. E. A. Milne has shown how certain atoms of matter, ejected from the sun, notably those of calcium, may, in consequence of absorption and emission of radiation, acquire sufficiently high velocities to penetrate deeply into our atmosphere. It may be that the brilliant auroræ and magnetic storms which so often accompany sunspot activity, are a consequence of the projection into our atmosphere not only of electrons, as has long been supposed, but of swiftly moving atoms of matter.

Television.—The following interesting additional information regarding Mr. J. L. Baird's work in connexion with the developments of television was published in one of the January issues of the *Electrical Review* apparently as an addendum to previous information given on the same subject :—

"Those who were present at those first demonstrations," says that well-known electrical authority, "will recollect that it was necessary for the person whose image was being transmitted to sit beneath a very brilliant light, the intensity of which caused considerable discomfort to the sitter. In the article it was pointed out that continual effort had been made to reduce this light, and that it had been so reduced as to be no greater than the normal lighting of a photographer's studio. Whilst pursuing this line of research an effort was made to use the invisible rays at the end of the spectrum, that is, the infra-red rays. These rays, while possessing great penetrative power, have unfortunately a comparatively small photo-electric effect, and considerable difficulty was at first experienced on this account. This difficulty has now, it is claimed, been overcome, with the result that Mr. Baird has been able to demonstrate actual vision of an object which is in "total darkness." At a recent demonstration the sitter occupied a chair in a completely dark room before the transmitting Televisor. On the screen of the receiving Televisor in another room his *confrères* were able to see his features portrayed. It is noticeable, however, that the use of infra-red rays has a distinctly distorting effect on the reproduced image; red parts of the image tend to be reproduced as whites, while blue comes out as black. The very great penetrative powers of these rays, together with the fact that they are totally invisible to the eye, would indicate that a development of the present apparatus might provide an instrument of considerable utility in military and naval operations."

Mr. Baird has also added to the gaiety of life by proving that "different faces transmitted by television transmission make different noises," that is to say that the variation and combination of electrical vibrations received from any televised object, if received on a *telephone* receiver produce certain sounds sufficiently distinctive to be identified very definitely with that object. The characteristic of one gentleman's visage, it is said, was the sound of a cabbage! *Oh mon pauvre choux!* ejaculated a French visitor.

Argentina.—Reuter's Trade Service, Buenos Aires, says that a contract has been concluded for an additional radio-broadcasting station in the Colon Opera House, Buenos Aires, at an estimated expenditure of 100,000 dollars (£20,000). The station, which is to be built by a United States company, is to be in operation by May, 1927, in time for the next opera season.

Australia.—*The Financial Times* declares that the Commonwealth has appointed a Royal Commission to investigate broadcasting. It is suggested that there will be alterations in policy and practice. The Commission is to work on much the same lines as the British Investigation Commission.

In the opinion of the P.M.G., Mr. Gibson, however, says another authority, there is no necessity for the appointment of a Royal Commission to inquire into wireless matters in Australia, as was advocated by the Association for the Development of Wireless. "There is no need for any more Government control than what is provided for under present regulations," he added.

Important proposals were agreed to at a conference called by the Council of Scientific and Industrial Research recently. It was agreed to recommend that immediate steps be taken in Australia to form a Wireless Research Board, attached to the Council.

Reuter's Trade Service, Melbourne, reports that according to a return issued by the Director of Postal Services, the total number of wireless listening licences held in Australia is 175,298. New licences to the number of 10,796 were issued last month; Victoria stands out from the other States with over 89,000. The ratio of licences for every 100 of population of the Commonwealth is now 2.9, of Victoria 5.28, and of New South Wales 2.04.

AUSTRIA.—Interesting particulars are given in the recently issued report for 1925 of the Austrian Posts, Telegraphs and Telephones Department regarding the extensions undertaken during the year. For the first time porcelain insulators of Austrian manufacture were used, to the extent of approximately 290,000 pieces. The work of changing over the Vienna telephone system to automatic operation, commenced before the war, was completed, and 6,000 new subscribers connected in 1925. There are now about 70,000 telephone subscribers in Vienna, who are served by thirteen exchanges, the largest having 10,000 connexions and the smallest 1,000. A new automatic telephone exchange has been completed in Linz; one is approaching completion in Salzburg, while work on one in Neustadt, Vienna, has been started. New international telephone connexions have also been established between Vienna and Warsaw, Vienna and Pressburg, Vienna and Agram, and between Kufstein and Oberaudorf.

Reuter's Vienna agency makes a statement which envisages telephone communication with India and China in the not too distant future. It says that the opening of the Vienna-Nuremberg telephone line on Jan. 4 connected Austria with the main telephone systems of Western Europe. The new line will form an important link in the extension of the telephone from Great Britain across the Continent to the Black Sea, Persia, and India. It is hoped to open a direct service between Vienna and London in April; next year the Austrian system will be connected with those of Hungary, Yugo-Slavia, Italy, Switzerland, and Czecho-Slovakia.

It is not thought that this particular development of long distance telephony to the Far East is likely to effect, detrimentally, the cable companies serving these huge areas.

The Radio-Austria Gesellschaft, which maintains the foreign wireless-telegraph service in Austria, continues to make good progress. During the past year a third transmitter (25-kw. Marconi) was installed at the Deutsch-Altenburg transmitting station. The receiving station at Laaer Berg was reconstructed and connected to the local municipal electricity supply mains. A short-wave transmitter has also been installed for experimental purposes. The average number of messages dealt with increased from 939 per day in 1924 to 1,708 in 1925.

BELGIUM.—According to the London *Times* the Ministry of Posts and Telegraphs is preparing the draft of a Bill, which will probably be placed before Parliament about the end of this month, for the creation of a separate and autonomous administration of telegraph and telephone services. The measure would provide the services with an accounts department on an industrial basis, and would empower the administration to borrow for extension purposes. Five companies have offered to provide the State with the necessary credit for the development of its plant, two of which would supply apparatus and the other three cables required for extending the system. Payments would be spread over a period of five years, the first instalment becoming due six months after the completion of the works, and subsequent instalments every six months thereafter. This arrangement would enable the State to defray the cost of the new installations with the additional receipts which they would yield.

BRAZIL.—From Rio de Janeiro per Reuter we obtain an apparent confirmation of the short wave service in the statement that a *new* direct means of wireless communication has been established between Brazil and Germany. The German sending station is at Nauen, near Berlin, and the Brazilian receiving station at Rio de Janeiro.

CENTRAL AMERICA.—From Guatemala City via the same agency we also learn that the radio stations presented by the Government of Mexico to Guatemala and El Salvador have been completed and put into public service. They deal with ordinary messages, night and special Press service, and day and night letters. The neighbouring States of Honduras and Costa Rica have been brought into radio communication range.

DENMARK.—From *Commerce Reports*, *World Radio*, and other sources, the information reaches London that over 92,000 licensed receiving sets, about 44,660 of which are valve sets, are now operating in Denmark, according to a recent announcement made by the Government Control Board. Practically 90% of all the sets are in Copenhagen and its suburbs, most of them being of the crystal type. It is expected that with a more strict enforcement of the licence law the figures for receiving sets in Jutland will show a great increase.

The present station in Copenhagen, which broadcasts on a wavelength of 337 m., will in the near future use a new transmitter built by Danish firms. The energy will be 1 kw., and it will act as relay for Copenhagen and its suburbs in co-operation with the new high-power station now under construction near Kalundborg, which will be working next autumn with 7.5 kw. aerial power. The provision of other relay stations will not be discussed until the Radio Council has experience to what extent the new high-power station will give satisfactory reception in the different parts of Denmark.

FRANCE.—Wireless-telephony in France is to be placed on a legal basis, according to a proposal made by the Minister of Commerce which has been unanimously approved by the Cabinet. Broadcasting becomes the prerogative of the State, which will assume possession of all transmitting stations in five years' time. Meanwhile broadcasting will be State-controlled by a mixed committee of Government officials, authors, musicians, and lecturers, who will supervise operation, which will be carried out by authorised private enterprise. During the transition period the State will receive a percentage of the advertisement receipts, says Reuter's Paris agency.

It is also reported, by the *Financial Times*, that the French Commerce Minister, M. Bokanowski, is seriously considering the advisability of issuing a decree shortly which will place all broadcasting in the hands of the State. The postal and telegraph workers have met M. Bokanowski and urged him to do this so that the broadcasting business may become a department of the French Post Office, employing only postal servants. The Commerce Minister apparently favours this idea.

On the other hand, and according to the London *Times*, M. Bokanowski, Minister of Commerce, who recently described as "anarchic" the conditions under which French broadcasting is carried on, prepared a scheme of control with a view to placing broadcasting in the hands of properly constituted and authorised organisations. The Superior Council of the Post Office Department, an advisory body to which M. Bokanowski submitted the scheme, has, however, refused to regard the matter as urgent and decided not to discuss its details for the present. In an official note the Ministry of Commerce, which seems to have yielded to this ruling, observes that broadcasting will therefore continue "to await in anarchy its permanent regulation."

The *Daily Mail* says that Strasburg is to have a powerful broadcasting station as the result of the action of a group of Alsatian patriots interested in replying to the Germans who recently strengthened their propaganda station at Freiburg-im-Breisgau, while the *Electrical Review* says that it is also reported that a 5-kw. radio broadcasting station is to be constructed at Nice, and it is expected that the station will be in operation early in 1927.

In Paris the new year commenced with the issue of a police order for the suppression of loudspeakers used for advertising and other purposes in the streets. They have long been threatened by the authorities.

GERMANY.—Several German newspapers announce that the new station at Langenburg, near Elberfeld, in the Rhineland, recently commenced testing on a wave of about 470 m. It is expected that it will commence regular transmission early in the new year on a wavelength of 468.8 m. It is said to be the most powerful station in Europe; its power is said to be 22 kw. and rumour has it that this figure will be increased to 60 kw. in the near future. The studios are situated at Cologne and Dusseldorf.

GREAT BRITAIN.—At midnight on Dec. 31, 1926, the British Broadcasting Co., Ltd., ceased to be, and the British Broadcasting Corporation (Inc.), came into being. Probably coinciding with the change-over, a campaign against "pirate" owners of receiving apparatus is to be commenced. The Post Office authorities have secured about 500 convictions of unlicensed listeners since the passing of the Act of 1925. There are now over 2,178,000 holders of receiving licences in this country.

The Assistant Postmaster-General, Lord Wolmer, recently said that people who have more than one receiving set are expected to take out a licence for each. Lord Wolmer said that the idea of taxing receiving sets according to the valve power, instead of the present flat rate, was a very attractive one, but there were many difficulties in the way.

"The owner next to you owns everything above his property right up to Heaven, and I am afraid you will have to take your aerial down," said Mr. Clarke Hall, the magistrate at Old Street police-court, London, recently, to a man who stated that a neighbour, over whose premises he had stretched an aerial, had asked him to remove it.

The *Daily Mail* says that it is reported that the scheme for the erection of new regional higher-power broadcast stations for Great Britain and for the provision of alternative programmes has been agreed to by the Postmaster-General in its broad outline. The main idea is for a certain number of high-power stations to be erected, some in parts of the country at present without a station. They will number five or six, and will have a power of 10-15 kilowatts, and there will also be other stations with the same power as that of London. It is expected that part of the scheme will be ready for inauguration at the end of this year.

The Eastbourne Corporation, like Paris, has been much plagued by the number of loud speakers and has been informed by the Home Office that if application be made for authority to issue a by-law, the same will be sanctioned if submitted in the following terms:—

"No person shall in any street or public place, or in any place which adjoins any street or public place, and to which the public are admitted, operate, or cause or suffer to be operated, any wireless loudspeaker or gramophone in such a manner as to cause annoyance to, or disturbance of, residents or passengers. Any person offending against the foregoing by-law shall be liable to a penalty not exceeding £5."

Reading has already a by-law of this kind, and other towns are likely to follow suit if users do not exercise a little more discretion. In the main these by-laws affect the proprietors of wireless shops who make a practice of fixing a loudspeaker outside their premises with the object of attracting purchasers.

HOLLAND.—*World Radio* and other journals are responsible for the two following items :—

The Commission appointed by the Algemeen Nederlandsch Verbond to find a solution of the state of affairs arising out of the report of the Royal Commission on National Broadcasting started its work on Dec. 10. Besides the chairman and vice-chairman of the Verbond, the Commission consists of six members from Amsterdam, The Hague, and other parts of Holland.

Dutch wireless dealers are organising an effort for the standardisation of parts and fittings, and also of the technical terms used with regard to wireless.

HONDURAS.—*Commerce Reports* states that work has been commenced on the erection of the high-powered wireless station at Puerto Castilla, which will eventually replace the obsolete one now in use. With the opening of the new station, messages may be received and sent direct, if necessary, to New Orleans, Tegucigalpa, Habana, Puerto Cortes, and other distant destinations. However, as heretofore, messages will normally be relayed through the station at Tèla, a supervisory centre in Honduras.

HUNGARY.—*World Radio* maintains that great improvements are being made in the Budapest station, which celebrated its first birthday on Dec. 1. The aerials are being raised, literally, and their capacity increased to 3-kw. By October the new transmitter, with a capacity of 20-kw., will be ready. The Post Office and Telephone Administration controls all broadcasting in Hungary. The Minister of Education has ordered receivers to be supplied to all schools if funds permit, and the Minister of the Interior that all hospitals shall be supplied with equipment, including loudspeakers, at the State's expense. All Budapest municipal blocks of dwellings are also to be furnished with radio sets.

INDIA.—The Indian Radio Telegraph Co., Ltd., has accepted the terms offered by the Improvement Trust for the lease of land in the Cossipore-Chitpore open space for the location of a broadcasting station.

The Indian correspondent of the *Electrical Review* states that another step is to be taken to popularise broadcasting in Ceylon. Government has recognised that it is impossible to provide good programmes constantly without some financial expenditure. The Postmaster-General has reported that the general impression in the trade and wireless circles is that progress in broadcasting is retarded because the programmes are not sufficiently varied. The chief engineer, Telegraph Service, recommends that the sum of Rs. 300 per annum allowed for entertaining artistes should be increased to Rs. 3,000 per annum for the organisation of programmes. There are at present 335 licence-holders, and the revenue collected from licence fees during the year amounted to Rs. 3,350. With better programmes it is anticipated that the number of licences will be greatly increased. Government proposes to authorise the Postmaster-General to incur an expenditure not exceeding Rs. 3,000 this financial year, on the understanding that the whole position will be reviewed again 12 months hence.

IRISH FREE STATE.—Mr. J. J. Walsh, Irish Free State Minister of Posts and Telegraphs, announces that the new broadcasting station at Cork will be completed by about March, and that it is intended to erect a station at Athlone, with a radius of 80 to 100 miles for crystal reception, and that it is also proposed to erect stations for the Irish-speaking districts. The Athlone station will be ready in about 18 months. He mentioned that of 40,000 listeners, only one in ten purchased licences, but legislation is now passing through Parliament making payment of licence fees compulsory under penalty. It is hoped, he added, to use electric power available from the River Shannon for the Athlone station.

The number of wireless receiving licences issued in the Free State up to the end of November was 4,544, of which number 430 were issued during November.

JAPAN.—The *Electrical Review* mentions that an order is said to have been placed for a 600-kw. station, which will be ready in 1928. It is to be entirely the property of the Japanese Wireless Telegraph Co., an official concern enjoying the support of Parliament. Also that the Osaka station is now regularly receiving direct wireless messages from the Sainte Assise wireless station near Paris. This service was commenced in September, 1926. Formerly messages were sent from the Bordeaux station indirectly to the Iwaki station in northern Japan, and were confined to news dispatches.

MEXICO.—From Mexico City by the medium of Reuter's comes the statement that the Telegraph and Postal Department of the Mexican Government will shortly call for tenders for the modernising of the entire telegraph and radio-telegraph systems of Mexico. Fourteen additional radio-telegraph stations will be installed, or acquired, and a considerable amount of equipment, including repair tubes, transmitters, and receivers, will be ordered.

POLAND.—H.M. Commercial Secretary, Mr. R. E. Kimens, at Warsaw, informs the Department of Overseas Trade that the exploitation of broadcasting in Poland is in the hands of a private company with Government participation in 40% of the share capital. The concession is for 10 years and the Post Office is collecting licences ; the fee is Z30 per year, or Z3 monthly ; 25% of the licence fees is retained by the Post Office and 75% is handed over to the company. On the formation of the company arrangements were made to erect one broadcasting station for Warsaw of half the power of Daventry, and one smaller station (6-kw.) for Cracow. The opening of the Warsaw station took place in the spring of 1926. In spite of the summer season the rush of applications for licences shows keen development. At present the number of issued licences amounts to 30,000. The collected fees are quite sufficient to run the Warsaw station without losses, with a quite good programme. Taking into consideration this quick development, it has been decided by the company to erect two additional transmitters, one in Poznan the second in Katowice, and a considerable number of new transmitting stations, some as relays, are proposed for the beginning of the next year.

Mr. Kimens has also forwarded to the Department of Overseas Trade a brief survey regarding development in Poland. For communication with foreign countries the Post Office is in possession of four stations :—The trans-atlantic station has been built with the assistance of the Polish emigrants in America by the Radio Corporation of America. The transmitter consists of two 300-kw. alternators, which can work both in parallel on a very good elaborated aerial. This station was designed for high speed, but as the actual number of words available for transmission is only between 700-1,000 daily, the running expenses are so high that special credits must be voted by the Diet to cover the losses. The greater part of the cost of the station is paid off, with the exception of an outstanding sum of approximately Z100,000, which has to be paid off within six years. Second and third stations are the arc transmitters at Cracow and in Poznan. These only permit of hand-speed working, and are used for communication with European countries. A French alternator station of approximately 6-kw. at Grudziadz is also used for communication with European countries, especially with France ; the last-mentioned three stations are " extremely inefficient " and are not equipped with modern receivers. Only a small part of correspondence which could be transmitted from and received in Poland is going by wireless.

PORTUGAL.—A direct high-speed wireless telegraph service between England and Portugal was opened on Dec. 15. It is the first of a number of wireless telegraph services which are being established by the Portuguese Marconi Co. under a 40-years' concession granted by the Portuguese Government to Marconi's Wireless Telegraph Co., Ltd., to undertake the organisation of a complete wireless telegraph and telephone system to place Portugal in communication with her Colonies, the principal capitals of Europe, South America, and other countries. Stations are being built near Lisbon, in Cape Verde Islands, Maderia, the Azores, Mozambique, and Angola. One of the group of transmitting stations to be erected at Alfragide, near Lisbon, and one of the corresponding receiving stations at Vendas Novas will work at high speed with the Marconi stations at Ongar and Brentwood, near London, and with the principal capitals of Europe ; another will communicate with the Portuguese Islands and with ships at sea, and short-wave " beam " staticns are also being built for communication with Brazil and other parts of South America, and the Portuguese Colonies at Mozambique and Angola, where similar beam stations are being constructed. The services recently inaugurated are those between Lisbon and London, Maderia, and the Azores.

RUSSIA.—The Soviet Government contemplates big developments in broadcasting, some of which were recently explained to the *Daily Telegraph* by M.I.N. Smirnoff, People's Commissar for Posts and Telegraphs of the U.S.S.R., who has been in Great Britain studying our methods, not only of broadcasting, but also of conducting the telegraph and telephone services. M. Smirnoff stated that there were in Russia about sixty local stations, in addition to the Moscow station. In two months' time a much more powerful station, with a radius of 2,000 miles, would be opened at Moscow. Broadcasting was being used for three purposes : For supplying the population with newspaper information, for announcing Government decrees and instructions, and for transmitting lectures, music, and the drama. At many of the street corners of Moscow there were loudspeakers, beneath which crowds gathered, even in winter. M. Smirnoff returned to Russia on Dec. 21.

Reuter's agency has received the following statement by M. Smirnoff : " The Commission which accompanied me on my visit to Great Britain consisted of Professors Bronch-Bruevich and Rozhansky, engineers Shorin and Vassiliev, and the president of the Low-Tension Electrical Trust, M. Zhukov. It came here at the recommendation of the late M. Krassin and the invitation of the Marconi Company, and its main object was to acquaint itself with the latest achievements in the domain of radio construction and broadcasting.

" As regards the telegraph system, it is still insufficient for our needs. We are extending the system so far as is possible with the means at our disposal; during 1926 a new telegraph station was erected in Moscow, which will be the second largest building in Moscow, and it will also house the international telegraph station.

" With reference to Radio communication, I should like to express our thanks to the management of the Marconi Company for the assistance it gave us in our investigation of the radio system of Great Britain. We are full of admiration for the remarkably fine work done by the Marconi Company ; it struck us as some of the best we have seen anywhere. We should also like to express our thanks to the Postmaster-General, Sir William Mitchell-Thomson, by whose courtesy we were enabled to view the telegraph and other institutions of the Post Office. Our short stay in Great Britain has furnished us with exceedingly valuable material which we hope to make good use of on our return to the U.S.S.R."

Quite a number of the C.R.O. staff, C.T.O., London, will recall the visit of these interesting and interested officials.

SWEDEN.—Reuter's Trade Service, Stockholm, says that an invention to prevent interference between broadcasting stations issuing the same

programme on the same wave-length has been made by the broadcasting expert of the Swedish Telegraph Office.

UNITED STATES.—*World Radio* says that with the advent of the new National Broadcasting Company, WEAF (New York) now becomes the centre of a system which comprises some twenty different transmitters in America. Several are of high power, and transmission from them is now being regularly and clearly received on this side of the Atlantic. The new company is in a position to link up with different cities in the United States and to relay programmes from any point in the system. For this reason listeners in the British Isles may pick up strange calls on wave-lengths which they have hitherto associated with certain well-known stations.

In a recent address, says the same authority, Major-General J. G. Harbord, president of the Radio Corporation of America, said that under the present developments there were only 89 wavelengths available within the United States, or approximately one-tenth the number of stations now in operation or projected in the immediate future. The National Radio Co-ordinating Committee had urged Congress to deal with the radio problem, saying that further delay would jeopardise a national industry involving $600,000,000 a year and disappoint 20,000,000 persons. The Co-ordinating Committee urged emergency legislation, necessary because broadcasting stations were increasing at the rate of one a day. The Committee urged prompt passage of a permanent control law, and endorsed the principle of the White Bill for control by a Federal Radio Commission and the United States Department of Commerce.

ATMOSPHERICS.—In addressing a gathering of 1,500 scientists from all parts of the world at Philadelphia, Dr. Michael Pupin made the startling announcement that "atmospherics" and the fading nuisances so well known to wireless enthusiasts were "messages" from the sun and the planets. The *Daily Telegraph* says that Dr. Pupin made it quite clear that he used the word "message" in a symbolic sense, and meant merely the electrical attraction between the earth and the planets as demonstrated by the periodical swing of great earth currents, the tidal flux of electricity through submarine cables, and objectionable noises in wireless instruments. These phenomena would in time be interpreted. It is, however, not unlikely that the bulk of a lay audience or readers would still misunderstand ! and one can only reflect upon the loose expressions which sometimes escape even from the lips of scientists.

Electrical Merchandising, an American periodical, recently gave an account of the extent to which the wiring of houses for radio reception is taking hold of the U.S.A. One installation was recently fitted in an apartment house in San Francisco which cost $10,000. The building is a ten-floor construction with a hundred apartments. The receiving set is situated in the entrance lobby and loudspeakers are arranged in ten groups of ten (a group for each floor). In 100 rooms a loudspeaker is set in a compartment specially provided in the wall, and it is covered with a neat metal grill so that it is entirely out of the way. Each instrument is, of course, controlled by the occupant of the room. A compensating arrangement is provided to control the volume.

VENEZUELA.—Reuter's Caracas correspondent states that the Government has concluded a contract with Marconi's Wireless Telegraph Co. for the erection of a high-power station at Maracay. It was originally proposed to erect the station at Caracas, but it has been found inadvisable to do so.

The Duty of Happiness.—There is no duty we so much underrate as the duty of being happy. By being happy we sow anonymous benefits upon the world, which remain unknown even to ourselves, or when they are disclosed, surprise nobody so much as the benefactor.—*R. L. Stevenson.*

J. J. T.

REVIEWS.

"Fifty Years of Electricity." By J. A. Fleming, M.A., D.Sc., F.R.S. (Published by Iliffe & Sons, Ltd., Dorset House, Tudor Street, E.C.4. Cheap Edition. xi + 371 *pp. Price* 15*s.*)

Every reader of the *Telegraph and Telephone Journal* knows Dr. Fleming by reputation, and a considerable number have had the privilege of making his personal acquaintance as students at one or other of the many courses of lectures which he has delivered. There is probably no one in recent years who has individually done so much to assist the developments of the scientific side of our work, while at the same time he has made the knowledge of these developments widely available by means of his remarkable gift of lucid expression in books and lectures.

It is therefore with great pleasure that we welcome the issue of a new edition of Dr. Fleming's book "Fifty Years of Electricity," published at a price within the means of all.

Dr. Fleming takes the period from 1870 to 1920, and reviews in a clear and non-technical manner, suitable for the intelligent general reader as well as the expert, the developments which have taken place during that period in electrical theory and the applications of theory to practice.

In the introductory chapter he surveys briefly the course of electrical engineering before 1870, describing the invention and early development of the electro-magnet, the voltaic battery, the telegraph, the submarine cable and the dynamo. Then follow five chapters dealing respectively with the development during the five decades in question in Telegraphy and Telephony ; Generators and Motors ; Electric Lighting ; Electric Heating ; and Supply Stations, Railways and Power Transmission. The sixth chapter deals with the advances made in Electric Theory and Electrical Measurements, and the seventh chapter is devoted to Wireless Telegraphy and Telephony, a subject in the development of which Dr. Fleming has played a leading part, from the earliest days of the application of electro-magnetic waves to signalling across space up to the present.

In a concluding chapter Dr. Fleming indulges in some very pertinent reflections on the manner in which the valuable gifts to humanity which he has described in the previous portion of his book have been secured, and on the methods by which these gains may be extended and enlarged in the future.

We can strongly recommend this book, first to those of our readers to whom many of Dr. Fleming's reminiscences will recall memories of their own early days, and secondly to those who are still in the student stage of their careers. There is so much to be learnt concerning the present-day stage of the various branches of electrical engineering that many students find little time to study the early work on which the present is based. To these a concise review such as Dr. Fleming's book should be an inspiration. A knowledge of the small beginnings from which the present mighty structure of electrical engineering has grown gives an indication of a still mightier development in the future.

"Exploring Life." The Autobiography of Thomas A. Watson. (D. Appleton & Co., New York and London, 315 *pp.* $3.50.)—

This autobiography of Thomas A. Watson is happily named. From working electrician, collaborator with Alexander Bell, to Bensonian actor is a wide step, in the making of which Mr. Watson explored many varieties of life with a single mind and a rare gusto. The whole story is told with a frank and clear straightforwardness, not without a certain naïveté, which gives the book an undeniable charm of its own. The episode of Watson's connexion with Bell is well told, and his wholehearted devotion to his task of working for the inventor during an exciting and protracted period of experiment forms good reading. The chapters describing vividly their ultimate success will have a special claim on our readers, but the remaining chapters are no less full of interest. Mr. Watson's description of Bell's lectures on the telephone, when his own share in the performance was to sing from a transmitter some 25 miles away a couple of Moody and Sankey ditties, or "Do not trust him, gentle maiden"—to the rapturous encores of the audience—are distinctly humorous. Mr. Watson confesses that his vocal gifts like his repertory were limited, but he mastered the art of making the most of both in close quarters with the primitive transmitter—always with a gratifying success. Tiring of electrical work and longing to attain a more general culture, Mr. Watson tried travelling, the study of languages, and shipbuilding, and then in response to a love of elocution which had been latent in him from boyhood, he asked to be accepted as a student in F. R. Benson's theatrical company in England. After touring with him, he directed his abounding energies to adapting Dickens for the stage, with enjoyment if without conspicuous financial success. The book throws an interesting light on American life in the seventies and eighties of the last century, and Mr. Watson describes the course of his eventful and varied part in it with a modest account of his achievements and valuable work, and always in most readable and vigorous style.

THE CONTRACT OFFICER.

THERE would appear to be an impression among many members of the service that a contract officer's life consists of one long glorious excursion into a sort of official Tom Tiddler's ground where two-shilling pieces are to be had for the picking up and where barren spots are covered in a single night by splendidly erected kiosks sprung like Aladdin's Palace solely from a desire. Alas! how different is the reality. The true picture of a contract officer is more like Christian passing across the Slough of Despond where all applications must be refused, or through Vanity Fair, gradually getting rid of his heavy burden of profusely illustrated literature, hoping some day to reach those Delectable Mountains where external and internal plants flourish, and a mass of enlightened people armed with fountain pens stretch forth eager hands for agreements.

What really happens is that, the staff being inadequate to attempt house-to-house canvassing, only those people who there is some reason to believe are likely to require a telephone are visited. This information is obtained in various ways; a builder or estate agent tells the contract officer that a house has been sold, or the contract officer sees a house newly occupied, or he may get an introduction from an existing subscriber. He calls and tries to obtain an order; often in the suburbs the husband is in town and will not be home until the evening and it may be 8 o'clock at night before an interview can be obtained. In many of the outlying districts transport is poor and, even if the contract is signed, it is late before the officer can reach home, and the commission is by no means easily earned. It frequently happens that at the first interview the prospective subscriber is undecided, and the contract officer has then to use his judgment as to when the seed he has sown is likely to mature, and he makes out a card with the name and address on it and the figure 1, 3 or 6 at the top according to the number of months which he considers will elapse before a further call is likely to be successful. These cards are filed and followed up in due course until an order is obtained or the case abandoned as hopeless, the latter being a very rare occurrence.

It will be realised that in order to carry out his work effectively a contract officer must keep a constant watch over all his territory, usually many square miles in extent. Old property must be watched to see if there is any change in the tenancies—this particularly applies to shop property where it is usually found that the new occupier is more up-to-date than the old one—and an eye must be kept on all building land because in the present state of affairs houses are completed and occupied in an incredibly short time after the foundations have been dug.

Perhaps one of the greatest difficulties a contract officer has to contend with is that, in spite of the fact that we as a nation label ourselves liberal, progressive, socialist or communist, there is a racial conservatism in all of us that looks with suspicion on anything we have not had before. Strange as it may seem, great difficulty is still experienced in convincing some people that a telephone extension is more convenient than a speaking tube, or than a bell which calls a servant from the bottom of a house to the top to receive a message. Even by business men the argument has been advanced that they were already doing as much business as they wanted to and did not require any more. With the latter the reply that if they did not employ up-to-date methods they might lose what business they already had has been found effective.

It is in endeavouring to persuade subscribers to withdraw notice to cease after they have given it that an infinite amount of tact is requisite. The contract officer must be prepared to prove that alleged trouble with the service is frequently due to the fact that the subscriber himself has done something he ought not to have done or left undone something he ought to have done. He must be prepared to show that privately kept records of calls made by the subscriber cannot be as efficient as those made automatically by a skilled operator, and he must be prepared to listen to and treat sympathetically general complaints about the whole conduct of the Government. As an instance, one complaint made was that compensation had been refused for the loss of registered letters where it could not be proved that the valuables lost were actually placed in the envelopes. In connection with notice to cease work perhaps the contract officer's greatest bugbear is the subscriber who apparently out of sheer cussedness gives notice regularly every quarter and as regularly withdraws it at the eleventh hour, but fortunately these are few.

After adopting in its entirety the advice of Polonius to his son, the contract officer will also find useful a general knowledge of the telephone systems of other countries, more especially of the United States and Sweden, as these are the ones most frequently quoted by the amateur technical subscriber as examples of what ought to be done in this country.

In spite of its many trials and difficulties the life of the contract officer being principally out of doors is a healthy and therefore a happy one, and he meets with many who treat him with the milk of human kindness and at rare intervals with the dew usually associated with mountains; so for the time being we leave him, wishing him patience under his sufferings and a happy issue out of all his afflictions.

J. R.

LONDON TELEPHONE & TELEGRAPH SOCIETY.

ON the 17th ult, Mr. H. G. Warren gave an intensely interesting paper at the Institute of Electrical Engineers and before the above society, illustrated with some excellent slides, on "Post Office Buildings," and might have added, though he did not, "And the troubles and trials of an Architect," as a very suitable sub-title.

We are all inclined to think at least at times that *we* have the worst and most difficult job in the Service, but an evening under Mr. Warren's tutelage proved to most of us that we might have more not less worry, and trials, and tribulations by changing over!

One's eyes opened, too, when we learnt that the Post Office of to-day has, on occasions, seriously to consider how to make a modern building such as should be a centre for posts, telegraphs, and telephones, assimilate the spirit of the architecture of, say, Oxford or York or Canterbury, &c., &c.

Who would have thought that Gothic, or Norman, or Corinthian styles troubled so prosaic a department as that charged with the design and erection of H.M.'s Post Offices?

One striking difference between engineers and architects was emphasised by the lecturer which is well worth quoting: "Engineers work *up* from detail to the mass, but architects work from the mass down to the detail."

Here and there we were given what may be termed "tips for house purchasers," for example, as to the best place for the bath-room, the correct fall for drain-pipes of 4 in. and 6 in. respectively, tricks of dishonest builders and contractors with wood-work, concrete-mixing, and the like. One gentleman came away asking himself why he had already chosen his house and paid for it, and was last understood to say, "How did *I* know that there should always be a damp-proof course round the base of a chimney pot? and how can I get up there to see? Another gentleman was concerned with the mystic measurement of "treads" and "rises" and how to juggle with the twice-times table in order to arrive at the correct number of 23 inches.

Mr. Warren well deserved the hearty vote of thanks accorded at the close of his paper and is to be congratulated upon so pluckily fulfilling his engagement despite an annoying attack of laryngitis.

J. J. T.

WEST YORKSHIRE DISTRICT.

ANNUAL REPORT (1926) UPON THE TELEPHONE SERVICE.
(*Abridged.*)

DURING the past year, in spite of the serious handicap caused by industrial unrest, a marked advance has been made in all directions.

New Stations.—

New lines, connected	4,722
Lines ceased	2,424

Net gain = 2,298 = 6%

Total number of lines on Sept. 30, 1926 = 38,119.

New Exchanges.—In the Leeds area the satellite exchanges of Chapeltown, Headingley, Roundhay and Stanningley have been converted from magneto to automatic working.

At Halifax the construction of an automatic exchange is proceeding rapidly, and it is hoped the work will be completed early in the year.

At Wakefield the installation of automatic equipment is in hand.

Shipley exchange is shortly to be transferred to new and more commodious premises over the new Post Office.

Brighouse exchange is to be converted from magneto to central battery working and very shortly will be transferred to new premises.

At Dudley Hill and Low Moor new central battery exchanges are in course of construction.

At Keighley, Armley and Sandal, building has commenced in which to house new automatic exchanges.

At a number of existing exchanges additional switchboard equipment has been installed.

At Idle premises have been purchased for a new exchange

At Lofthouse, a site for a new automatic exchange is being sought.

An extension of the Batley Head Post Office to accommodate a new exchange is about to be commenced, and at Hebden Bridge plans for a new Post Office and exchange are under consideration.

Rural Exchange.—An exchange has been opened at Cracoe where continuous service is now available to certain subscribers by means of through switching at night and on Sunday to Skipton Exchange.

Telephone Kiosks.—Very considerable progress has been made in the provision of public kiosks throughout the district, from which telephone service is available day and night, and there are over 200 actually available for public use or on the point of completion.

Telephone Calls effected during the Year.—

Trunk calls	5,231,959
Local and junction calls	38,208,568
Telegrams passed by subscribers by means of the telephone	388,825

Private Automatic Branch Exchanges.—The value of private automatic exchange switchboards at subscribers' premises is being increasingly recognised, and since the last report a number of private business firms in the district have been provided with these installations. As previously pointed out, the provision of this type of switchboard enables rapid intercommunucation between offices without the intervention of a switchboard operator.

Underground Cable Extensions.—During the year in question satisfactory progress has been made with the laying of trunk and local underground cables. The gross mileage of wire existing at the end of September was 202,895 miles, being an increase of 22,184 miles during the year.

During the year additional main underground cables have been brought into use as follows :—

Leeds to Hull (2nd cable), with spurs serving the Doncaster and and Goole areas.
Hull to Driffield and Bridlington.
Lincoln to Newark and Nottingham.

The main cables referred to are of the balanced and loaded type.

A new underground cable between Dewsbury and Wakefield has been authorised. The work is well in hand, and it is anticipated that it will be brought into use early next year. The provision of an additional underground cable between Huddersfield and Manchester is also scheduled for next year.

In connection with the provision of an additional cable from Bradford to Keighley and Skipton, all the necessary duct work has been completed, and the laying of the cable will follow as soon as the latter is available.

In addition to the foregoing proposals, arrangements are in hand for loading additional circuits in the existing Bradford-Dewsbury cable to improve speech efficiency on circuits routed through that cable.

The provision of local underground cables to serve subscribers in the various exchange areas is resulting in a gradual reduction in the number of overhead lines carried on poles and brackets, and in a very large number of cases the only overhead plant now existing is one or two spans from a distributing pole—up to which point the underground is laid—to the subscribers' premises. This not only gives greater immunity from line faults due to storms or other causes, but is far more satisfactory and economical from a maintenance point of view, and undoubtedly provides the subscriber with a more efficient and regular service. Further, in large cities such as Leeds and Bradford, underground cables are frequently led to a point within a building containing suites of offices, &c., which point is technically known as a "block wiring" point. Connections are then made to the subscribers' instruments by internal covered conductors. It will thus be seen that in these cases overhead lines are dispensed with altogether.

Trunk Communications.—As a further indication of the progress made during the year, 165 additional trunk and junction circuits in the West Yorkshire Telephone District were brought into use, whilst 46 additional circuits were provided from towns in this district to towns in other telephone districts.

Telephone Repeater Working.—The raising of the roof of the right wing of the Leeds Head Post Office has been completed. This alteration has been carried out to provide room for a new repeater station which is to work in connection with the underground cable from London to Glasgow. At present, only a temporary repeater station exists, fitted with a capacity of 43 repeaters, 35 of which are working. The new repeater station will have an initial capacity of 190, and an ultimate capacity of approximately 1,000 repeaters, and will enable full use to be made of the wires available in the new underground route from London to Glasgow via Leeds and Edinburgh. Leeds being a good geographical centre, the establishment of the repeater station will also enable underground wires east and west of Leeds to be placed in repeater, and thus provide more efficient transmission on these circuits.

The installation of the apparatus is now completed, and is being tested out. It is hoped to bring the new repeaters into use early in the new year.

In connection with the above station a new secondary battery installation has been completed, which has a capacity of approximately 5,000 ampere-hours.

(Signed.) W. H. HANCOCK,
Surveyor,
West Yorkshire District,
Leeds.

(Signed.) T. B. JOHNSON,
Superintending Engineer,
North Eastern District,
Leeds.

TELEPHONE PROGRESS IN SPAIN.

KING ALFONSO, General Primo de Rivera, together with over two hundred Government Officials, Diplomats and leading citizens of Spain, participated last month in the establishment of a new European long-distance telephone record, when a conversation was carried on over a circuit 3,800 kilometers long, as a feature of inauguration of Standard Rotary Automatic Telephone Service throughout Madrid.

The record was established in a demonstration of the lines of the nation-wide system that has been built in the last eighteen months by the Compania Telefonica Nacional de Espana and, although the distance covered was equal to that from Madrid to Moscow, the circuit did not extend beyond Spanish territory. It did, however, cross the Straits of Gibraltar by submarine cable uniting the Continents of Europe and Africa. Starting at Madrid, the circuit travelled north of San Sebastian on the Bay of Biscay, passing thence south-easterly to Barcelona on the Mediterranean, then turning westward to Madrid, deflected to the South and diving beneath the surface of the sea at Algeciras, brought up at Ceuta in the Spanish Protectorate of Morocco. Returning northward to Madrid by another line the circuit then shot off toward Galicia, terminating at Coruna on the north-west corner of the Iberian Peninsula. Sixteen stations responded to the roll-call over this circuit and greetings were exchanged with the four corners of Spain. The demonstration was opened with a talk by the Marques de Urquijo, President of the Company, in which he described the work accomplished in the past year. General Primo de Rivera replied in the name of the Government, expressing his appreciation and congratulating the Company on what it had accomplished for the benefit of the National communication in such a short time.

After the roll-call was completed, His Majesty addressed the sixteen stations over the circuit, congratulating the Compania Telefonica Nacional de Espana and the Spanish Nation, expressing his satisfaction upon the important advance which had been made in the Telephone service of the country.

This event was preliminary to the formal opening by King Alfonso of the new Madrid Local Telephone system completely installed in a space of fourteen months by the Compania Telefonica Nacional de Espana, the old manual switchboards and overhead lines being replaced by Standard Rotary Automatic equipment and underground cables.

The change in service was accomplished simultaneously throughout the Capital and was loudly acclaimed by the public, who had endured many years of inadequate facilities. Madrid is second in the series of nineteen cities in which the Compania Telefonica Nacional de Espana will convert the telephone service to Rotary Automatic within the coming three years.

TELEPHONE NOTES.

ACCORDING to Reuter's Trade Service (Stockholm) the Director-General of the Swedish Telegraph Board stated in a recent interview that a third telephone cable between Sweden and Germany would be laid this year, 1927, not only to meet the steadily increasing communication between Sweden and Germany, but also for an extension of telephone traffic to England, in which very great interest is shown, and perhaps later on to France and Italy. The planned telephone cable to Finland will not be laid yet, no allowance having been made in the Finnish Budget for this purpose. Among other features will be the continued erection of automatic telephone stations at Stockholm, the extension of the telephone cable northwards to Upsala and Gaefle, and an increased use of the Stockholm-Gothenburg cable.

* * * *

Reuter's agency has received a statement from M. Smirnov, People's Commissar for Posts and Telegraphs of the U.S.S.R., who has lately been in England. He states, *inter alia* :—

"Telephony has developed considerably during the last few years, although there is still a very great shortage of connections in the U.S.S.R. During the present year the Moscow system has been extended; four automatic stations with an initial capacity of 40,000 'members' are now being constructed. The work is being carried out by the Low-Tension Trust, and a programme has been drawn up for a period of five years, which will supply the most necessary needs of the population at a cost of 150,000,000 roubles, but an endeavour will be made to raise the necessary capital in order to put the work on a more extensive footing. The Telephone Department is very profitable, and a considerable proportion of the required capital is furnished by the profit made in this Department. The rest is obtained from the profit on the postal system and by means of loans. During the last three years the extent of our telephone lines has increased by 40%; last summer the Moscow-Rostov and Moscow-Kiev lines were completed, whilst in 1927 a Rostov-Tiflis line will be constructed. We shall thus have connexion between Leningrad-Moscow-Rostov-Tiflis, a total of 2,000 kilometres. Our international telephone communications are also developing very successfully."

* * * *

In connexion with a discussion on a paper read before the Institute of Electrical Engineers by Mr. J. A. Cooper, Chief Engineer of the Birmingham Broadcasting Station, the *Electrical Review* states that Mr. Cooper paid a tribute to the Post Office Engineers in connexion with the telephone lines allotted to the B.B.C. for use in simultaneous broadcasting, and mentioned an important improvement in S.B. work by which the engineers hoped to minimise line distortion and line noises. In the earlier days, he said, it was found necessary to introduce filter circuits at the end of the line, but they were now dispensed with, and the new method, details of which he was not at liberty to disclose, consisted of the insertion at stated and convenient intervals along the line of what were called "mirror images." They revealed the characteristics of the line, and it was possible by their use to check distortion in sections of the line; the ultimate result was that at the station end of the line a fairly good frequency characteristic was obtained.

* * * *

A service complaint, rather out of the ordinary run, according to the *Telephone Engineer* of Chicago, came to a telephone manager in a certain city in the United States, recently. A subscriber called the manager and asked if some way might not be found to prevent his residence telephone being called by people conducting sales campaigns by telephone. The complainant said that scarcely a day passed when his wife was not called to the telephone by agents selling household appliances, articles of clothing, toilet preparations, dress patterns and all manner of merchandise, and these repeated calls had become very annoying. After giving the matter some consideration, the manager was able to suggest only one remedy that might be applied, namely, the withdrawal of the telephone directory listing, which might or might not be a solution.

* * * *

The opening of the Vienna-Nuremberg telephone line on Jan. 4 connected Austria with the main telephone systems of Western Europe. The new line will form an important link in the projected extension of the telephone from Great Britain to Austria and the countries beyond in Near East.

H. J. E. S.

PROGRESS OF THE TELEPHONE SYSTEM.

THE total number of stations working at Nov. 30, 1926, was 1,464,735, a net increase of 11,555 on the total at the end of the previous month. During November 21,780 new stations were added to the system counterbalanced by 10,225 cessations.

The growth for the month of November is summarised as follows :—

	London.	Provinces.
Telephone Stations—		
Total at Nov. 30	515,300	949,435
Net increase for month	4,494	7,061
Residence Rate Installations—		
Total	108,310	179,141
Net increase	1,831	2,386
Exchanges—		
Total	112	4,012
Net increase	—	8
Call Office Stations—		
Total	4,660	16,645
Net increase	34	112
New exchanges *opened* under Rural Development Scheme—		
Total	—	981
Net increase	—	12
Rural Party Lines		
Total	—	9,932
Net increase	—	35
Rural Railway Stations connected with Exchange System—		
Total	—	798
Net increase	—	7

The number of inland trunk calls dealt with during October—the latest statistics available—was 7,873,526, an increase of 343,810 or 4.6% over the figure for the corresponding month of 1925.

Calls made to the Continent during October numbered 24,876, and from the Continent 27,363.

Further progress was made during the month of December with the development of the local exchange system. New Exchanges opened included the following :—

LONDON—Burgh Heath, Seven Kings.
PROVINCES—Crowborough—Automatic.
Leigh-on-Sea ,,
Stalybridge ,,
Cosham ,,
Oxford ,,

And among the more important exchanges extended were :—

LONDON—Buckhurst, Esher, Purley, Royal, Sidcup, Sydenham, Thornton Heath, Willesden.

PROVINCES—Cheetham Hill, Garston, Portsmouth, Urmston, Uxbridge, Wigan, Wilmslow, Wolverhampton.

During the month the following additions to the main underground system were completed and brought into use :—

Exeter—Torquay,
Polmarkyn—Liskeard,
London—Welwyn,

while 99 new overhead trunk circuits were completed, and 82 additional circuits were provided by means of spare wires in underground cables.

In the Capital of the Mid-Pacific

THE operation of a telephone exchange in such a remote and different place as Hawaii presents many handicaps. The climate, perfectly suited to one of the world's great playgrounds, is far from favourable to telephone operation. In addition, the many nationalities served and the many different languages spoken might well be expected to offer almost insurmountable difficulties.

In spite of these things, the Mutual Telephone Company of Honolulu, by its great resourcefulness and through the aid of Strowger Automatic Telephone Equipment, which it long ago adopted as a "tropical standard," has achieved enviable success and prosperity in its work of rendering telephone service on this far-away island.

STROWGER AUTOMATIC

Automatic Electric Inc.

FACTORY AND GENERAL OFFICES: 1033 W. VAN BUREN ST.
CHICAGO, U.S.A.

The
Telegraph and Telephone Journal.

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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 the 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 MESSAGE FROM SIR EVELYN MURRAY.

THE opening of the transatlantic telephone service is an historical event in the sphere of communications, and I should like to take this opportunity to congratulate the Wireless Engineers of the Post Office who, in collaboration with our friends of the American Telephone & Telegraph Company, have achieved this notable success.

Credit is also due to the London Telephone Service and to the Traffic Staff for the smooth and efficient organisation at the Trunk Exchange, and last, but not least, to the admirable team of operators, who worked the service under the difficult and somewhat discouraging conditions of the opening day with enthusiasm and efficiency.

G. E. P. MURRAY.

A GREAT EVENT.

A GREAT date, which may be called "epoch-marking" without doing violence to that well-worn epithet, has come and gone. Jan. 7 marked the culmination of years of patient experiment. On that day public commercial speech was exchanged by wireless telephony between London and New York, and the dream of far-seeing telephone engineers became a reality. Although the Press, on the whole, has recorded the event with acclamation and devoted columns of description to this latest wonder made manifest in our midst, we may doubt whether less marvellous events have not seized more powerfully on the public imagination. The public is suffering from a surfeit of scientific marvels, real and imaginary, in this century, and when a new one is thrust upon its attention, it perhaps ceases to wonder "how it's done." This incuriosity, this attitude of *nil admirari*, can be carried by the easy-going citizen and "heir of the centuries" to a point where the fact that the Rangers have beaten the Rovers by 5 goals to *nil* will seem, for a brief hour, more stupendous than all the triumphs of science. He knows at least how that's done and can marvel that it was done. He has become so accustomed to pick up with a valve-set stray songs and speeches from foreign wireless stations that he hardly realises what it means to devise and perfect apparatus which enables any London subscriber to speak to any New York subscriber over a distance exceeding 3,000 miles without the aid of wires.

Telephony by wireless was, in fact, accomplished a quarter of a century ago, but it was then in such a form as to be impracticable for ordinary commercial usage. It had to await the advent of the thermionic valve, the invention which has revolutionised the arts and practices of communication. Commencing with quite a small size, such as is used in the broadcasting receiver of to-day, the valve has been increased in power year by year until we have the large power valve transmitters of 200 kilowatts capacity which are in service for the telephony between London and New York.

In order to minimise the troublesome factors of "fading" and "atmospherics," systematic observations had to be carried on for over three years, and the conditions which have to be met are known. Side by side with this observation work has proceeded the installation of the 200 kilowatt telephony transmitter at the Post Office Station at Rugby. Continuous experiments have also been directed towards the improvement of the receiving apparatus in the reduction of the effect of atmospheric interference by the use of directive aerials. This work is cumulative in its effect, and as a measure of its magnitude it may be stated that when all the improvements which are at present planned are realised it is expected that the receiving conditions will be 100 times better than they were in 1923. The transmitter at each end which, gauged by its effectiveness, is 500 times the strength of the ordinary broadcasting station, is the most expensive part of the installation. The receiving arrangements, which involve the magnification of a signal, which at a distance of 3,000 miles, in spite of the enormous power of the transmitter, is only about one thousandth of the strength which a broadcast listener receives from his local station. The directive reception involves the erection of very special aerials whose length totals 10 miles. Lastly, there are the underground land-line systems, some hundreds of miles at each end, to connect the transmitters and receivers to the central locations at New York and London respectively. All these links in the chain have had to be carefully engineered with the proper speech levels at all points and with all the necessary amplification and other devices for ensuring good transmission. Another interesting problem which had to be faced was the fact that the aether is very much

overloaded. In the wave band between 5,000 and 6,000 metres, which was decided upon as the best for this particular communication, there were over 40 wireless telegraph services already at work and occupying most of the available space. It was decided, therefore, in order to economise aether space, to work both transmission and reception on the same wavelength. This introduced many difficulties which were solved by the design and adoption of very delicate switching arrangements operated by the voices of the speakers on the circuit. These switching devices are controlled by the voice in such a way that when the subscriber in London speaks, his circuit to New York is switched on and the circuit from New York to London is switched off. As soon as he ceases speaking the switches restore automatically and when the New York subscriber replies his voice works the switches so that he is connected to London and the circuit at New York incoming from London is temporarily cut-off. This to-and-fro process goes on automatically all the time the conversation is proceeding.

A well-known writer in the *Evening News* says that instead of exclaiming at the wonder of transatlantic telephony, many people are content to remark that £15 is a large fee to pay for 3 minutes at the telephone. But when it is remembered that the cost of the Rugby station was about half a million pounds, that a similar station is in use in America and that in both countries separate receiving stations and long and expensive trunk lines are required before a conversation can take place, it will be understood that the charge for such a conversation must be high. The £15, however, includes a privilege not given in the Inland or Continental services, namely the two administrations will endeavour to find a particular person wanted and to put the caller into communication with him. If he cannot be found and a substitute acceptable to the caller is not available, the only charge made will be a report charge of £2 towards the cost incurred in the attempt.

The great event will go down to history fully documented. The future historian will have the ample and ornate columns of the London and provincial press to digest as well as the more matter-of-fact accounts of the scientific journals. Incidentally, he will have some legends to ponder over and, we hope, discard. The stories of the bells of St. Pauls and the film-stars of Los Angeles will amuse but not impose upon him.

THE FIRST PUBLIC TRANSATLANTIC MESSAGE.

THE public Telephone Service across the Atlantic is now a *fait accompli*. It is not merely a service in which some varying and disconnected speech " gets through " in each direction, requiring the speakers to build up intelligibility by some patchwork process of context and guess work. It is a real commercial service with transmission conditions equal to those experienced on our inland routes. The fact that exceptionally bad atmospheric conditions developed on the day of opening and severely handicapped the service is only another case of the exception proving the rule. Since the opening date the calls have been dealt with efficiently and expeditiously, and no user of this wonderful new channel of communication has been dissatisfied. Many messages of congratulation and appreciation have in fact been received.

It was a thrilling moment when Mr. W. S. Gifford, President of the American Telephone and Telegraph Company, in speaking to Sir Evelyn Murray made the first call passed after the time announced for the opening of the Service to the public. The conversation which ensued and the messages which were passed paid full tribute to the remarkable degree of co-operation that has existed between the American and British staffs throughout the experimental and preparatory stages of this new venture. The work has called for the exercise of ingenuity, patience, and perseverance, coupled with high scientific attainments, and the officers concerned have ungrudgingly devoted extra hours and complete week-ends to the solution of the many problems involved.

In all the circumstances it is fitting that congratulatory messages should have been passed in each direction, and we feel sure that the quality of the service will secure the support of the public and that a rosy future is assured for transatlantic telephony.

HIC ET UBIQUE.

MR. J. F. STIRLING (Assistant Controller, London Telephone Service) and Mr. W. D. SHARP (Overseas Telegraph Branch, Secretary's Office) have joined the Editing Committee in the place of Mr. JOHN LEE and Mr. J. J. TYRRELL who have resigned. Mr. Tyrrell, as our readers already know, will continue to contribute his " Telegraphic Memorabilia " and Mr. Lee's invaluable aid will still be available—for a time at least.

In an Editorial last month we computed the total number of telephones in Great Britain and Northern Ireland at Dec. 31, 1926, at 1,507,000. The official figure is now available. It is actually 1,510,775 made up as follows :—

Post Office system	1,477,003
Hull, Guernsey, and Jersey systems	21,736
Private stations connected with P.O. system	12,036
	1,510,775

The increase for the year is 119,619—the largest yet recorded. (The figure of 148,000 was a clerical error.) This gives 3.4 telephones to 100 inhabitants.

We see from *The Times* that Mr. Frank Gill has received the King's authority to wear the insignia of Commander of the Order of Isabel the Catholic, an order conferred on him by the King of Spain in connexion with his valuable (telephone) services.

The year 1927 will see some remarkable developments of the trunk telephone system of the world. The line from Melbourne-Townsville (Queensland), 2,017 miles, was opened last month. The Calcutta-Delhi line is about to be opened, and Calcutta connected with Bombay. We record elsewhere the opening of the

Vienna-Passau trunk cable, which will form an important link between Western and Eastern Europe. New Trunk services are being put in force between Prague and Trieste, and Belgium and Italy.

Opportunist or Humourist? A Wimbledon tobacconist who has a telephone call-box in his shop, says the *Daily News*, has taken swift advantage of the latest facility. He has hung out a notice, "*You may telephone New York from here*—£15."

During the recent tests of the Australian Beam Wireless, one of the first messages sent was from the Editing Committee of this *Journal* to Mr. H. P. Brown, Secretary of the Australian Post Office, asking him if he would contribute for the information of his old colleagues, a short article regarding telephone developments in Australia. The following reply was received:

TO EDITORS "TELEGRAPH AND TELEPHONE JOURNAL, LONDON."

Your message of greeting is highly appreciated and sincerely reciprocated. I have not lost my former deep interest in the achievements of my colleagues in the British Post Office and in all pertaining to their progress and welfare. The *Journal* is one of the means by which I am able to keep in touch with the various activities of the telephone and telegraph branches at home, and to hear of items of interest which concern my old associates. I shall be happy to comply with your request and furnish information reference developments which are taking place here in the Antipodes and which I trust may be of interest to readers of your *Journal*. The statement will be posted to you as early as possible. All good wishes. BROWN.

TRANSATLANTIC TELEPHONY.

OPENING CEREMONY.

BY LT.-COLONEL A. G. LEE, M.C.

NEARLY twelve months have elapsed since two-way radio-telephony across the Atlantic was first attained experimentally. This was the culminating point of a long series of experiments extending over a number of years. The vast research resources of the American Telephone and Telegraph Company had been attacking this formidable task since 1915, when one-way radio-telephony was obtained between Arlington, U.S.A., and Paris. After the war intensive development of the problem was resumed and in 1923 another effort was made to span the Atlantic telephonically. This time the experiment was performed from Long Island to New Southgate, where a large audience, assembled at the Western Electric Company's works, heard the voices of the speakers in New York clearly and loudly. Following on this demonstration the Postmaster-General decided to co-operate with the American Telephone and Telegraph Co. and the Western Electric Company (now the Standard Telephones & Cables, Ltd.), and a committee under the chairmanship of Admiral of the Fleet Sir H. B. Jackson, G.C.B., was appointed to inquire into the question of the feasibility of commercial radio-telephony between England and America. Further experiments were carried out, involving some thousands of observations, on the factors governing the propagation of the radio waves between the two countries at different times of the year and also on the amount of atmospherics present and the best means of overcoming the disturbance caused by them. Side by side with this work was proceeding the installation of a 200-kw. transmitter at the Post Office station at Rugby by the Western Electric Company. Experiments were also carried out by the Post Office on directional receiving antennae, first at Chedzoy, Somerset, and later at Wroughton, near Swindon.

The initial two-way conversations were carried out on two separate wave bands, but, owing to the congested state of the ether, it was decided to work both transmission stations on the same wave-band so as to economize ether space, and the interval since last March has been largely occupied on both sides of the Atlantic in developing means for doing this.

Finally, the day for opening the service to the public arrived. It had been heralded the week before by announcements made to the Press on both sides of the Atlantic which created such interest that the excitement in the newspapers did not subside for several days. A further statement to the Press a few days later announced the opening of the service to take place at 1.45 p.m. on Jan. 7. At this hour, which was 8.45 a.m. in New York, Mr. W. Gifford, the President of the American Telephone & Telegraph Company, in the presence of officials of the Company and a group of newspaper representatives, lifted the receiver from his telephone and asked for Sir Evelyn Murray in London. He was immediately connected, and in his greeting to Sir Evelyn Murray Mr. Gifford said:—

To-day, as a result of very many years of research and experimentation, we open a telephonic channel of speech between New York and London. Thus, the people of these two great cities will be brought within speaking distance. Over 3,000 miles of ocean individuals in the two cities may by telephone exchange views and transact business instantly as though they were face to face. I know that it is your aim, as it is ours, to extend this service so that in the near future anyone in either of our countries may talk to anyone in the other. No one can foresee the ultimate significance of this last achievement of science and organization. It will certainly facilitate business; it will be a social convenience and comfort; and, through the closer bond which it establishes, it will promote better understanding and strengthen the ties of friendship. Through the spoken word, aided by the personality of the voice, the people of New York and the people of London will become neighbours in a real sense, although separated by thousands of miles.

We are glad to have co-operated with you in this notable enterprise, and shall actively continue to work with you in extending and improving the service. I congratulate you upon your successful solution of your problems, and wish to extend to you and to your associates the greetings and good wishes of the officers and staff of the American Telephone & Telegraph Company and of their associates in the Bell Telephone System.

In reply Sir Evelyn Murray said:—

The opening of a public telephone service across the Atlantic between London and New York is a conspicuous milestone on the road of telephone progress, and marks the beginning of a new epoch in the development of communication between our two countries. Personal conversation between Great Britain and the United States has emerged from the stage of experiment into a practical reality, and we are confident that the service which we are inaugurating to-day will be a boon to both nations, whether as an aid to commerce or as a medium of social and domestic intercourse, and will tend to strengthen the bonds which unite the two communities.

I am charged by the Postmaster-General to take this occasion to acknowledge the notable contributions which your company has been able to make, through its great engineering and research organisation, towards the solution of the many baffling problems which have been encountered. We recognize, as we believe you recognize, that there are difficulties still to be overcome before the Transatlantic service can attain the standard of regularity and reliability at which we aim; but we are convinced that there is no better means of solving these difficulties than by putting the service to the crucial test of daily use, and we share your hope that before long Transatlantic conversation will be available not only to the citizens of London and New York, but to every telephone subscriber in both countries.

We of the British Post Office look back with pleasure upon the cordial co-operation with the American Telephone & Telegraph Company, which has led to the success so far achieved, and on behalf of the Postmaster-General and the officers of the General Post Office I warmly reciprocate your greetings and good wishes. I now declare the service open to the public.

At the London end a group of Post Office officials who had been associated with the inception of the service, Messrs. R. A. Dalzell, C.B., C.B.E., W. T. Leech, L. Simon, F. W. Phillips of the Secretary's office, Col. T. F. Purves, E. H. Shaughnessy, O.B.E., Lt.-Col. A. G. Lee of the Engineering Department, and Lt.-Col. H. E. Shreeve of the American Telephone & Telegraph Company, were assembled in Sir Evelyn Murray's room to hear the opening speeches.

Thus, in this quiet unostentatious way, was opened a memorable chapter in the history of Telephony. The bringing together of the two English-speaking peoples across the Atlantic by radio-telephony will be, without doubt, the forerunner of many other telephone services to the most distant portions of the globe, linking together the peoples of the earth with knowledge and with friendships.

In closing this brief review I should like to pay a tribute to the genius and far-sighted vision of the American Telephone & Telegraph Company which has made this marvellous product of science and engineering possible, and to express our appreciation of the opportunity of being linked with them in this great venture.

THE ANGLO-AMERICAN TELEPHONE SERVICE.

By W. C. GRIFFITH.

THE wonderful story of engineering achievement which has culminated in the opening of a public transatlantic telephone service has already been told elsewhere, and a brief corresponding account of the preliminary commercial organisation and of the traffic problems may be of interest.

The main discussion commenced in October last, when Mr. Gherardi and Dr. Jewett, vice-presidents of the American Telephone and Telegraph Company, arrived in this country, following on the earlier arrival of representatives of the traffic and engineering branches of their Company.

As soon as the decision to open a public service between the two countries had been taken, it was necessary to settle the questions relating to fees, limitations of area of communication, hours of service, special facilities, equipment and operating procedure. In advising on these questions, the technical officers concerned were guided by a general decision that the service should be opened on a simple and limited basis, and that expansion in area and in facilities should be a matter of subsequent development in the light of experience.

The fixing of the basic fee was mainly an accounting problem, involving considerations of capital cost, depreciation and maintenance, and those who might be inclined to criticise as high the charge which was ultimately decided upon should bear in mind that the users of this service have, during the period required to pass their demands and during the period of conversation, the exclusive use of plant costing over one million pounds, and that each call must necessarily bear its due proportion of the cost of the periods when for various reasons the circuit cannot be employed for paying traffic.

The areas on the two sides between which the service was to be opened were fixed as the London Telephone Area and a corresponding area in New York respectively, early extensions being contemplated as soon as experience had been gained. Before this article appears the service will probably have been extended to the whole of Great Britain and the whole of the Eastern States.

The hours during which the service could be opened initially were limited by technical considerations at the Rugby transmitting station, where, owing to the industrial troubles, certain plant which would permit simultaneous transmission of telegraphy and telephony was not available. When this temporary difficulty has been overcome there will be no technical bar to a practically continuous service, but the number of hours per day during which such an expensive organisation can be kept available must necessarily depend on the demand. This question is affected by the difference in time in the two countries, amounting to five hours, so that 10 a.m. in New York is 3 p.m. in London, while 5 p.m. in London is noon in New York. The overlapping normal business hours are thus virtually limited to two per day—3 p.m. to 5 p.m. British time—and the waking hours—say 8. a.m. to 10 p.m.—to nine per day.

There exist in the British and American telephone organisations various special service facilities, designed to meet special needs of the respective telephone subscribers, e.g., fixed time calls, differentiation in rates with time, person to person service. The overriding considerations of simplicity during the early period of the public

FIG. 1.—OPERATING POSITIONS.

service led naturally to a desire to offer at first only one type of service. It was felt that in view of the high charge the calling subscriber must be given some guarantee that his fee would not be wasted by the chance absence of the person to whom he wished to speak, and it was decided, therefore, to offer as the initial standard type of service the American " person to person " service.. Under this system a call may be booked, not merely to a given telephone number, but to a given individual, and is not regarded as effective until communication has been established between the calling subscriber and the particular person to whom he wishes to speak, or a substitute acceptable to the caller. If, when the connexion is effected, the called person is not available, a report to that effect is given to the calling subscriber, who may then request that the call shall be cancelled (in which case only a comparatively small

" report charge " is made) or may ask that it shall be completed later. Further, the telephone administrations undertake to do all in their power to trace the called person ; for example, if a call is booked to an individual at his office, and it is found that when the call matures he has gone home, the call will be diverted to his home, and so on,. This facility is undoubtedly of very great value to users of the service.

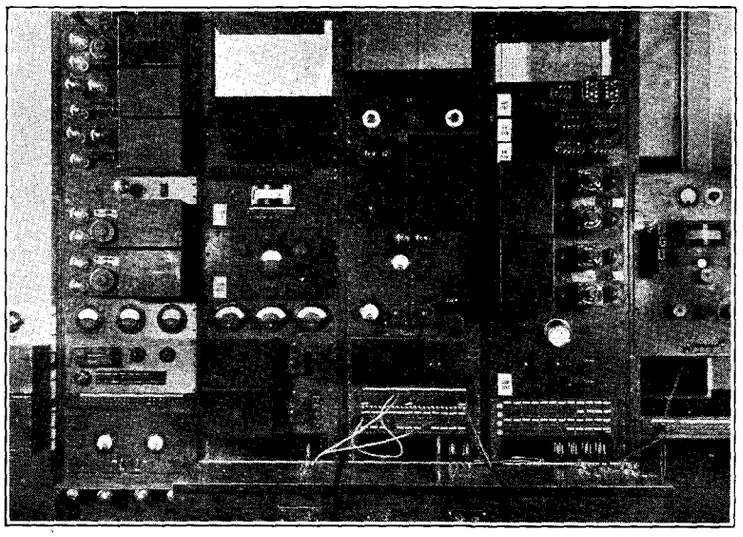


FIG. 2.—TECHNICAL OPERATOR'S POSITION.

The control of outgoing transatlantic calls is vested in the London Trunk Exchange, at which two positions have been specially equipped for this purpose. These positions are shown in Fig. 1. The position on the left is used by the " advance calling telephonist." This telephonist does not speak on the radio channel, but is responsible for tracing and obtaining the British subscriber in connexion with originating and incoming calls. She is further responsible for warning subscribers a short time before their calls will mature, in order that the particular person who originated the call, or who is required to receive it, as the case may be, may be available at the telephone when the call is completed. The position on the right is used by the " line " telephonist. This telephonist is continuously in circuit on the radio channel, and is responsible for passing all demands, and for agreeing with the American telephonist the order in which calls shall be effected, having regard to the order of booking and the subscriber's requirements, and as the " particular persons " required become available, and for the timing of the calls.

In connexion with timing, it may be interesting to note that calls are charged for by the minute with a minimum charge for three minutes, and that a notification is given at the end of each three minutes by the interpolation of the line telephonist with the words " 3 minutes," " 6 minutes," &c. In order to avoid a waste of line time, extensions are not " offered " in the sense in which they are offered on the inland service.

The technical control of the circuit is vested in the technical operator, who is an engineering officer situated in the Control Room. This officer has under his control the amplifying and correcting apparatus by means of which he can adjust the volume and quality of speech to the particular conditions of each call. The quality of the transmission reaches, when atmospheric conditions are not unfavourable, an extraordinarily high standard. Many transatlantic calls may be said to be quite equal to an inland trunk call. There are however periods, particularly about sunset, when speech is difficult and even impossible owing to extraneous noises introduced by " atmospherics."

The operating of the circuit is on an alternate basis, i.e., one call outgoing from England is normally followed by a call incoming from the United States and so on. Subscribers have been requested to book their calls as far as possible on the day previous to that on which the connexions are desired, and as soon as the circuit is opened each day all demands on hand on both sides are passed and are assigned serial numbers, the American calls having odd numbers and the British calls even numbers. When once the particulars of a call have been passed in this way the call is known thereafter solely by its serial number. Demands received after the circuit has been opened are passed as opportunity offers. Some extremely interesting experiments have been made in connexion with the passing of numbers over the radio channel by means of Teletype keyboard telegraph instruments. Teletype instruments have been fitted in the London and New York Trunk Exchanges, and it is possible at any time to turn to these and to type out upon them the series of numbers required, thus giving a printed record of what has been passed at both the home and the distant stations. The use of this method for passing numbers has great promise in that it is probably more accurate, and, when repetitions and corrections are taken into account, more speedy than verbal demands. It is absolutely secret, and furthermore, it can be used during periods of atmospheric disturbance when intelligible speech is impossible, and periods when conditions are bad may thus be utilised to the ultimate saving of circuit time. It is probable, therefore, that this method will become the standard method for passing demands. In view of the very high value of the circuit time, great care is taken to ensure that numbers are correctly received : the name of the firm as well as the telephone number is passed in each case, and is checked in the Telephone Directory in order to ensure that no wrong numbers are connected.

As soon as the various matters which have been mentioned had been settled, it was arranged to commence a trial of the service under full commercial conditions. This trial was carried out between officers of the Post Office and officials of the American Telephone and Telegraph Company. Directories of each organisation were circulated in the other, and a certain number of officers were asked to originate calls as if they were members of the public. The requests to pass calls were so regulated as to produce a light load on the circuit at the commencement of the trial, which lasted throughout December, with a gradually increasing load, until during the last week of the month the demand for connexions was intentionally a little in excess of the full limit of the estimated carrying capacity of the circuit under normal conditions. As it happened, during the last week the circuit conditions were considerably below normal, with the result that a certain number of calls booked could not be completed, and those readers of this Journal who were amongst those thus disappointed will perhaps

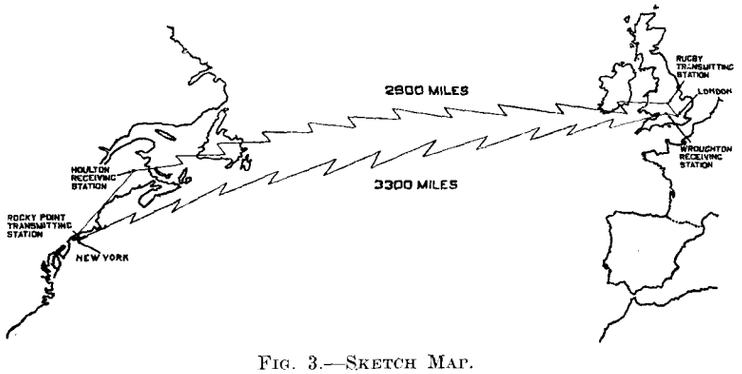


FIG. 3.—SKETCH MAP.

accept this explanation. This trial was exceedingly valuable to all concerned. Certain operating difficulties came to light, and steps were taken to overcome them, while all those engaged on the control of the circuit were able to become familiar with their duties. At the same time valuable data were obtained on such matters as the proportion of the total available circuit time which could be utilised for actual conversation and kindred questions. In order to ensure smooth working of the public service a liaison officer of

each administration proceeded to the headquarters of the other, Mr. W. F. Dobson, of the London Trunk Traffic Office, going to New York, and Mr. E. J. Padmore, of the Long Lines Department, New York, coming to London.

The service was opened to the public on Jan. 7, 1927, and so great was the public interest that on the first day calls greatly in excess of the carrying capacity of the circuit were booked. Through the courtesy of the Foreign Office in foregoing their evening Press transmission from Rugby on that day it was possible, however, to work the circuit until late at night, with the result that a considerable number of the demands were satisfied, though unfortunately the atmospheric conditions on the date of opening were appreciably worse than immediately prior to or since that date.

This, then, is briefly the story of the negotiations which have resulted in the opening of a service the result of which it is difficult to over-estimate in its effect in bringing together in closer business and personal relationships the peoples of the two great English-speaking nations.

OVERSEAS COMMUNICATION—ITS ORIGIN AND DEVELOPMENT.*

BY H. G. SELLARS.

(*Continued from page* 67.)

AN early form of apparatus was Wheatstone's ABC. step-by-step telegraph, composed of two dials marked with the alphabet and punctuations, and furnished with indicating needles. By depressing keys corresponding to the required letters and turning at the same time the handle of a magneto generator current waves were sent out which actuated the pointer at the distant end and the words were spelled letter by letter. W. S. Steljes adopted this system in his Recorder but replaced the receiving dial by a typewriter which printed in Roman characters upon a tape. In the Rebesi typewriting telegraph, also designed by Steljes, a typewriter keyboard takes the place of the ABC. communicator, and the receiver prints on tape, or in column, as required. Continuous efforts were made to produce type printing telegraph apparatus and, as early as 1845, Jacob Brett, prompted by Royal E. House, of U.S.A., and John Watkins Brett, patented a machine of this kind. Professor David Hughes (1831-1900) introduced in 1855 his direct working typeprinting telegraph, the sending portion of which consists of a piano keyboard with 28 keys, for sending letters, figures and punctuations, and for changing from letters to figures and punctuations, or vice versa. The receiving portion is made up of an electro-magnet, the armature of which, when released by the incoming current, brings into operation the various mechanical devices which cause the synchronised typewheel to print the transmitted letters in Roman characters on tape. This apparatus worked admirably on cables between England and the Continent. Other direct printing machines are the Morkrum Company's "Teletype," and that patented by Messrs. Creed & Company, in both of which a typewriter keyboard is used.

Reference has already been made to the idea of recording pre-arranged telegraphic signals having occurred in 1832 to Samuel Morse. Experiments were carried out, and in 1837 Morse, assisted by Alfred Vail and Gale, perfected his model apparatus. In 1838 he attempted to take out a patent in England, but found he had been forestalled. In July of that year Edward Davy patented a telegraph in which magnetic needles recorded signals upon chemically prepared calico. In 1841, 1843, and 1845 Alexander Bain took out patents for a typewriting, an indicating and an electro-chemical copying telegraph, and in 1846 patented his electro-chemical direct working telegraph, in which perforated and chemically prepared tapes were used at the sending and receiving ends, respectively. This apparatus was tried in Paris before M. Leverrier and Doctor Lardner, and worked successfully at 324 signals a minute. In 1847 it was working between London and Manchester, and on Oct. 9, 1856, when Professor Morse was in London, Sir Charles Bright showed him that from 210 to 270 letters a minute could be sent over a circuit of 2,000 miles, composed of underground wires joined in series.

* Paper read before the Post Office Telephone and Telegraph Society of London.

The chemical tape was soon replaced by ordinary slip on which signals were recorded by a wheel running in ink, as suggested by Morse, and for less busy circuits a simple sending key took the place of perforated slip. This Morse printer, as it was known, had been in use for a considerable period when it was found that the movements of the armature carrying the ink wheel could be read by the ear. As a result, the slip and inkwheel were eliminated, and the instrument known as the Sounder was introduced, becoming deservedly popular in all parts of the world. The differentially wound polarised sounder was invented by Mr. C. C. Vyle and has been found extremely useful where weak currents are employed.

THE automatic transmitter and receiver, with which Post Office officials of the present day are most familiar, were patented in 1858 by Sir Charles Wheatstone and John Matthias Augustus Stroh. In 1870, when the Government took over control of the Telegraphs, the speed of working was from 70 to 80 words a minute, but, by 1890, thanks to the efforts of Sir William Preece, Mr. Mat Cooper and Mr. A. J. Stubbs, a speed of 600 words a minute could be attained. Improvement has taken place in the three principal components of the system. Several perforated slips can now be prepared simultaneously, and Mr. J. W. Willmot has designed a new form of punch. Mr. J. W. Willmot has also done valuable work in connection with a magnetic bias transmitter, while Messrs. Vyle, Smart, and Mulligan have succeeded in introducing electric motors for driving purposes. In 1896 Mr. F. G. Creed introduced a typewriter keyboard perforator, and, in 1899, the British Post Office purchased a number of the machines. Other keyboard perforators in use now are the Gell and Kleinschmidt. In 1900 Creed produced a receiving perforator and afterwards developed a typeprinter, which printed the telegram in Roman characters when the perforated slip was passed through it.

RELAYS.

The use of long lines and the limitations of battery power introduced another problem and Sir Humphry Davy in 1828 invented an "Electrical Renewer" for strengthening current at intermediate points. In October, 1852, Sir Charles Bright patented an automatic relay for retransmitting signals, an example which was followed by Cromwell Fleetwood Varley (1828-83) in 1854. In February, 1879, Bright increased the delicacy of relays, and at a later date K. Gulstad produced a vibrating relay for use on circuits where high speed is required. Members of the London Telephone and Telegraph Society will remember that Colonel A. C. Booth and Messrs. J. N. McCurdy, A. H. Roberts, J. L. Taylor, and E. Lack have given us the benefit of their studies of relays and repeaters.

We are indebted to Messrs. A. Eden, J. R. Kempe and A. J. Stubbs for the Sounder Silencer, which is fitted to repeaters in such a manner that, although the normal working signals are not heard by the relay clerk, his attention can be drawn when required.

DUPLEX, QUADRUPLEX AND MULTIPLEX WORKING.

The need for economy in the provision of wires promoted a desire to make more use of existing channels and, in 1853, Dr. Gintl, an Austrian, succeeded in obtaining duplex transmission. In September, 1855, Bright patented a simple method of duplex working which was used effectively on some of the Magnetic Company's wires. J. B. Stearns, John Muirhead, Alexander Muirhead, Herbert Taylor and M. Ailhaud also devised methods of duplexing landlines and cables, while Edison introduced a system of quadruplex. Multiplex working was the subject of successful experiment in 1852 by M. G. Farmer, an American, and, at a later date, Delaney introduced the synchronous morse sounder multiplex system which was duplexed by Mr. S. Pollock and was used by the Post Office for several years. In 1873 Meyer, an Austrian, exhibited at the Vienna Exposition a four-channel multiplex apparatus which, by means of combinations of eight keys, produced morse characters transversely on slip. Experimenting in the same direction Emile Baudot invented in 1874 his synchronous multiplex system, using on each "arm" a keyboard composed of five keys, which printed Roman characters on slip on the receiving end. The apparatus was adopted by the French Government in 1877, and has been used on circuits of various lengths including submarine cables. In 1897 a quadruple set was installed on a London-Paris circuit and since that date the instrument has come into general use on Government cables and in the United Kingdom. In France, Messrs. Montoriol, Picard and Mercy have laboured to improve and perfect the system, while in this country it has been the subject of deep study by Colonel A. C. Booth, who successfully accomplished the duplex method of transmission, Messrs. Arthur Crotch and H. W. Pendry, who have contributed to the literature on the subject, and Mr. J. J. Tyrrell, who, accompanied by Messrs. E. Barrett and E. H. Dykes, took the Baudot to India. Colonel Booth and J. W. Willmot were associated in the assembling of a typewriter perforator suitable for producing perforated slip for automatic transmission by a transmitter which takes the place of the 5-key keyboard. Systems similar in essential principles to the Baudot have since been brought into use by Mr. Donald Murray and the Western Electric Company, while Mr. H. H. Harrison has invented a 5-unit printing telegraph on which Baudot or Murray tape can be used. Elisha Gray's Harmonic Telegraph and the Mercadier radiophone apparatus fall into the category of multiplex. The Siemens automatic 5-unit printing telegraph can only be worked duplex, but at a speed of 100 words a minute in each direction. The most recent of the 5-unit system is that of Cavaliere Giovanni Miniotti who, in 1923, exhibited a typewriter keyboard printing apparatus in which steel balls, dropping into depressions on a revolving disc, transmit the necessary currents to line. A certain number of signals are stored by this method, and the use of perforated tape is obviated.

THE TELEPHONE.

The telephone is used for overseas communication and it will be interesting therefore to follow briefly its development. In 1870 Cromwell Fleetwood Varley (1828-83) invented the cymaphen, an instrument resembling the modern telephone, and in 1871 Antonio Meucci patented at Washington a similar contrivance. On June 25th, 1876, Professor Alexander Graham Bell submitted to Lord Kelvin a telephone which he had patented in the previous March. The attention of other electricians was attracted, and two years later Professor David Hughes invented the microphone and Thomas Alva Edison introduced his carbon loudspeaking transmitter. Since that date Dr. Cornelius Herz, Dolbear, Machalski, Deckert, Hunning, van Ryssel-berghe and many others have suggested improvements in methods and apparatus, and to-day the number of telephones in use runs into millions.

OVERSEAS COMMUNICATION.

Having summarised very briefly the inventions and discoveries which rendered internal communication possible, we are able to examine the methods employed to extend the facilities to countries overseas. Visualising, to some extent, the future, Andrew Crosse, an electrician, speaking in 1816, said: "I prophesy that, by means of the electric agency, we shall be enabled to communicate our thoughts instantaneously with the uttermost ends of the earth." The prognostication did not show signs of tangible result until 1838 when Major-General Sir F. C. Pasley carried out experiments with electrical signalling under water in the Medway at Chatham. In 1839 Dr. O'Shaughnessy, in India, passed an electric current under water through a wire covered with pitch and tarred hemp. In the following year Sir Charles Wheatstone evolved a scheme for laying a wire covered with rope between Dover and Calais, but it was not until January, 1849, that the feasibility of the idea became manifest. In that year Mr. C. V. Walker connected two miles of copper wire covered with gutta-percha to the landlines at Folkestone and, taking the free end out to sea on the steamer *Princess Clementine*, exchanged messages with London. This short line served as the forerunner of the network of submarine cables which now encircles the globe. Permission had been obtained from Louis Philippe, King of France, in 1847, and a concession from Louis Napoleon, President of the Republic in 1849, to lay a cable across the Channel, and a single copper gutta-percha covered conductor was laid by the steamer *Goliath* on Aug. 28, 1850. Messages were exchanged between the two countries, but during the night the circuit was broken. In 1851 a four-conductor cable was manufactured and was laid by the hulk *Blazer*, under the supervision of Mr. Crampton, of the Submarine Telegraph Company. This cable was opened for public traffic on Nov. 13, 1851, and is still in use. The success of this undertaking led to the provision of submarine communication from other points in the British Isles, and in other parts of the world, e.g., between Scotland and Ireland, and England and Belgium in 1853, from Jersey to France, England to Ireland, and Spezia to Corsica in 1854, Bulgaria to the Crimea in 1855, Sardinia to Bona in 1857, England to Holland in 1858, England to Denmark, and Suez to Aden in 1859, England to Germany, Aden to Karachi, and Spain to Minorca in 1860, Malta to Alexandria, via Tripoli and Benghazi, in 1861, and Persian Gulf to Karachi in 1864.

The cables running from the United Kingdom to France, Belgium, Holland and Germany were worked by the Submarine Telegraph Company until 1889, when their undertakings were transferred to the Post Office. A great increase in traffic and lines has taken place and early in 1925 it was decided to make a clear line of demarcation between national and international telegraph services. With this end in view an Overseas Telegraph Branch was formed under the control of Mr. F. W. Phillips, Assistant Secretary. The manipulative section (the Cable Room) is under the control of Mr. F. T. Wadley, and has keenly interested and powerful friends in the persons of Messrs. John Lee and J. Stuart Jones, Controller and Deputy Controller of the Central Telegraph Office.

THE ATLANTIC CABLE.

Telegraph Engineers have always been ambitious and as early as June 16, 1845, the brothers John Watkins Brett and Jacob Brett registered a company with the object of establishing submarine communication between Europe and America. Serious discussions took place concerning the construction of the length of cable which would be required, the ocean bed, the electrical conditions and suitable apparatus. Experiments were carried out by Sir Charles Bright, who joined up the London-Manchester underground wires in series, and by Mr. Wildman Whitehouse, who utilised some of the Mediterranean cables in the same manner. A route from Ireland to Newfoundland was considered most suitable and the landlines on both sides of the Atlantic were extended to suitable points. Cyrus West Field (1819-92), deputy chairman of the New York and Newfoundland Telegraph Company had taken great interest in the project, and sailed for England in July, 1856. On Sept. 29, 1856, an agreement was concluded between Cyrus Field, John Brett and Sir Charles Bright for the purpose of forming a company to establish telegraphic communication between Newfoundland and Ireland, and on Oct. 20, 1856, the Atlantic Telegraph Company was registered. Experts in addition to those already mentioned, notably Sir Samuel Canning, Captain James Anderson, Henry Woodhouse, Wildman Woodhouse, Daniel Gooch, C. F. Varley, C. W. Siemens, Willoughby Smith, and Sir William Thomson (afterwards Lord Kelvin) worked wholeheartedly and, on Aug. 5, 1857, the European end of the cable was fixed at Valentia, Ireland. The gratification which such a feat engendered was dissipated, however, six days afterwards, when the cable broke. Telegraph men cannot be discouraged, and, on June 26, 1858, H.M.S. *Agamemnon* and the U.S. frigate *Niagara* commenced laying another cable, but this also snapped and both vessels returned to Queenstown. Another attempt was made and on Aug. 5, 1858, the two ships were successful. Messages were exchanged between Queen Victoria and President Buchanan on Aug. 16, but, on Sept. 3, 1858, the cable broke down Another attempt was made by the *Great Eastern* in July, 1865, but a breakage took place within ten days. In July of the following year the *Great Eastern* started from Valentia with another cable, and not only achieved her object, but managed to raise and repair the cable of 1865. A cable from France to America was completed in 1869 and, before 1877, cables joining up the West Indian Islands and Central American countries were laid and brought into use.

THE PACIFIC CABLE.

The success of the Atlantic cables inspired a suggestion that attempts should be made to span the Pacific Ocean, and patriotic, sentimental and strategic considerations directed special attention to the possibility of connecting Canada with Australia. An "All British" Pacific Cable became the dominating dream of Britishers in Australia, Canada and England, but many difficulties and much opposition, had to be overcome, and it was not until Oct. 31, 1902, that the series of lines from British Columbia to Australia and New Zealand via Fanning Island, Fiji, and Norfolk Island, was complete. The Vancouver-Fanning Island section, the longest in the world, measures 3,458 nautical miles and reaches in one part a depth of about 3½ miles.

THE "IMPERIAL" CABLE.

The bridging of the Pacific by an All-British line was a big step from an Imperial point of view, but Charles Bright, son of the telegraph pioneer, Sir Charles Tilston Bright, pointed out in December, 1902, the need for a complete imperial link between the Mother Country and the Pacific Cable. Such a result could not be attained immediately, but on June 18, 1917, the British Government, through a combination of fortuitous circumstances, was able to put into operation a communication running from Penzance to Halifax, via the Azores. A second cable connecting the United Kingdom with Canada direct was purchased from a North Atlantic Cable Company and these two channels, under the personal surveillance of Mr. John Lee, have worked to great advantage and provided the long-desired "All Red" route.

CABLE CONSTRUCTION AND MAINTENANCE.

The high costs of cables necessitates paying close attention to laying and maintenance and many excellent devices have been introduced in this connection. Sir Charles Bright, Charles de Bergue and C. E. Amos invented machinery for paying out cable; Latimer Clark, Frederick Braithwaite, Longridge, Brooks, W. H. Preece, H. C. Forde, Willoughby Smith and many others devoted attention to the construction of cables; Dr. Muirhead introduced a duplex system; Sir Charles Bright, J. B. Saunders and Sir Oliver Lodge devised lightning protectors; Oliver Heaviside advocated "leak" circuits and self induction, while, more recently, Colonel A. C. Booth introduced a method of using condensers for reducing induction between the various cores of a cable.

SUBMARINE CABLE TELEGRAPH APPARATUS.

Practical experience of cable working soon proved that, although the old needle apparatus and morse key could be used on short lines, they were totally unsuitable for long submarine conductors owing to their high static capacity. To meet this difficulty Sir Charles Bright invented in 1852 a "curb" key which adapted the duration or force of the current to line requirements, while his brother Edward patented, in 1858, a key which brought reversed currents into play. The most suitable instrument devised, however, was the mirror galvanometer and signalling apparatus introduced in connection with the first Atlantic Cables by Professor Thomson (afterwards Lord Kelvin) to which reference has already been made. Excellent signals were obtained with this apparatus when, experimentally, two Atlantic cables were looped and the working current was obtained from a battery consisting of a silver thimble containing a few drops of pure sulphuric acid and a piece of zinc weighing 1½ grains. Using the principle of his galvanometer, Kelvin produced the syphon recorder, in which a tube, conveying ink to paper tape, takes the place of the mirror. The sending apparatus consists of keys which, similar to those of the single needle, send negative or positive currents as required. The Muirhead recorder is operated in a similar manner. Practically all the forms of telegraph apparatus enumerated earlier in this paper have been tried or used on submarine cables. The Hughes was worked for many years on Anglo-Continental lines, but, since 1898, has been gradually supplanted by the Baudot. The latter is in use on the Paris-Algiers circuit in which is included a cable over 400 miles in length, and an adaptation of the system has been tried on the Brest-Casablanca Cable, which is 1,600 miles long. Wheatstone transmitters, combined with Creed perforators and printers, are doing over 70 words a minute in both directions on the London-Norwegian communications, while on the London-Halifax cable the incoming signals, besides being received on the syphon recorder, are translated into Wheatstone signals on perforated slip which is run through the Creed type printer.

SUBMARINE CABLE TELEPHONY.

The securing of overseas communication by telegraph opened up the prospect of cable telephony, and, in March, 1891, the British telephone system, which had been started in 1879, was put into touch with that of France.

After a long period of successful working, communication was extended to Belgium, Holland, Switzerland and, recently, Germany, while, at the present moment, communication with Austria and Czecho-Slovakia is contemplated.

WIRELESS OVERSEAS COMMUNICATION.

We must now examine the latest phase of overseas communication, viz., the elimination of the metallic conductor. James Clerk Maxwell (1831-79) proved, in 1873, that electrical disturbance would set up and radiate waves of electro-magnetic nature, and other scientists were soon busy with research work. Heinrich Rudolf Hertz (1857-94) demonstrated the existence of electro-magnetic waves of comparatively low frequency, Branly used a tube of metal filings for detecting these waves, and Sir Oliver Lodge improved the tube and introduced a point detector. Nikola Tesla, Professor Righi, Professor Bose, Doctor Pupin, J. E. Ewing, Poulsen, Ernest Rutherford, Fessenden and many others devoted their attention to various aspects of the subject, while De Forest and Dr. J. A. Fleming designed thermionic valves. To Senatore Guglielmo Marconi, however, must be given the credit for having demonstrated the practicability of telegraphy without wires. In 1896 Marconi came to England and, under the supervision of the Post Office, Admiralty and War Office, conducted experiments in London between St. Martins le Grand and the Embankment, and then over a distance of four miles on Salisbury Plain. Successful attempts were also made between the Isle of Wight and Bournemouth, and in May 1898 apparatus was installed at Ballycastle and Rathlin Island. In 1899 South Foreland communicated with Boulogne-sur-mer and, in August of that year, 85 miles of sea were covered successfully.

TRANSATLANTIC WIRELESS TELEGRAPHY.

As in the case of submarine cables, spanning the Atlantic Ocean became the object of desire. Marconi, with his assistants, Messrs. G. S. Kemp and Paget, left England in 1901 for the old barracks on Signal Hill at St. Johns, Newfoundland, leaving instructions for signals to be radiated at certain times from Poldhu, Cornwall, where an aerial connected to masts 210 ft. high was situated. The aerial at St. Johns was held by a kite, hovering at an elevation of about 400 ft. Success attended the efforts of the experimenters and, at about noon on Dec. 12, 1901, Marconi and Kemp heard the first Transatlantic wireless signals. Much progress has been made since that date. Ships of all kinds have been equipped with wireless apparatus, islands have lost their isolation, and international communication without wires has become a permanent feature. The British Post Office, with Mr. T. F. Purves as Engineer-in-Chief, has brought several stations into use, the largest in the world being erected near Rugby under the supervision of Mr. E. H. Shaughnessy and his able assistants, Messrs. A. J. Gill, T. Walmsley, Dr R. V. Hansford, and Lt.-Colonel A. S. Angwin.

DIRECTIONAL WIRELESS TRANSMISSION.

In 1923 Marconi and Franklin devoted particular attention to directional transmission and, their experiments proving successful, it was suggested that the system should be employed in the contemplated Imperial scheme for communication between England and Canada, South Africa, India and Australia. Experiments commenced with Canada on Oct. 8, 1926, and, during the trials a total duplex speed of 450 words a minute was attained. The service between London and Canada opened at midnight on Sunday, Oct. 24, 1926. Since that date communication with Australia has been established, and the installation of the much-desired links of Empire is well on the way to completion.

TRANSATLANTIC WIRELESS TELEPHONY.

The ambitious efforts made to establish telegraphic communication across the Atlantic were repeated in connection with the telephone. The impracticability of the present Atlantic cables for telephonic conversation turned the thoughts of experimenters in the direction of wireless, and, early in 1919, sounds emitted from Ballybunion, Ireland, were heard at Cape Breton Island, a distance of 1,800 miles. Efficient conversation was not practicable, however, until the Rugby installation with its special equipment for wireless telephony was brought into use. Experiments took place during 1925, with the station at Rocky Point, Long Island, and on Feb. 7, 1926, satisfactory conversation was held. Since then unceasing efforts have been made to perfect the arrangements for two-way speech, and regular calls have been made by well-known officials on both sides of the Atlantic. Sir Ernest Rutherford, president of the Royal Society, speaking on Nov. 30, said, "it was now possible, and would, it was expected, soon be practicable to connect any telephone subscriber in Western Europe with any telephone subscriber on the North American Continent."

TRAFFIC STATISTICS.

In the course of this necessarily short and fragmentary paper statistics have been avoided, but the time has arrived to say what has been achieved by the various overseas services which have come under review.

The British Continental telegraph cable service which opened with France on Nov. 13, 1851, possesses to-day over 130 channels and maintains direct communication with France, Italy, Switzerland, Holland, Belgium, Germany, Austria, Czecho-Slovakia and Norway. The number of telegrams exchanged during the year ended October, 1926, amounted to over eight and a quarter millions, while the number of messages handed to and received from Cable Companies reached one and three-quarter millions.

The Continental telephone cable service, which commenced in 1891, handled last year over 900,000 calls.

The London-Halifax (Imperial) Cable, opened for public traffic in July 18, 1917, during the last twelve months disposed of over 550,000 telegrams.

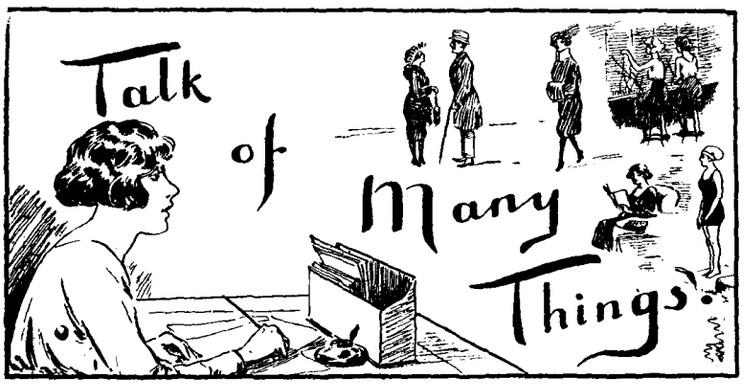
The Post Office Continental Wireless service which opened with the establishment of communication with Berlin on Jan, 27, 1921, now exchanges traffic with Italy, Hungary, Czecho-Slovakia, Poland, Esthonia, Danzig, &c., and transmitted over half a million telegrams last year.

* * * *

It has been necessary in the course of this lecture to quote many names and dates, but an attempt has been made to present a meagre recitation of facts in such a manner that you will agree that Mr. John Lee was fully justified when he described the history of electrical communication as the "Romance of Telegraphy."

Much more could have been said on a subject which is so intimately connected with the lives of Post Office telegraph and telephone officials. Prognostications as to the future could be indulged in, but, on the present occasion, I will be content, and, paraphrasing Goethe, will say, "It is a great pleasure to transport one's self into the spirit of the times, to see how wise men thought before us, and to what a glorious height we have at last carried their ideas."

WE TELEPHONISTS



Coupling.

HAVE you noticed those little couplets posted about by the Underground which tell you crisply where to live and why? I have not yet learned them all by heart but there are a few which I remember even now despite my third lesson in a course of Dispelmanism. One day perhaps I will tell you about that course. It's quite "intreeging" and briefly, it helps you to forget to remember things that you would have forgotten if you hadn't remembered to forget that you'd forgotten them. In other words—but I digress and anyway it can wait. I was speaking of those cutlets—couplets I mean—"Live in Surrey, Free from worry," "Live in Bucks, Among the ducks," "Live in Hants, And wear *no*—wear *no*—" Um! I've forgotten that one. "Live in Kent, And pay no rent." I like the last one best of all: it's so simple and yet I'd never thought of doing it. "I've always meant, To live in Kent" shall be my Coué motto, unless I choose a better one, such as "The perfect gent, Should live in Kent," or "When all is spent, Go, live in Kent."

Oh, you have noticed them—good, but you've been a long time answering, miss. Well now, don't you think we might do something similar for exchanges? For example, "We at Purley, Are never surly" and as a contrast, the subscribers' wail, "Saints of City, Show some pity." It is probable, of course, that while Purley may be content with their couplet, City will be furious. Quite so, quite so, but these are only quoted to give you the idea. Let us try again, "To Maryland, By fairyhand," or "Seven Kings, Heaven brings." How do they appeal to you—quite neat compliments, don't you agree? And again, "Banish physic, Ring up Chiswick"—there's a sort of Kruscheny kick in that, I think. Rather a sad one has just occurred to me, "How we toil, Here at Royal"—there was a catch in my voice as I said it. However, let us take heart "At Walthamstow, There's mistletoe." Yes I know it's an awful rhyme, but how much worse it would be were it true. Mistletoe is dangerous and, although some escape, most of us only get a miss.

Having suggested the great thought I must leave it with you to set your poetic imaginations to work. Prizes will be offered for the best efforts. Competitors must be over ninety years of age and in their second childhood—but perhaps it is unnecessary to mention that latter condition.

PERCY FLAGE.

In an article headed "Why we shall have to learn American," a *Daily Express* writer says :—

"We may expect to hear something like this, when we ring up New York City by wireless :—

"'Lo. 'Lo. . . . Zat Lunnun ? . . . Yeah, Lunnun. . . . 'Lo. Say, gimme Lunnun willya ? . . .

"Hallo ! Hallo ! I say, is that New York ? What ? Yes, please, Miss. Oh, that *is* New York, Beekman 8900. Mr. Cyrus Hambone, please . . Cyrus Hambone . . .

"OHMYGOSH.

"Wassat ? Hudjawant ? How ? Oh, yeah. Mister Hambone . . . Holdawire. . . . Who ? Nosir. Holdawire. . . . Willya wait please while I fetchum on the wire. . . . Ohmygosh. . . . Caint you speak English ? . . . Yeah, I'm getting Mister Hambone, right now cominonawire. . . . Wait now kid an' shoot snappy. . . . Here's your party. . . .

"Hallo, Hallo, I say is that Mr. Hambone ? Mr. Hambone . . .

"'Lo. Hamboneonawire. . . . Zat Lunnun. . . . Yeah. Say, Iwanna speak to Mister Smith. . . . 'Lo. . . . 'Lo. . . . Say Exchange this wire's on the blink. . . . 'Lo Mister Smith. . . . Zat you Smith ? . . . 'Lo Howareya ? . . . Yeah, Gotta punk line. Yeah, I say we gotta punk line. . . . A PUNK LINE. . . . CAN'T YOU UNDERSTAND PLAIN TALK. . . . A PUNK LINE. . . . 'Lo. . . . 'Lo. . . .

"Hallo ! What's that ? Half-past nine ? I don't care if it is, I want to speak to Mister Hambone. . . . Hallo. . . .

"'Lo. . . . Watsat ? You kin play a trambone ? Gosh. . . . Say Exchange I wanna talk with a Hobo in Lunnun an some sap slips me the goods he kin play a TRAMBONE. . . .

"British operator, to subscriber : 'Your time's up, Sir. Ring off, please.

"American operator, to subscriber : "Getoffa the wire, please. Time limit.

"British and American subscribers together : Help ! ! !

"So now you know."

(The mistake appears to be in the heading, which should read : "Why Americans will have to learn English" !)

Brixton.

Brixton, what of the Summer's day, what of the Winter's night ?

Woe is me, that I should be here among you where social life plays no part.

Swimmers we have, but there is no swimming club.

Book-lovers we also have, but no library.

'Buses travel to anywhere from outside the door, but where is the Rambling Club ?

Artists there are, but a Dramatic Society there is not !

Dancers there are, but no dancing, and singers but no song.

Come ! let us take counsel together, that we may liven ourselves up ! Let them that swim make unto themselves a Swimming Club wherewith to compete in the Service Galas. Let us give our silent, solemn ones a goodly array of fine books, that their hearts may be contented. When the sun doth give of her radiance let us assemble on top of a fifty-eight 'bus and traverse the downs of Purley.

Let those who act and those who sing practice of their arts within the dining room, where their voices cannot be heard by Subscribers afar off. How sayest thou—"We have no time ?" Rather let us dramatise our lunch-times and symphonize our tea-times.

Let us provide our young bloods with song and with dance, that laughter and merriment may resound in the Halls which we engage. Suffer them also to invite their boys, that the young men and the young maidens may be joyful.

Come ! let us reason one with another that we might make for ourselves a name unto all people.

GERTRUDE M. TURNER,
Brixton Exchange.

On Buying a Hat.

"I *must* get a new hat !"—those few words were uttered on Wednesday morning—but being a Telephonist I must wait till Friday to fulfil my desire.

So, on pay day at 4.30 p.m., I sally forth on a hat-hunt. Having glued my nose in turn to every local hat shop, I decide there's nothing for it but to go up to town. Arrived, I inspect the windows of "Marion" and am cautiously trying to get a glimpse of the price on a dangling ticket, without turning a somersault, when I become aware of a pair of eyes through a flimsy door curtain, giving me that "Come hither" look—I beat a hurried retreat ! P'raps I'd better try a bigger shop ; they *might* have a few cheap, cheerful hats among their vast collection.

Ah ! this looks better—I think I'll go in—"Yes, Moddom ?"—"A felt ?"—"Certainly, Moddom ; this way," and I follow a waved, perfumed, and highly manicured being, who finally hands me over to a smaller edition of herself, who enquires in a languid tone, "What price, Moddom ?" The moment has come, I feel a cold, creepy feeling in the region of my spine as I murmer, "Not more than a guinea" (It had been my firm intention not to pay more than 15*s*. 11*d*.—but what can I do ?—thank goodness I did that 2.30 to 8 p.m. last Sunday !). At this the smaller edition puts down the two smart models she had been going to show me and starts groping in a remote drawer, presently emerging with a bright red velvet toque, and an emerald green straw, quite regardless of the fact that I had asked for a *fawn felt*, and obviously entirely ignorant of the fact that I possess hair that is know as "Titian," but looks to me, more like the colour of a marigold and a tangerine mixed.

Shall I ever escape ? I am surrounded by an army of hats, some like birds' nests, and others resembling flower gardens—still, I suppose they *must* be fashionable, though I haven't as yet seen anyone wearing anything like these creations. I begin to think I shall be reduced to a handkerchief with knots in its four corners ! Realising I must do something, I say : "I'm sorry ; I couldn't possibly wear any of them," and flee, leaving an irate assistant, who probably thinks I am mad, to restore order out of chaos ! I spend the next hour gazing in West End milliners, and finally come to the conclusion I can do better in my own home-town—so take a 'bus back and begin all over again. I'm still trying on hats at 6.55 p.m., the shops close at 7 p.m., so I *must* make a choice here, as I'm determined to get a new hat. I survey myself in the glass under a nondescript black felt, and wonder if anyone else has hair like mine—it looks too long without a hat, and yet when I put one on, lo ! it disappears and I look as if I hadn't any ! I've had it bobbed, shingled and bingled, now it's a mixture of all three and the next thing I suppose, is an Eton crop.

I buy the nondescript black felt for 25*s*.—I don't like it much, but it is better than some I have seen, anyway, and I wend my weary way home.

The next day I see the *very* hat I wanted, *fawn* felt—with *such* a jaunty angle, and only 15*s*. 11*d* !

It is still there three days later ; if they don't take it away soon I shall yield to temptation.

I've heard of raiders grabbing diamonds and disappearing in taxis, but can you imagine me smashing a window, grabbing a hat and disappearing in a bus ? I can !

F. G. RUSSELL,
Streatham Exchange.

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 INSTITUTION OF POST OFFICE ELECTRICAL ENGINEERS : BOOTH-BAUDOT AWARD.

The Council wishes to call attention to the "Booth-Baudot Award" of £5 which is now offered annually for the best improvement in Telegraph, Telephone or Wireless Apparatus or Systems. The award for the year 1926 is governed by the following conditions :—

1. The Award will be restricted to employees of the British Post Office.
2. Applications for the Award should be made between Jan. 1 and March 31, 1927, and such applications should refer to improvements made, or suggested, during the twelve months ending Dec. 31, 1926.

   Attention is drawn to the fact that recipients of Awards via the Post Office Awards Scheme in respect to any improvement in telegraph, telephone or wireless apparatus or systems are eligible to apply for the Booth-Baudot Award in respect thereto.
3. At the discretion of the Council of the Institution of Post Office Electrical Engineers the Award may be withheld if, in the opinion of the adjudicators appointed by the Council, after full consideration of the applications received, no award is warranted.
4. Applications for the Award, accompanied by full details of the improvement, should be addressed to the Secretary, The Institution of Post Office Electrical Engineers, G.P.O. (Alder House), London, E.C.1.

R. V. HANSFORD,
Secretary.

LIVERPOOL AND DISTRICT.

ANNUAL REPORT FOR YEAR ENDED DEC. 31, 1926.
(*Abridged.*)

THE report which follows deals with the development of the Service in the Liverpool District during the year ended Dec. 31, 1926, which, in spite of the depression caused by the coal strike, has been well sustained, considerable progress having been made in all directions.

New or Improved Exchanges.—A considerable extension has been made to the equipment at the Central and Bank Exchanges, and the equipments at many other exchanges have been increased to provide for the growing needs of the telephone users. Complete new manual exchanges of the latest type have been provided at Hoylake and Upton. A new exchange at Huyton is nearly completed, and will be ready for service early this year. Arrangements are also well in hand for providing new exchanges at Garston, Maghull and Stockton Heath. Sites have been acquired for new exchange buildings at Prescot and St. Helens, in which exchanges of the automatic type will be installed.

Telephone Progress and Increase in Number of Telephones.—During the year ended Sept. 30, 1926, 6,762 new telephones were fitted. After allowing for cessations this shows a net increase of 4,125, or approximately 7¼%. The number of telephones increased from 34,910 in September, 1912, to 61,634 in September, 1926—a growth of 76% in 14 years. The provision of additional underground cables required to meet the demand for new circuits is proceeding steadily, and new services can now be given in most cases within one or two weeks from the date of the order. Isolated cases of unavoidable delay occasionally arise, owing to the spare underground plant being used up through exceptional growth in certain localities. In such cases prompt steps are taken to lay new cables.

Underground Cable Extensions.—New main cables have been brought into use from Liverpool to St. Helens, from Warrington to Wigan, and from Birkenhead to Upton, Hoylake and Neston. A new cable from Liverpool to Bootle, Waterloo, Crosby, Hightown and Formby will be completed and brought into use early this year, to provide for increased junction requirements between those exchanges. Similar additional junction cables will also be shortly provided from Liverpool to Old Swan and Huyton. An additional cable with 254 circuits is also to be shortly laid from Liverpool to Manchester.

Long-Distance Communications.—Several additional long-distance circuits from Liverpool and the surrounding industrial areas to London and other important centres have been brought into use during the year by means of the various repeater stations associated with the main underground routes. The function of a telephone repeater is to amplify the telephone speech currents by means of thermionic valves—so well-known to the wireless enthusiasts—with the result that the volume of speech reaching the distant subscriber closely approximates to that sent out by the originating subscriber.

Telephone Traffic.—During the past year there has been a further substantial increase in the number of calls dealt with in the district, the total number approximating 62¼ millions (58 million local and 4¼ trunk), being an increase of 6% over the previous year.

The number of phonograms—telegrams handed over the telephone by subscribers for transmission—number 214,000, an increase of 10% on last year.

The quality of the service continues to improve. Written complaints were comparatively few and referred mainly to plant and apparatus faults which are more or less unavoidable. The total written complaints represented 1 complaint to every 36,890 calls dealt with. With the conversion of Liverpool North, Hoylake, and Upton exchanges to central battery working, the Liverpool district is now almost completely equipped with the most up-to-date manual system.

Phonogram Equipment.—The new phonogram room at the Liverpool Head Post Office has now been equipped with the latest type of ancillary panel board and it is expected that the new apparatus will be brought into use this month. The improved facilities for handling the work should greatly benefit those subscribers who telephone their telegrams for onward transmission.

Street Kiosks.—The use of street telephone call kiosks is still being extended. A new coin box permitting of shillings, sixpences, and pence being inserted, has been introduced in certain towns and, if it proves successful, its issue will be generally extended. It is anticipated that this will lead to a considerably increased use of these kiosks for the purpose of sending telegrams and making trunk calls.

Telegraphs.—The further experience of the type keyboards and automatic transmitters on the London and Paris routes, referred to in the last report, has been entirely successful and this method of working is likely to be extended to other routes.

Direct telegraph working between Liverpool and Antwerp has been introduced, and the question of further direct lines between Liverpool and the Continent has been reviewed. The circumstances, however, are not such as to justify any extension in this direction at the moment, but the matter is being kept in view.

There has been a large increase in the number of Christmas and New Year Greetings sent by the Imperial Cables and Empiradio.

We regret to record the death during the year of Mr. E. J. Hidden, who had been Telephone Manager at Liverpool for 26 years. He has been succeeded by Mr. W. E. Gauntlett, formerly Manager of the Scotland West District.

W. M. SIMPSON, *Postmaster-Surveyor.* W. J. MEDLYN, *Superintending Engineer.*

LONDON TELEPHONE SERVICE NOTES.

Contract Branch Notes.

THE net increase in exchange lines for the year 1926 amounted to 28,959 or a percentage increase of 10.7, whereas the stations increased by 43,156, or 9.2%. In view of the adverse effect of the coal strike and the unsatisfactory trade conditions, these increases may be considered satisfactory. The population per telephone in the London Telephone Area at the end of 1925 was 16.2, and at the end of 1926 14.96. The last figure compares with 29 for Great Britain.

The Contract Branch had the satisfaction of closing the year by negotiating an order for what will be the largest P.B.X. in London and probably in the Kingdom. It will have a total of 944 internal extensions. It would be interesting to know how many installations of this size are in existence in New York.

It is interesting to ascertain from what classes of the community the demand comes for telephones. Some time ago one of the lecturers before the Post Office Telephone and Telegraph Society mentioned that in the United States even charwomen found it necessary to be on the telephone. A case came under notice recently in London where two charwomen were living together in a flat and had the telephone installed. Every week the Contract Branch receives evidence that the working classes are being educated rapidly in the value and usefulness of the telephone.

The population per telephone in the United States on Dec. 31, 1925, was 6.7, as compared with 32.2 in this country. It appears from statistics recently published that the population per motor-car in the United States is 5.8, as compared with 45.6 in Great Britain. It may be inferred from these figures that the motor industry, with its enormous sales organisations, is relatively further from United States standard than the telephone service.

Mr. H. C. Edwardes, a Contract Officer attached to the City District Office, retired from the Service on superannuation on Jan. 8. It is interesting to recall that Mr. Edwardes is the first Contract Officer of the original Post Office London Canvassing Staff to retire. His colleagues have subscribed to a presentation which will be made at a later date.

Letters which reach the Contract Branch between Christmas and the New Year sometimes depart from the purely formal basis and reveal the general seasonal feelings. One subscriber addressed a letter to the *Consoler* London Telephone Service but it was not clear that it was due to gratitude for benefits received ! ! Another subscriber expressed the hope that the service procedure would be carried out both by the exchange staff and himself. It is hoped this New Year's resolution was not made to be forgotten within a week or two.

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Telephonists' Society.

Once again the Annual Dance of the London Telephonists' Society has taken place, and once again it has been an unqualified success. This year it was held on Jan. 1 at the usual rendezvous, Bishopsgate Institute, and though delays on a certain railway, just now notorious, caused the earlier arrivals to have an unexpected amount of room in the first dances, long before supper time 200 folk were gaily footing it to the music of Mr. Skinner's Orchestra. He and his merry men were as usual in excellent form, and soon proved that they can still play valses in the perfect time for which they were famous in the early days of the Society, umpteen years ago.

This Session's president, Mr. J. Hinshelwood, made his first appearance at these functions (but that is no reason why he should not now make a habit of it), and past presidents also present were Miss Cox, Mr. Beck and Mr. Buckeridge. The latter shares with one or two others the distinction of never having missed one of these events, which, as Social or Dance, have occurred every year since 1906, except during the war period. Indeed, one of the most enjoyable sides of this dance is the fact that a number of the veterans of the Society make a point of turning up and meeting old friends.

A very familiar bugle call about 9 p.m. sent everyone supperwards to find the tables festive with a wonderful assortment of caps and hats, which added to the ballroom gaiety later on. Auld Lang Syne came far too soon for most.

The Secretary, Mr. Thirkell, who was M.C., and his Dance Committee of two (both being of the aforementioned veterans) are to be congratulated on another successful evening.

In order not to clash with Christmas festivities next year's dance will probably be held about the middle of January, 1928. We shall all be there !

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Accounts Branch.

Anyone wandering by chance into certain sections of the Accounts Branch after office hours, a few days before Christmas, would have wondered what had happened in that usually matter-of-fact atmosphere of ledgers, because though the ledgers were certainly put away, the staff had not gone home, but were in enthusiastic groups round tables laden with—toys ! And, as thereby hangs a tale, I had better begin at the beginning.

During 1925 the Accounts Branches of the Controller's Office moved to Cornwall House, and before the Christmas of that year came round, someone discovered that in the Waterloo Road Hospital next door, there were 72 children's beds, and all would be occupied at Christmas, and there were not many outside helpers to play Santa Claus to them. So two or three enthusiastic folk got to work and spread round the news, others at once volunteered to dress dolls, buy dolls or bring toys, with the result that on Christmas Eve 72 presents were handed over to a very grateful Matron.

This last Christmas plans were made earlier and it was soon found that the help forthcoming would do more than supply the needs of our neighbours. But nobody was discouraged for other cases of need were known, and when the time arrived for the exhibition, there was not one show, but several. Dolls predominated, dolls large and small, baby dolls that went to sleep, dolls in knitted suits and rompers, dolls in partyfrocks, and sleeping suits, fairy dolls, fashionable shingled dolls complete to the handkerchief, black dolls, brown dolls, in fact, every kind of doll. Then there were the animals, including, of course, Teddy Bear, Dismal Desmond, Pip and Squeak, Ernest the Elephant, and other old friends, while mechanical toys, games and other joy creaters too numerous to mention, added to the collection.

As a result, a goodly supply of toys of all sorts was sent not only to the Waterloo Road Hospital, but also to the Queen's, Hackney, St. Mary's, Plaistow, and the South-West London Mission.

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Paddington Exchange.

Within a stone's throw of Lord's Cricket Ground—to many of us the very centre of the British Empire—there lies the fringe of a dull sordid neighbourhood stretching outwards to the regions of Paddington and St. John's Wood, unheeded by and almost unknown to the luxurious and well-to-do. It was here that the Paddington Exchange Staff had elected to give their Annual Tea this year to 300 boys and girls of the Capland Road L.C.C. School. Consequently at an early hour on Saturday, Jan. 15, West End Caterers were busy delivering their choicest delectables and dainties at the School and ere long a large number of willing and enthusiastic helpers took possession of two of the floors of the building and soon wrought wonders with the material at hand, converting the conventional surrounds of the School interior into a fitting setting for a glorious feast. At about 4 o'clock tea was served simultaneously in two large School Halls, helpings of bread and butter, cakes, pastries, jellies, &c., disappearing with a rapidity which bespoke practical appreciation of the bountiful fare provided. The merriment of the children soon became infectious and wavelengths of enjoyment pervaded the whole atmosphere. Tea eventually gave place to an impromptu "Sing-Song" which gave scope for the native talent of the Staff ; piano solos, songs with rollicking choruses lustily and spontaneously emphasised by the youngsters, and captivating recitations all being included, while a band of Rovers who had generously volunteered for general service for the afternoon delighted the audience with some hearty turns reminiscent of the breeze and verve of their seaside training camp life.

The triumph of the entertainment was finally assured by the appearance of those old-time favourites, Messrs. Wilkins and McGowan in their inimitable Living Marionette Show which went with its accustomed drollery and swing evoking an enthusiasm and applause which fairly made the welkin ring.

Mr. Cox Johnson, the Headmaster, having called for a hearty "Three times three" for the Paddington Staff, the party was reminded that on this occasion every scholar takes a prize. The children were then lined up and each one presented with a well-chosen toy while by way of a final touch there were oranges, pennies and smiles for the departing guests.

The Committee are very grateful to Mr. Cox Johnson, the Headmaster, and to Miss Worts, the Headmistress, and their Assistants for their able co-operation in everything which was done, and also to that ever-increasing number of ladies and gentlemen who, by their liberality of time, service and money, made the afternoon the great success which it deserved to be.

PERSONALIA.

LONDON TELEPHONE SERVICE.

Promotions :—

Miss H. HAMER, Asst. Supt., Class II, at Clerkenwell, to Asst. Supt., Class I.

Miss A. M. FAZAKERLEY, Asst. Supt., Class II, at Primrose Hill, to Asst. Supr., Class I.

Marriages :—

Miss F. WYATT, Asst. Supr., Class II, of Trunk Exchange.
Miss E. P. ISON, Asst. Supr., Class II, of Clerkenwell School.
Miss M. F. SLATER, Telephonist, of London Wall Exchange.
Miss D. M. DUNCKLEY, Telephonist, of London Wall Exchange.
Miss E. E. BROWN, Telephonist, of London Wall Exchange.
Miss E. A. TURNER, Telephonist, of Museum Exchange.
Miss F. GOODMAN, Telephonist, of Museum Exchange.
Miss G. V. BERJEAN, Telephonist, of Museum Exchange.
Miss V. E. M. ANDERSON, Telephonist, of Museum Exchange.
Miss P. WOOLLVEN, Telephonist, of New Cross Exchange.
Miss I. M. ROBERTS, Telephonist, of Putney Exchange.
Miss K. I. KING, Telephonist, of Riverside Exchange.
Miss D. BURLACE, Telephonist, of Trunk Exchange.
Miss A. HAGARTY, Telephonist, of Trunk Exchange.
Miss M. WIGMORE, Telephonist, of Trunk Exchange.
Miss G. MARFLEET, Telephonist, of Trunk Exchange.
Miss H. S. SMITH, Telephonist, of Trunk Exchange.