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THE TELEPHONE SERVICE.

THE POSTMASTER-GENERAL'S REPLY TO A DEPUTATION OF THE NATIONAL UNION OF MANUFACTURERS, OCT. 16, 1919.

THE Postmaster-General said: Col. Sir Frederick Hall and Gentlemen. I am very pleased that you have come here because I think a talk like this will do a good deal of good. From lots of things I can see you have not the opportunity of understanding the position which I shall be very pleased to explain to you. This Deputation has been delayed a considerable time. When you first mentioned it I was undergoing a slight operation, which delayed things for a while. I then fixed a day for Aug. 6, which did not materialise somehow. I then fixed a time for Oct. 2, and then, of course, came the Railway Strike, which upset that arrangement—we were all too busy with other things to receive deputations. Now I am very glad at the third attempt it has come off.

Perhaps I had better first explain the situation to you, Gentlemen, and what has led up to it. As far as forty years ago, which Sir Frederick was referring to—of course, I am not responsible for it, or anybody else in the Post Office now; we are rather, if I may say so, perhaps the victims of it, and we ought to have your sympathy—the National Telephone Company, as you know, had the licence given to it and was working under a terminable licence. Of course, that is all very well for the shareholders in a way, they did not suffer very much, but the general public did. The licence expired on Dec. 31, 1911, and an Arbitration took place to fix the purchase price, as you all know. I think we are all business men here, myself included, who would say they themselves would have pursued the same policy, that is when the company saw that the whole of their assets were to be taken over by somebody else, they were not going to keep laying out money to the very last moment when it was to be taken over, and they cannot be blamed for it; consequently there was no incentive to them to sink any capital in the concern, and when the thing was taken over, they had arranged their affairs so very well that practically there was no spare plant left at all. The Government took over a service which, as everyone knows—I had a good deal to do with the agitation myself a few years before that—was not by any means satisfactory, it could have been very much better, but, as I say, for business reasons, the Company did not lay out capital. The arbitration was delayed some time, but the Post Office took the service over in 1912. They began to lay out money, and during the years 1912-13, 1913-14, 1914-15, a sum of about £1,350,000 was laid out per year. Then the war broke out, and when the war went on for a considerable time, for the rest of the period of the war, from early in 1915 up to March of this year, on account of shortage of material, shortage of men and so on, there was only an average of £280,000 a year spent on maintaining the system. There was practically no extensions except for urgent war work and for Government Departments.

The cases that have been referred to by Mr. Wright and others I will inquire into. There is, I may say, a very great shortage of these switchboards and there has been all along; they have not been made because there is nobody to make them, but I will inquire into that, and go well into it. As soon as the Armistice was signed, we went into the question very carefully and drew up a programme for this year—I am talking of the financial year, the Government year that ends on March 31, and for this year we have drawn up a programme in which we intend to lay out £3,000,000 sterling on new Exchanges, improving the lines, putting in extra lines, extra switchboards, and generally making a beginning—it is only a beginning—in getting the service into a more satisfactory condition. I should explain that we should be quite willing and, in fact, we are anxious to do more than this, but it is impossible; there is such a shortage of material, labour and transport as you all know. All your businesses are affected in the same way; you have suffered and will suffer more or less in the same way. When you want anything you do not know when you will get it, or it is very much delayed; and had we been able to expend more money, we should have been very pleased to do so and have had a more extended programme.

I will tell you what the programme is shortly. Of course, a building takes a considerable time, more especially now, to put up, but where it is very urgent indeed, and where a building will take a very long time to put up, we are going to arrange to have temporary accommodation so that some relief can be afforded while a proper and suitable building is being put up, and will be fully equipped later on. That is only part of our difficulties. There are many others. One is the shortage and inexperience of staff. In 1914 there was only 4 per cent. of the operators who had less than six months' experience. Recently the average has been over 25 per cent., and in one of the Exchanges there was 41 per cent. with less than six months' experience. Then, over 1,000 trained operators during the war were taken away to go to various Government establishments, private exchanges, naval and military places all over, and though we have had a few of these returned, there are still nearly 800 of these highly-skilled operators, whom we cannot get back, working in the various Government Departments. We should like to have them, and we hope that something will be arranged by which the Departments will be able to liberate at least some of them. It takes six months' training for them to be even of moderate use, and to be of full efficiency it takes something like eighteen months to two years. So you see that there is a difficulty which we are up against, and are hoping to overcome. It has been said by various people who make complaints that the shortage is due to our not paying sufficient wages. Well, I do not think that is so, because those girls of eighteen years of age who before the war were receiving 16*s.* a week at the beginning and rose up to 28*s.*, are now starting at 37*s.* 10*d.* a week, rising to 52*s.* 2*d.* The greatest care is being exercised to get the very best material possible, and I think that only something like 10 per cent. of those who present themselves are taken. We want to get, when we are getting them, the very best people we can, who will be likely to stay and become part of the permanent staff. Recruiting is improving, though it has been made more difficult by the way in which the telephone operators are abused by the press. They read a newspaper and naturally they say: "Here are all these unjust charges made against us, that we are knitting, sewing, reading, and all that, having tea and indulging in conversation instead of attending to the work; we will go somewhere else, we are not going to be ridiculed by these people." But in spite of all that, it is improving. The traffic, of course, has increased enormously. Before the Armistice the calls in London were rather under a million per day. Now they are fully a million and a quarter, rather over that, and there is not much more material for it to go over. The consequence is that getting such an enormous number of people using the telephone, probably some of them many times during the day, that is to say at any rate some two and a half

million of people, there is bound to be an opportunity of somebody being annoyed every day. It is a big figure, and some of them make more of it than they are really justified in doing, I think.

Now, Sir Frederick Hall, referring to the question about your friend who could not get put on. We know perfectly well that what we are suffering from is the shortage of wires, cables, trunks and exchange boards as well as the personnel. As I say, the service was handed over in 1912 practically bare. Then the Post Office began for three years getting things straight, and then we have had a period of five years when we have been absolutely doing nothing at all, except, as I say, for war work. We are all that in arrear, but, as I said, when I come further on to the point, I will tell you what we are doing in that way to make good the deficit. I may say here that some people say that since the Post Office took over the trunk lines, they have done nothing at all, and that the National Telephone Company did marvels. In the twelve years that the National Telephone Company had charge of the trunks they put in 29,000 miles of trunk wire. In the twenty-three years the Post Office have had it they have put in some 420,000 miles, which, with the extensions going on, will make it over 500,000 miles. As I say, not having sufficient wires, cables, trunks, boards and operators, there is delay, overloading, confusion, and there is bound to be. It is just like the Embankment was on the Monday morning of the Strike. I came down there and it was all jammed up with traffic and I could not move; in ordinary times you come down in a motor quite freely. It is just the same with this extra traffic over the wires; there is not sufficient room, there is the great pressure of several messages waiting to go over one line when they ought to have two or three to accommodate the traffic satisfactorily. Of course, at busy times of the day everybody gets to a certain extent tied up. The remedy, of course, for that is perfectly obvious, and it is to do what we are doing, that is, have increased accommodation, increased wires, increased cables, increased trunks, increased exchanges, and switchboards, and a larger staff to deal with them, so that they can all just have a comfortable amount of calls to deal with, and have no delay. That is the obvious thing to do. Of course, at present there is no room on the boards or anything else.

As you represent Manufacturers from all parts of the country, I will tell you first what we are doing in the country. I may say in London since the Armistice, we have put in 14,000 lines in London alone, and at present we are doing 400 a week.

Col. Sir Fred. Hall: Might I ask a question on that. In July in the House you said you were going to put down new cables. Might I ask you, while on that point, what new cables have been laid down since then?

The Postmaster-General: They are all in work.

Col. Sir Fred. Hall: You say new cables.

The Postmaster General: You cannot dig fifty or a hundred miles of trench to put them in and get the cables manufactured ready and delivered immediately; they are all going on. We are putting underground wires in twenty large towns so that there will not be breakdowns from storms and so on: Perth, Dunfermline, Saltburn, Lincoln, Grimsby, Dewsbury, Ashton-under-Lyne, Eccles, Accrington, Stroud, Newcastle-under-Lyne (Staffordshire), Malvern, Cardiff, Porth, Tonypandy, Mansfield, Nottingham, Chesterfield, Market Harborough, Sheffield, Shrewsbury, Norwich, Aldershot, and a number of smaller places. A new Exchange has been opened, I think some months ago, in Huddersfield, which is working very satisfactorily, and improves the service very much indeed. A new switchboard is being provided at Liverpool Central Exchange, and extensions of the Bank Exchange (Liverpool), Derby and Leeds. Then there are new Exchanges being put up at Carlisle, West Bromwich, Milnsbridge, Northampton and Guildford. I do not know whether these have all started building, but preparations are being made and they are going on with them.

Then there are Exchanges (switchboards and apparatus) being extended at Lincoln, Cambridge, Birmingham North and Hove.

Then again there are new Exchanges also being built at Grantham, Henley-on-Thames, Stratford-on-Avon, Lancaster, Southport, Northampton, Preston, and Whitley Bay (Northumberland).

The Exchanges, where there can be additions made to them, that is where there is sufficient room, are being extended at Dublin, Swansea, Burnley, Dundee, Canterbury, Fleetwood, and Wigan.

Then there are underground new trunk lines from London to Manchester, passing Northampton, Leicester, Loughborough, and Derby; Derby to Nottingham, and a new cable from Derby to Sheffield and Leeds.

Of course, that is a biggish programme. Then we are laying new cables (this one is almost finished): Liverpool to Manchester. Then Liverpool to Chester, Leeds to Wakefield, Manchester to Bolton, Manchester to Rochdale, Glasgow to Motherwell; then London to Stanmore, and it will connect up various routes, Luton, Watford, St. Albans, and various other places.

Then there are London to Bristol, London and Southampton, Loughborough and Nottingham, Derby and Nottingham, Hull and Grimsby, Leeds and Harrogate, Leeds and York and Paisley and Greenock.

I am afraid I am giving you a rather long list, but I want you to see that we are not quite so sleepy as we look.

Col. Sir Fred. Hall: I am very glad to hear the work is being pressed on. We had this information in July in the House; you very kindly gave it then.

The Postmaster General: Which, however, was not reported; it was carefully kept out of the papers. It was rather too much to expect the press to publish a debate in the House giving all this list of names; naturally they were pressed for space and it did not get as widely known as I should have liked. Glasgow to Coatbridge; Coatbridge to Airdrie; Motherwell to Hamilton; Motherwell to Wishaw; Glasgow to Dumbarton; Ormskirk to Preston; Ormskirk to Bacup; Slough to Windsor and Staines to Tunbridge Wells, these are going on, and it is hoped, at any rate, they will be ready within a year from now. It is hoped so; I will not give any guarantee they will. Everybody knows, especially anyone here in the engineering trade I always say that the engineering trade has a special calendar of its own—they have difficulties beyond their control, strikes, getting material, and so on, which delays them; but we are hoping to get it done.

What we are doing in London in the way of Exchanges is this: There is Clerkenwell Exchange, which we hoped to open in December, which will accommodate 1,700 lines, but it will be open, I think, in January. Then there are Bishopsgate, Tower, Holborn, Strand, Sloane Square, and Marylebone. Those are new Exchanges, some of which have been begun, some have not been begun, but they are all going to be pressed on as quickly as possible as far as building material and labour are available.

Then extensions are being made at the Avenue Exchange, and a temporary one at Clerkenwell, as I said before, Chingford, Hampstead, Harrow, Hornsey, Battersea Park, Stratford, Tottenham, Victoria, and Waltham Cross. Those will be opened, except two, before next June, most of them in January, February, and March, two of them in September, Harrow and Victoria.

Col. Sir Fred. Hall: I do not see anything in the south of London. Are there any improvements in the south of London? Perhaps that will be looked into.

Mr. Dalzell: The southern exchanges are not full.

Col. Sir Fred. Hall: They are very unsatisfactory in many cases.

Mr. Newton Knights: You mentioned the Tower, Sir. I was turned out of my offices eighteen months before the war to build the Tower Telephone Exchange that was going to be put up, and not one stitch has been put in on that property ever since; the hoarding has been standing for eighteen months before the war, the tenants turned out, and not a thing done.

The Postmaster-General: There has been delay during the war.

Mr. Newton Knights: A year has gone by since the termination of the war, and not a stone touched.

The Postmaster-General: I will forward your remarks to the Postmaster-General of the day. I am not responsible for that. Tenders are now in for the Tower Exchange and they are going to begin building immediately.

I see there is a point of yours I ought to have referred to, but which I am afraid I overlooked, that is about the installation charge. As you said, I said in the House that when it meets again in the autumn, I am going to ask for a Select Committee to go into the whole question of charges. The service is being run at a loss, because we have not passed on to the public what we have had to pay out in extra expenses in all sections of the Post Office and this £4 is a thing to help on for a bit, for the time being, but it will come up for discussion when the Select Committee is appointed. Then they will go into the whole question of the financial part and see what they have got to recommend.

We are always anxious to get information or advice as long as it is helpful. With that object in view I arranged last January to send some of our experts over to America to look into their system there. This has been done before, and some of the Americans, I believe, are over here now looking into our system to see whether they can adopt anything or improve their system in New York. I arranged for them to leave in May, but the time then was not favourable for them, and they asked to put it off. Some of them went last week and some of them, I believe, are going next week, and then they will come back and compare notes and see if there is anything to adopt. The Americans have come here as I say, some are over here now, and they will go back and see whether there is anything they can pick out of our system that will be a help to them. The companies there have been very good; we exchange full information with one another, and any fresh information is open on both sides of the Atlantic to both people.

I think I have shown you fairly well that what with this problem of the terminable licence that the National Telephone Company was working under and the conditions since the Post Office took it over, really the telephone has not had the opportunity that it has had in other countries: it has not had a proper opportunity at all. Where there has been a national system or a private system in other countries they have had a straight run; the private owners know that it is going to remain their property, and they have been able to develop it fully without fear of somebody pouncing upon them and taking it away. That is what happened to the National Telephone Company, and, added to that, those unfortunate five years in which we have had to stand still, with the traffic increasing all the time, has brought things to the present pass. You will all agree, I think, as reasonable men that five years' arrears of work is a big lee way to make up. It cannot all be done in a year. We cannot dig all those hundreds of miles of trenches and get hundreds of miles of cables laid all at once. We are pressing on as hard as we can, and will eventually, I am absolutely certain, arrive at a telephone system by far the most efficient in the world, the same as our Postal service and the Telegraph—in spite of the few complaints which you have brought as to the Telegraph.

Col. Sir Fred. Hall: I hope you will take that only as a sample. We did not wish to bring them all. Unfortunately there are hundreds and hundreds.

The Postmaster-General: It is admitted by everybody to be the best in the world. These are matters to be regretted, but I am sure in your own business you have people making mistakes occasionally, which they should *not do. We have not got to absolute perfection yet: when we do,* I think it will be a very dull world!

There are millions of telegrams dealt with, of course. I think from what I have told you and what I have shown in the programme you will recognise that everything is being done that reasonably can be expected to be done to improve the service. As I say, I am quite sure in the course of time it will be by far the best service in the world.

Col. Sir Fred. Hall: With regard to the expenditure of this three millions and subsequent sums, is it intended that the telephone system shall become dearer or will it become cheaper? And only one other point: recognising, as I am sure you do, Sir, the importance of the Association from which I have had the honour of introducing the deputation to-day, might I suggest that you would ask the Association to select one of its members to sit on, say, the committee that is dealing with the London Telephone system? Might I venture to suggest that, Sir?

The Postmaster-General: I will consider that point.

With regard to the proposed expenditure making the telephone system cheaper or dearer, I have been considering the desirability of passing the extra charges, as everybody in business does, on to the consumer. Take gas for instance, which was 2*s*., now it is charged to the public at anywhere between 4*s*. and 5*s*., I believe, most of it is 4*s*. 8*d*. We have thought at any rate for the present while trade is in a sort of transition state, it would be more desirable to keep up communications as cheaply as possible. As it is now, the Post Office is being subsidised by the Treasury in order to keep going. *Things change so rapidly, it is difficult to say* what the loss will be, but when we looked at it, it looked as if this year it would be two millions; it would not be less, anyway. As I say, it will be for the Select Committee to settle all this very complicated question of telephone charges; they will go into it and advise what to do. As I said before, everybody knows in their own business—I know in my businesses—that wages which are being paid are nearly three time what they were before the war, and the output is less through the shorter hours. The extra charge applies all round; it is not peculiar to the Post Office. We are not magicians who can produce something out of nothing. However, that is the position as it is at present. The various complaints I will go into. With all the millions and millions of calls that are made, when I am suddenly confronted with one complaint, I cannot be expected to deal with it immediately.

Col. Sir Fred. Hall: Surely. Perhaps you will be good enough to look into it. I am sure, Mr. Illingworth, we are exceedingly grateful to you for having accorded us this interview, which has been, I am afraid, a long one, this morning. We appreciate the difficulties that you have to contend with, but we do venture to hope that at all events the views of the representatives of such an important body as have had the honour of waiting upon you this morning will give an impetus to the Department in seeing whether something cannot be done to improve the system. We recognise to the full the difficulties that you have, but we do think, as has been referred to, that a year after the Armistice, we ought to find ourselves with a better system than we have. We look forward to it. We tender to you our best thanks for the full manner in which you have gone into the matter, and if, for instance, you cannot see your way to fall in entirely with the resolution that was passed *at the Cannon Street Hotel—you have promised to give it your due consider*ation. I do venture to press that one of the members of the Association should be invited to join the London Committee. Once more on behalf of the deputation I thank you cordially for your kind reception.

The Postmaster-General: I am very pleased to see you, but I must point out to you that you cannot expect five years' arrears to be overtaken in eleven months when the country has been so disturbed. It is not reasonable to expect it, and I am sure really you do not, but we are doing our best. I may say that although we get a certain amount of abuse, we get a certain amount of praise. I will read you one or two. Here is one: "Doubtless *with all the complaints published in connexion with your service, you may* be thinking this earth is worse than hell. Let me say that at about 6.15 p.m. I put a call to Glasgow and before 7 p.m. I had secured a connexion, and as a Scotsman I raise my hat to such service."

Col. Sir Fred. Hall: The exception proves the rule!

The Postmaster General: Here is another one: "I have been confined to the house this week and had to attend to business and other matters over the telephone. During the morning I have been speaking without interval, either being called up and calling up. Throughout the service was so quick that I cannot refrain from giving it a word of appreciation, which I do by these few lines, and tendering my thanks to the operators in charge." We have heaps of that sort of thing. We have, I am glad to say, a little bright side to our dull life!

Col. Sir Fred. Hall: I am sure you do not think we are unreasonable.

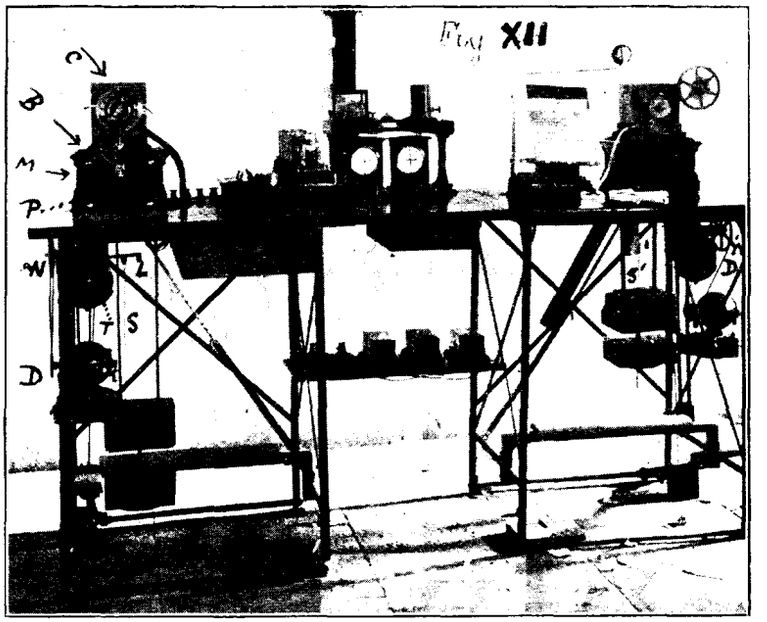
The Postmaster General: Not at all.

THE BAUDOT.

By J. J. T.

(*Continued.*)

In the older type of Baudot the whole of the apparatus, both *receivers* and distributors, was weight-driven, the weights in all cases being foot-raised. A distinct improvement was introduced by the addition of an electric motor-lift to the winding-gear, the motor being automatically put into and cut out of circuit by a very simple spring contact switch and chain attachment. (See Fig. XII underneath both *distributor* and *receiver* S.S.). The action of the weight falling *below* a certain point closes the switch by means of the chain S. Similarly the raising of the weight *above* a certain point cuts off the current by means of a lever L.



So far as this country is concerned the weight-drive and gearing has only survived in the case of the distributor. Direct drive by means of an electric motor and endless band has however been in general use for several years in connexion with the *receivers* Fig. XIII. Even as regards the *distributors* the weight-driven sets though still holding a numerical superiority will probably in time be superseded or at least out-numbered by direct electric phonic wheel drive. At the moment the Indian Government is also adopting this latter system in both India and Burmah where the Baudot has been successfully exploited ever since its introduction by British Post Office officials in 1905. The U.S.A. have also adopted this method in their *Western Electric.*

For the moment it will doubtless prove advisable to give way to the present preponderating type and to apply one's self, so far as the distributor is concerned, to the weight-driven winding gear and the interesting and well-proven Baudot speed governor.

Fig. XII is a photograph by Mr. George Wren of the Government Telegraph Works, Alipore, Calcutta, and is reproduced in these pages because it very conveniently shows the electric weight-lift attachment as applied to both *distributor* and receiver. Fig. XIII shows an up-to-date direct motor-driven *receiver* as now in general British use, and manufactured by Siemens.

As a matter of interest it should perhaps be stated that the installation (Fig. XII) here shown has no counter-part in this country as regards its functions as it was specially designed by

Messrs. Carpentier, of Paris, for *repeating* purposes on the Calcutta—Allahabad—Simla line, and is one of a type known in France as *Translateur tournante*, or rotating repeater.

Its introduction into the British Isles is somewhat unlikely as methods more nearly conforming to standardised Wheatstone *repeater* practice have been adopted by the British Administration and with marked success. These last observations however must only be taken to refer to *repeating* functions. Baudot as such both mechanically and electrically still remains virtually a standardised system throughout the world.

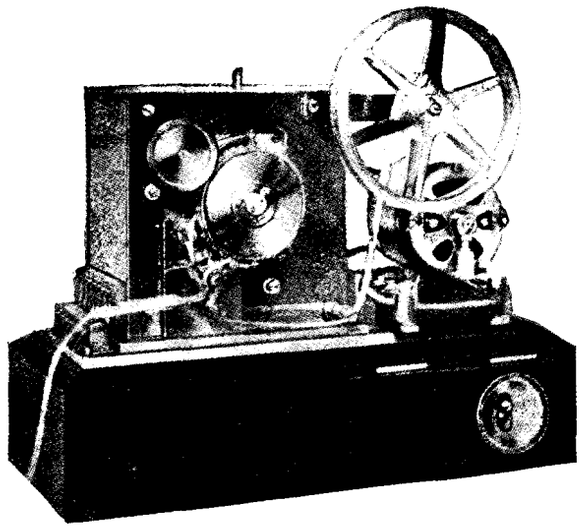
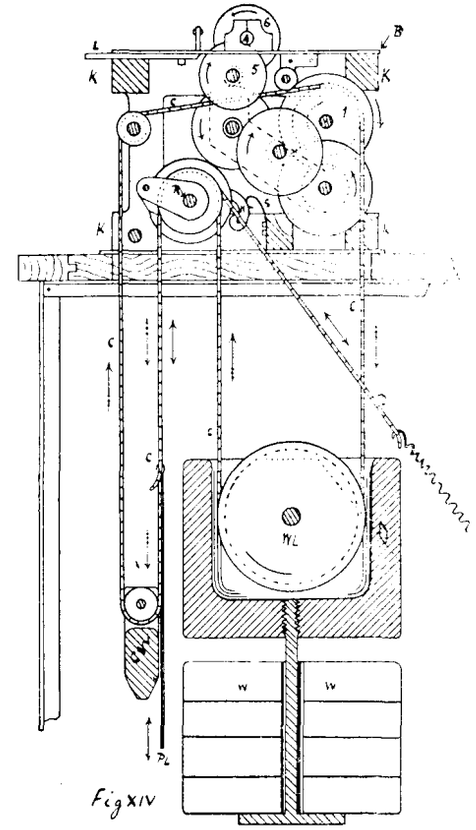


Fig. XIII.

The weight-driven gearing of six wheels is contained in a rectangular steel frame-work, (Fig. XIV) K itself enclosed in a wooden casing M. (Fig. XII.). The sixth wheel is carried on a brass base-plate B (Figs. XII and XIV), the latter being screwed to the upper part of the framework K. B also carries the hand brake L controlling the stopping and starting of the mechanism by its pressure against the fly-wheel 6, (Fig. XIV.) The gearing gives a minimum number of 1800 r.p.m. to the fly-wheel 6 which is carried on the axle A. An extension of this axle beyond the plate and casing carries the governor shown within the guard ring P, (Fig. XII). The distributor and distributor caging C fit on to the base-plate and framework by means of steel steady-pins and screws. In so doing the gearing of the distributor-*cage* C engages with that contained in the steel frame-work enclosed within M, see also wheels 5 and 6, (Fig. XIV).

The skeleton diagram Fig. XIV shows the foot-raised weight-driven gear. P L is the foot-pedal lever which when drawn downwards draws the chain D against the pressure of a steel spiral spring T engaging D with a toothed wheel, fitted *free* upon the axle R.

Upon the same axle is carried a second toothed wheel also free on the axle. This wheel is carried *forward* but not backward by the first toothed wheel mentioned, *i.e.*, that carrying the chain D. The second toothed wheel engages with the *endless* chain C, carrying the weight wheel W L, weights W W and counter-weight C W. When the chain D yields to the pressure of the pedal it carries forward with it its own toothed wheel axled on R and by means of a click and spring the second toothed wheel behind it thus compelling the chain C to raise W L and W W a certain distance. When the pressure upon P L is released by the raising of the foot from the pedal the spring T pulls the chain D and its toothed wheel *backward* and also the pedal lever P. L and the pedal itself (not shown) to their position of rest. The chain-wheel of C which was carried *forward* by the chain-wheel of D is commanded by a strong click and spring H S, fitted to the side of the steel frame work K so that while D moves backwards the chain C is unable to return, the wheel of the latter being released from the engaging click of the chain-wheel of D but held by the framework click H S.



The application of electric motor lift in place of foot lift may be very briefly described.

By means of a band-drive D (Fig. XII) the winding-motor (formerly fixed on a shelf to, and now suspended from, the distributor table frame-work) is geared to a pulley-wheel W, Figs. XII and XV (*a* and *c*), the axle A of W being tangentially geared to a toothed wheel H [Fig. XV (*b*)] which runs in a guard-cup T [Figs. XII and XV (*a*, *b* and *c*)].

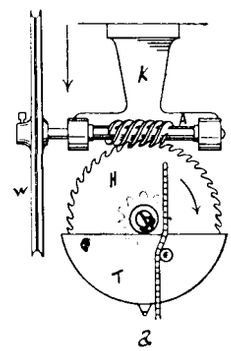


Fig. XV.

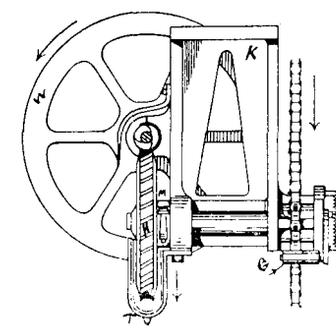


Fig. XV.

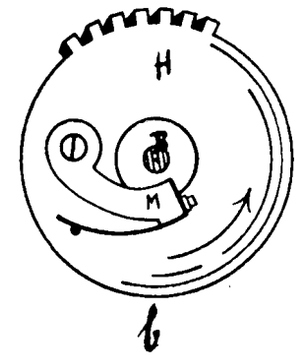


Fig. XV.

The toothed wheel H (Fig. XV) carries a click and spring M (*b* and *c*) which the latter engages with the axle B. This axle runs at right angles to the axle A and at its further extremity terminates in a pinion the teeth of which engage in the links of the winding chain. To change from foot-winding to motor-winding the pedal is removed and the free end of the chain threaded under the roller G [Fig. XV (*c*)] the spiral spring N forcing the chain on to the toothed extension of the axle B. In the latest type, the chain D and its click are dispensed with altogether.

The tangent wheel W and its gearing are fixed to the under side of the distributor table by means of the iron casting K (Fig. XV).

(To be continued.)

TELEPHONES AND NATIONALISATION.—III.

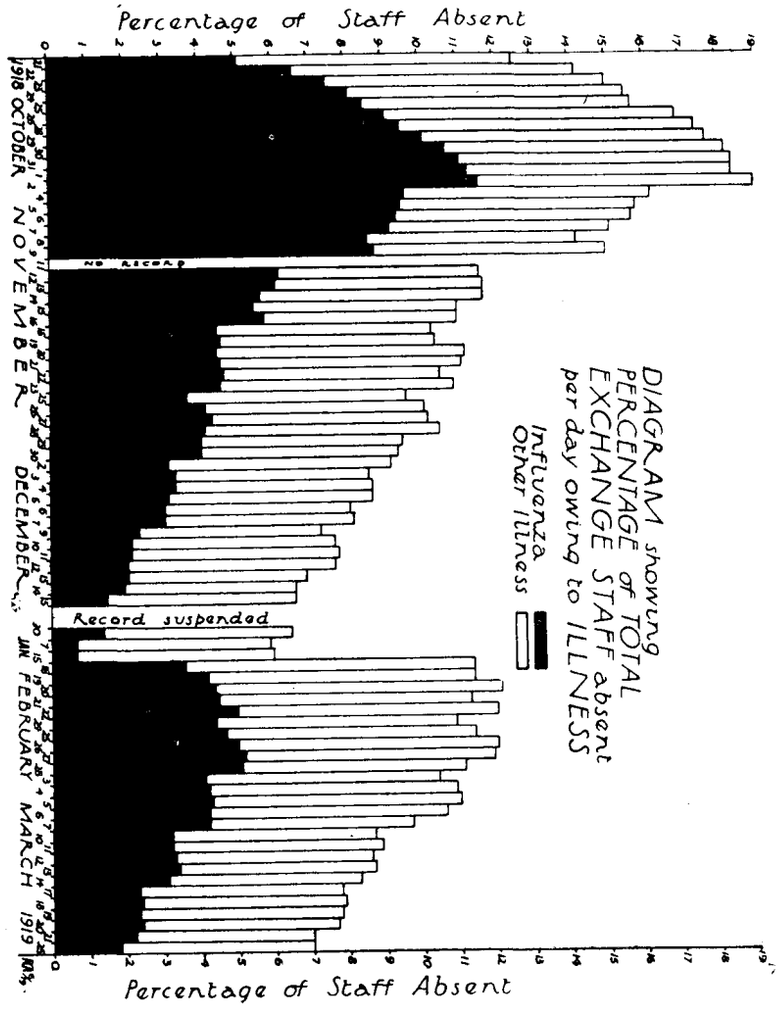
SERVICE DETERIORATION: (*b*) SOME SUBSIDIARY CAUSES.

BY P. W. MAYCOCK.

THOUGH, as shown in a previous article, the transformation of a senior into a junior staff by War leakage is the main cause of service deterioration in London, there are other causes which must be mentioned if anything approaching an adequate survey of the whole period concerned is to be attempted. Some of these further causes arise directly out of War conditions. Theoretically, they ceased to operate at the Armistice; but in certain cases their effects lingered for some months afterwards. Here the writer would offer an apology to his Telephonist fellow-workers for restating points which in the opinion of so many are items of ancient history which have already been discussed *ad nauseam*. The desirability of a complete statement is his justification.

"War Strain" is perhaps the best description of the first of these causes. Not merely the strain of personal anxiety and lowered vitality due to food restrictions, shared in common with the rest of the Nation, but a special form incidental to the telephonists' calling. In a very real way the telephonists of London were employed on the military line of communications. Seventeen different schemes for the transmission of military messages and warnings—including the public Air Raid warning—depended entirely for their success upon the telephonists' willingness to "carry on" in the face of danger. How well they rose to the occasion the records of the Order of the British Empire testify. Eighty per cent. volunteered for service; and in the 32 air raids on London, hundreds of girls faced death on their way to the exchange; where, in the eerie hush in which the City's voice was stilled as the raid reached its climax—a tense dramatic silence that could be felt, hardly broken by the staccato bark of the anti-aircraft guns and the dull roar of the exploding bombs—with calls for "Police," "Fire" and "Ambulance," telling of grim tragedy moving swiftly nearer, the telephone girls of London "did their bit" under fire. They do not want to pose as heroines or martyrs—many indeed resent the little publicity that their pluck and devotion have received—but it is only right that the public they dared so much to serve should know that the effort cost them something—a something which, in an industry where the normal work-strain is directly and primarily mental, was bound to be reflected in the quality of the service.

The health of the staff was further undermined by the three influenza epidemics of the past two years. The percentage of staff absent through illness on the occasion of the last of these outbreaks—but not the most severe—is shown in the following diagram.

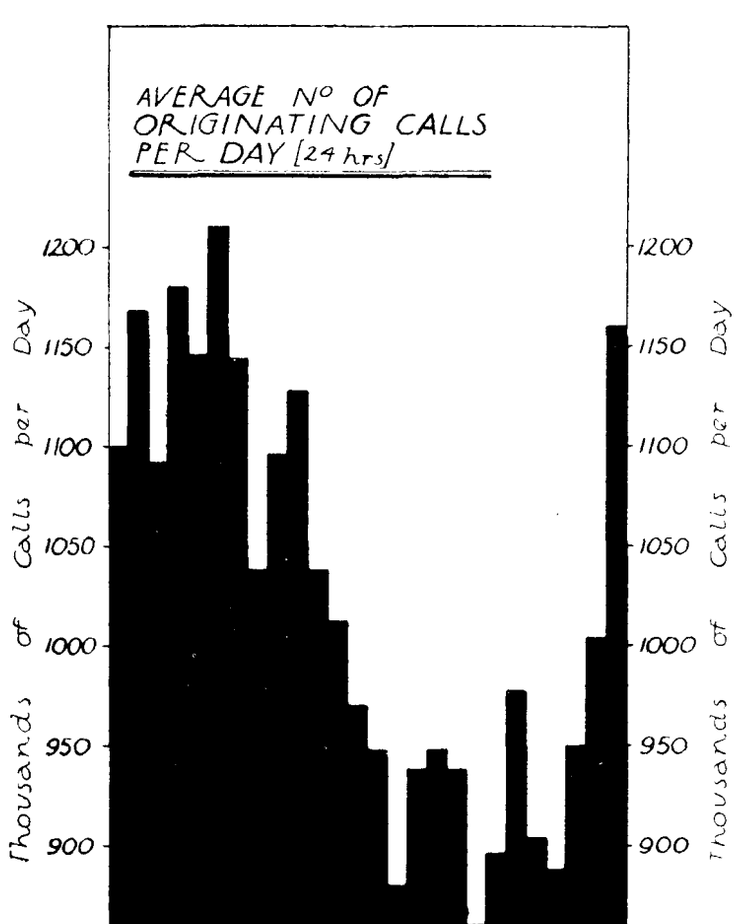


At the height of the various outbreaks the effective strength of the exchange staff of London was reduced to an extent varying between 19 and 25 per cent., and for weeks at a time the seriously reduced force—already suffering from the effects of war strain—had to bear the increased work-load resulting from the enforced defection of their colleagues. Both at the time of the outbreaks, and for some time later by reason of its after effects, influenza dealt a severe blow to service efficiency.

Thus the Armistice found the London Telephone Service with a staff of juniors instead of seniors, with its vital force weakened by War strain and illness, awaiting the necessarily unknown traffic development of the reconstruction period. It did not have long to wait. During the first three years of the War subscribers' calls gradually decreased to the extent of some 22 per cent., and up to the time of the Armistice there had been but little increase. But between January and April of the present year there was a dramatic change, illustrated in the following diagram.

A swift reversion to pre-War traffic pressure occurred, all the leeway was more than made up, and during the London season that has recently expired the exchange staff was confronted with a work-pressure that would have taxed the abilities of their vastly more experienced predecessors of 1914. New staff was drafted in as quickly as it was possible to recruit them to meet the traffic rush, but, as previously stated, trained telephonists cannot be made in a day—nor indeed in a year—and this increase in traffic pressure has, therefore, been accompanied by an increased proportion of junior staff.

The last but not the least serious of the causes of service deterioration has been the campaign of ridicule and abuse with which the effects of the War hardships of the Telephone Service have been assailed by a certain section of the Press. It is all very well for our critics, after publishing columns of carefully selected complaints designed to discredit the operating staff, to say that there was no intention to blame the operators, but the Telephone Administration! This delightfully characteristic facing-bothways trick deceives no one—its victims possibly even less than its



perpetrators. Administrative and executive workers in the Post Office have had their sharp differences of opinion—family quarrels so to speak—as all "live" organisations must have and doubtless will continue to have until the dawn of the millenium: but underneath these differences there is a very real bond of unity in a common public service—one of the more subtle aspects of the solidarity of labour that often escapes attention when that much discussed principle is being canvassed. The youngest telephonist realises to some extent that there is a sense in which the telephone industry is one and undivided, and that when one part is attacked the whole is attacked. And even apart from this the telephonist finds but little satisfaction in the bland assurance that she is selected as the butt of cheap witticism, fantastic misrepresentation, and ignorant abuse in order to discredit somebody else! No industry can be systematically held up to public odium without a definitely adverse effect on the efficiency of the workers engaged in it. Censure and destructive criticism stimulate nothing but the desire for a counter attack, while both are the implacable foes of work-interest, the most potent of all factors of industrial efficiency—though the workers themselves may be unconscious of the fact. This effect on work-interest is naturally more serious in the case of a body of girl workers, keenly sensitive to the stab of unjust criticism and too young to appreciate the true inwardness of the anti-telephone campaign.

To summarise, the business efficiency of the London Telephone Service is suffering in much the same way as that of Brown Jones, and Robinson, whom the war has robbed of their right hand men and supplied in their places inexperienced juniors—good men and true, but as yet lacking the knowledge of the old hands. Drag Brown Jones, and Robinson, into the limelight; harry them with questions in the House: damn with bell, book, and candle all that they have ever done or hope to do: brand their luckless employees, struggling to master the details of a new and complex business, as idle, tea-drinking, and philandering wastrels and . . . Brown, Jones, and Robinson, together with their staffs, will lose the keen edge of their desire for some one's head, have less temptation to write to the papers, and last but not least will understand the feelings of the staff of the London Telephone Service in this our present year of grace!

TELEGRAPHIC MEMORABILIA.

MR. JOHN LEE's paper on the "Psychology of Supervision," read before the members of the T. & T. Society on Nov. 4 touched high-water mark. Mr. Lee gripped the attention of his large audience from first to last for over an hour. This is saying much when the nature of the paper is considered. If the actual text of the paper be read and re-read it will be agreed that every sentence was studied, every paragraph weighed before it was vocalised. Those who had the privilege of hearing it delivered are not likely to forget the fine effort of that vocalisation.

The comments which followed were wide in their range. It was perfectly certain that only those who were present will ever be able to explain how a debate on so abstruse a subject yet nevertheless led debaters into the strangest of fields. "String bands," "telepathy," "stained glass windows," "phrenology," "human aura," and yes, "the training of mules in Salonica" were all subjects most seriously touched upon and most learnedly connected with human psychology!

The impression of the paper upon the bulk of the audience as one left the hall, was that of supreme admiration for the idealistic conception of supervisorhood by the Controller of the C.T.O., with a most sceptical sigh as to the possibility of its realisation.

This is noted with regret, but as a truthful chronicler the fact must be set down in cold print. What wonder! Men and women have been promised "a world fit for heroes to live in" with no cloud even so large as a man's hand to confirm their trembling hopes as to the approaching beneficial showers which are to nourish the arid wilderness and make it blossom as the rose. Faith is by no means lacking in the earnestness of purpose of the dreamer of dreams. Cold reason, however, sees only the difficulties of stirring dry bones with new life: it only realises the deadening inertia, that everlasting foe to all progress. It has not yet recognised the power of a new *spirit*.

So far as can be ascertained the Marconi Company is the first telegraph organisation to appoint a Welfare Superintendent. One of the features of this officer's work is the provision of educational classes for employees at their head office. All expenses are borne by the Company including those of light refreshments. Eight L.C.C. instructors are employed, foreign languages looming large in the programme. Mathematics and bookkeeping have also their place and a novel feature is a study of the Theory of Commerce.

As indicative of the advance in wireless telegraphy rendered possible by the sensitive vacuum tube amplifiers it is interesting to learn that signals from Nauen have been repeatedly heard in the woods of Columbia where a *growing* oak tree has been used as an aerial.

The method of connexion is simplicity itself. All one has to do is to drive a suitable nail into the tree about two-thirds of the way up and there is your aerial.

This, General Squier of the U.S.A. Signal Service, has christened the *optimum* point. This natural aerial appears to obey much the same laws as the manufactured article. It receives better in dry than in damp weather, and better at night than in day. The

unique features are curiously enough that a dead tree is useless, and one in full leaf is a better medium than a leafless one.

Somewhat belated perusal of the Annual Report on the Indian telegraphs for 1917-18 discloses the interesting fact that Type Printing Telegraphy continues its advance in that country. Creeds were installed at Simla, Delhi and Madras and Baudots at Rawalpindi.

Of the inventions and discoveries in the realm of Radio-Telegraphy like the making of books there appears no end. Radio-telegraphy by means of the infra-red rays is an accomplished fact over a distance of 20 kilometres according to *Génie Civil* of a recent date. The best results have been obtained by a thermocouple in the form of a platinum plate one-hundredth of a millimetre in thickness welded to the point of a crystal of tellarium. The junction of the welding is enclosed in a glass bulb screened by fluorine and the thermocouple is fixed at the terminals of a lamp amplifier. The current is broken by a description of cadence of musical frequency, a potentiometer being joined up in circuit to nullify the effect of eddy currents.

A variant on this device for using the invisible rays of light for telegraphic purposes is its utility for detecting the approach of bodies at different temperatures, icebergs at sea for example, the current in that instance being passed into a sensitive galvanometer giving a deflection of about three millimetres for each micro-ampere. Special mechanical devices compensating for the pitching and rolling of a ship at sea have been successfully designed.

Yet another development! According to the *Revue générale de l'Electricité* it has been found possible to obtain mechanical inscription of wireless telegraph signals by the application of Amplifiers, special Morse apparatus or a recording galvanometer wound to several thousand ohms being used and a working current of two milliamperes proving sufficient. Ten-fold sensitivity may be obtained if a magnetic recording oscillograph using smoked tape be used.

According to the *Electrical World* Messrs. Slaughter, Bray & Stokes have given some extremely interesting particulars of Radio-Telephone and Telegraph developments in the Air Service evidently largely drawn from war-experiences. Several difficulties arising from communication between aeroplanes in flight and aeroplanes and the ground are dealt with. A "filter" has been devised for cutting off commutator notes, a transmitter that asbsolutely rejects all engine noise and a sound proof helmet for telephone receivers. It is also interesting to note that while voice-command of aeroplane fleets offers important advantages over telegraphic means of communication yet "Radio-telegraphy is preferable to radio-telephony for code messages in that it is for this service quicker, better and requires less power than radio-telephony.

In this same connexion the American *Journal of the Society of Automotive Engineers* gives some particulars of a sound-proof helmet the ear-piece of which "was made of porous sponge rubber, reinforced with tinfoil, telephone receivers being buried therein." This arrangement was fixed inside a leather helmet, itself specially designed to eliminate "bone transmission" of sound and to enable the aviator to inhale oxygen at high altitudes. "By means of this helmet a pilot could hear distinctly from a distance of 5 to 6 miles and yet not be able to hear himself speak!"

Yet further quotations! Mr. R. B. Black in a paper read before the *Institute of Radio Engineers* spoke of the failure of the early attempts of the radio companies to handle commercial business in competition with the land telegraph and cable companies, and attributed the same "probably chiefly due to lack of business planning." One or two other difficulties are mentioned such as that of the impossibility of the receiver stopping the sender for repetitions, but "lack of business planning" arrested the writer in these days of the supposed infallibility of the business man controlling and managing everything and everybody including the telegraphs and the telephones.

Mr. E. Bradley, formerly of the Inland Telegraphs of the C.T.O., has succeeded to one of the Superintendentships of the Cable Room, a position made vacant by the retirement of that well-known personality Mr. W. T. West, early in September last. Messrs. O'Shaughnessy and Fox succeed to the two respective positions consequent upon the above promotion. Hearty congratulations have followed all three from many quarters.

J. J. T.

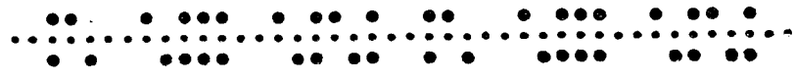
WHEATSTONE SPEEDS.

By A. C. BOOTH.

(By the courtesy of *The Post Office Electrical Engineers' Journal.*)

EVERYONE who has dealt with speed-trials of Wheatstone apparatus on long lines or cables must have been impressed with the serious waste of time and slip that is involved in the cumbrous method of running "old slip," then measuring a 10-foot slip, timing it through the transmitter and calculating the speed. It is hard to get a change made in old-fashioned methods, but the following method is well worth a serious trial by all those that have occasion to test Wheatstone speeds:

(1) Punch a slip about 3 or 4 feet long with the three letters A, B, C repeated, having two letter spaces between each letter, thus:



(2) Gum the ends together accurately so that the slip forms a loop and can run continuously and accurately.

(3) The speed of working in words per minute is the number of groups of A, B, C which are received in 50 seconds, or obviously twice the number received in 25 seconds.

This method obviates all reference to the sending station for measuring speed. It gives the actual speed of the running slip, and avoids that often noticeable variation of speed immediately a slip is put in the transmitter, due to the star-wheel not engaging correctly at the start.

Another most important point is that when the speed of working is approaching the limit, the dot of the A is the first signal to show signs of shortening, due to the long preceding space signal. The speed-slip has the dot, dash, short-space and long-space signals and is therefore a perfect test-slip. It also takes much less time to examine than the usual "old slip."

I devised this in 1910 for prolonged tests of the Anglo-German cables, and although I have often mentioned it to those interested in Wheatstone working its use has not been extended.

ICELAND.

The Iceland Telegraph and Telephone system at the end of 1918 comprised 2,256 km. (pole route) and 6,692 km. (length of wires). There were 140 stations, 1,877 telephone instruments and 12 telegraph instruments, the telegraphic work being largely dealt with by telephone. There were 752 subscribers in Reykjavik, 139 in Akureyri and 79 in Vestmannaeyjar.

The Telegraph and Telephone Journal.

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

Editing and Organising Committee - - MR. JOHN LEE. MR. J. J. TYRRELL. MR. J. W. WISSENDEN. MR. W. A. VALENTINE.

Managing Editor - - MR. W. H. GUNSTON.

NOTICES.

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

VOL. VI. DECEMBER, 1919. No. 57.

THE POSTMASTER-GENERAL'S REPLY.

THAT the Postmaster-General's reply to the Deputation from the National Union of Manufacturers (which we reprint in another column) did not give much satisfaction to the hostile section of the Press will perhaps not occasion much surprise. When detailed explanations are waved aside as excuses that have been heard before, and when indeed nothing will satisfy critics but a promise of the re-establishment as by some magic invocation of a pre-war service (or something better), a plain story of the causes of the decline of the service will be esteemed unsatisfactory and the absence of anything heroic, dramatic, or thaumaturgic in schemes for the future will, in the atmosphere of sound and fury in which they breathe, be accounted as weakness and unreality. But could any comparison be more unreal and insincere than that made by the *Evening News* between the effect of the War on the Post Office and on the Ministry of Munitions? In the one case stagnation, and in the other "wonders of energy and technical inventiveness" Prodigious! Do readers take this kind of thing seriously? It would be as pertinent to remark that just in this very winter when wonders of energy and activity are being produced in football and hockey circles, our leading cricket clubs are doing absolutely nothing. Should not the M.C.C. be taken to task about it? There is, in fact, little in the criticisms we have seen beyond a clamour for an immediate return to a pre-war service, and some of those time-honoured references to the £2 and £3 rates in Scandinavia. These last may be relegated to the back numbers of telephone humour which have ceased to amuse.

It is curious nevertheless that those who clamour most for unlimited and lavish expenditure on the telephone service are those who are most sternly convinced that no increase in the rates is even thinkable; that those who know only too well how the price of nearly every commodity and every public service has risen something like 100 per cent. can maintain that the telephone service should be remunerative at the present rate, and even fondly imagine that a dividend earning undertaking—under "expert management," of course—could reduce the rates and still be in the happy position of earning dividends. There is always a large class of telephone-users and would-be telephone-users who wish to obtain the service partly at other people's expense. Of course they do not put their demand in this way. They point to some small continental town where low rates are in force and bid their own administration go and do likewise in some huge and complicated network of telephones where conditions are in no way comparable. What matter if there be a loss at first? The system will expand so rapidly under the influence of cheap rates that it will soon pay its way, on the scientific principle of that grocer who lost a farthing on every article he sold—but, as he said, "It's the quantity that pays!" Then there are other subscribers who protest that they don't mind how much they pay provided they get a first class service; but too often, when it comes to the point, it will be found that they consider the rate they already pay should entitle them to the service *de luxe* which they desire, if indeed their gaze is not also fondly turned towards Sweden.

The Postmaster-General's reply, of which no full account has appeared in the public press, states at some length the effect of the War on the service, the programme for the coming year, the present difficulties, and what is being done to overcome them. We wish our readers to have the opportunity of reading it in as full a form as our space permits, and we are convinced that if the public had its information from well informed sources instead of in the form of fanciful and distorted special pleadings they would be more tolerant of the present difficulties.

HIC ET UBIQUE.

TOWARDS the end of last month the Press announced the re-opening of telephonic communication between France and Great Britain, Luxemburg, the Sarre region, and Spain. Some journals, however, evidently got the impression that any of these countries could have speech with the other, and gave notice that communication was restored between Great Britain, Luxemburg, Spain, and the Sarre district. Needless to say, communication with Spain is not yet obtainable from this country.

The number of telegraph offices in South Africa increased from 1,703 to 1,738 in 1918, and the number of messages from 6,174,888 to 6,619,635. The number of telephone exchanges increased from 437 to 452, and the number of telephones from 36,846 to 38,396. Trunk communication was opened during the year between Port Elizabeth and East London. It has been decided to adopt automatic working at Cape Town, Pietermaritzburg and Johannesburg.

SAYS the *Lincoln Echo* of Oct. 25 1919: "With the signing of the Peace, mainly owing to the energies of Mr. F. MacMorrough, the Lincoln District Engineer of the Post Office, an early start was made with the completion of the work."

Our colleague is to be congratulated on his efforts towards Peace.

Telephony recently published a statement shewing the telephone rates in 23 American cities with populations of 70,000 to 115,000, selected at random. The average rate for business connections worked out at 74.86 dollars, or about £15 12*s*., although, of course, the rates for private houses and party lines were somewhat lower. The rates in many of these cities shewed a tendency to rise, *e.g.*, that for Hartford, Conn. (107,000 inhabitants) was being raised from $90 to $96, Wilmington, Delaware (92,000) from $60 to $72, Lynn, Mass., from $57 to $63, Albany, New York (102,000) from $60 to $72. The rates in Kansas, $66, and Norfolk, Virginia, $84, were also about to be raised. The rates in provincial cities in this country compare very favourably with these figures.

WE learn from another issue of *Telephony* that the Ohio Public Utilities Commission, in an order of Sept. 13, approved a charge of $1 for the transfer of an existing telephone installation from one subscriber to another, and charges from $1 to $2 for changes in the location of an instrument, but declined to authorise a service installation charge to new subscribers companies. To protect themselves, however, the companies may establish a regulation that new subscribers shall pay three months' rental in advance, which payment shall not be subject to rebate if the service is discontinued within three months of the date of installation. Presumably the order applies to the State of Ohio only, but we do not think the practice of charging installation fees is usual in America. In France, Holland, Sweden, and other European countries, however, the charge has long been a regular feature of the telephone tariffs.

THE *Freeman's Journal* of Nov. 20 tells us that the Post Office is incurring an expenditure of £3,000,000,000 for the improvement and extension of the telephone service. This means one man one telephone at least unless Parliament should notice the extra noughts.

DIFFICULTIES OF TELEGRAPH MAINTENANCE IN THE BUSH

GIRAFFES are by far the worst offenders, as they blindly walk into the telegraph line, bringing down 10 or 12 spans of wire, unless the poles are well stayed fore and aft—in addition to side stays at frequent intervals. In giraffe country the main lines are erected on 30-foot poles, to give sufficient clearance.

The elephant usually keeps to the denser parts of the forest, and does less damage, as lines are not run through there if it can be avoided; but as he makes his own pathway, anything like a telegraph pole in the way goes down.

An elephant has been known to uproot poles with his trunk, and not infrequently a number of spans have been brought down by the elephant rubbing against a pole.

Both elephants and rhinoceroses in a stampede have been known to sweep poles out of the alignment, thereby breaking the wire.

Even the white ant is capable of doing considerable damage to wooden poles by eating the base, and where the line is run on trees, which are topped and ringed, the foliage dies down, and the ant attacks from above, rendering the tree useless in a very short time.

I have heard of crocodiles eating our cable across the River Rufigi.

In addition to the destruction caused by animals, trouble frequently occurs through bush fires, which spread rapidly, and owing to the intense heat it is not easy to repair the wire.

During the rains, whole sections have been washed away by floods. At the end of the rainy season, foliage and creepers grow very quickly, the latter entwining round the wire, and much current goes to earth.

The majority of the roads are merely cuttings through thick bush, and motor-cars often knock poles down. The "Road Corps" is a big offender, and when felling trees usually allow them to fall across the line. Another cause of trouble is the native "boy" in charge of a donkey transport. He has a happy knack of curling his long whip round the line, dragging it down. The native also is very fond of cutting pieces of wire—especially copper—for armlets, &c., and yards of G.I. wire are cut out and melted down to make spear-heads.

THE PSYCHOLOGY OF SUPERVISION.*

BY JOHN LEE.

THERE is something to be said for the middle man. Practical economics seems to desire to banish him; the Coal Commission found him a luxury and an extravagance. It may be that when he has ceased to distribute our groceries and our coal he will remain in the less tangible realm of philosophy. Sir Clifford Allbutt finds a place for him in the philosophy of medicine. He would have a middle man "continually irrigating the profession from the springs of pure sciences." I would make some such claim for our own profession and indeed for all industries. I believe there is much to be said for careful and specialised study of the mental sciences with a view to the discovery of points of contact with what I will call industrial practice. The science of psychology has received very much attention of recent years. There has been a vast amount of research into the workings of the human mind, and various new theories have been expounded. I shall venture to touch upon a few of these theories and to try to put them to the test in our own calling, but first I have to remind you that there is not a new Psychology. "There is nothing," says Professor James, "but the old psychology which began in Locke's time, plus a little psychology of the brain and senses and the theory of evolution, and a few refinements of introspective detail, for the most part without adaptation to the teacher's use. It is only the fundamental conceptions of psychology which are of real value . . . and they, apart from the aforesaid theory of evolution, are very far from being new." This is one reason why some of us, in the world of practice, fail to realise the importance of the study of psychology. It reminds us of so many old things, of Plato and Aristotle and the Schoolmen and John Stuart Mill and certain Germans. We cannot believe that it is the foundation of all science. We attend to the routine details of our business and overlook the fact that fundamental characteristics of the human mind form the first study which we should make. Mr. Bradley in "Appearance and Reality" makes a point which it is important that we should appreciate. "Whether there is progress or not, at all events there is change; and the changed minds of each generation will require a difference in what has to satisfy their intellect. Hence there seems as much reason for new philosophy as for new poetry. . . . That is why, so long as we alter, we shall always want and shall always have, new metaphysics."

In that sense, a limited sense, there may be a new Psychology, but it is not new; it is our need of the frank recognition of Psychology which is new. And the middle man may strive to discover in the new presentations of Psychology something which may meet this, our new need. In this sense I am to speak of the Psychology of Supervision. The process will be essentially analytical and tentative. It is to discover a content, not a dogma; to find that which is implicit rather than that which is stated. You will notice presently that much of what I have to say comes from the newer statements of Psychology for the use of teachers. The whole attitude of teaching has been revolutionised by the Psychologists and in revolutionising it they have made discoveries which are of the greatest value to us. The immediate problem of industry is in supervision. The word has a sound which is not very pretty. It comes to us from the Victorian age when the somewhat crude conception was general that the bulk of men and women would not work unless they were "supervised." It took its use in an analogy between the protection of industry and the protection of property, which has proved to be an incomplete analogy. The American word "Boss" carried the idea farther, coming from the Southern States northward to industry. "Where is the Boss?" says the inquirer to one of the ten little nigger boys. "Jess you go inside an' de man dat's a-doin' nuffin—he's de Boss." Our old English word "foreman" is nearer the mark. Still while we have retained the word "Supervision" there can be no doubt that we have changed its meaning; unconsciously we have become affected by the newer presentations of the fundamentals of psychology. The Supervisor has come to be the leader, the guide, the farther-seer. He will do his duty in spite of the discomfort which that may occasion to others, but not by giving way to the subtle temptation that his duty is to be measured by the discomfort which it occasions to others.

Now while this change is put in the foreground let me say at once that it means a more strict and not a less strict sense of discipline. It may mean a newer conception of the word "discipline" in which discipleship is the central thought. There is no science of psychology, or any other science, in sickly sloppiness. The last and lowest attribute of supervision is timidity. The fact that supervision needs foremost of all clarity and definiteness in thought, brings home to us that this clarity and definiteness of thought are of no avail unless they are carried into effect by strict obedience, only it is not the obedience demanded by the martinet, merely the acceptance of his will and often a variant and inconsistent will at the moment, but the obedience due to a clear definite process of thought, and to this domination of clear definite processes of thought the supervisor himself is subject. Just as the King is obedient to Kinghood so the supervisor is obedient to that mental process which is the spirit of his supervision. In short he is psycho-

*The Chairman's opening address at the London Telegraph and Telephone Society. Nov. 4 1919.

logically a constitutional monarch and not an absolute monarch. Professor James warned his teachers that "an oriental despot requires but little ability; so long as he lives he succeeds, for he has absolutely his own way; and when the world can no longer endure the horror of him, he is assassinated." The constitutional mind, ruling by careful, balanced thought, requires great ability, for the very simple reason that it requires a width of mental training which only of recent years we have come to appreciate. Now this mental training is not the same as education, commonly so termed; it is not the possession of facts in the mind. The best educated man I know is a blacksmith in the North of Antrim who cannot read or write, but he has the newspapers and books read to him, and he trains his powers of judgment in the weighing of arguments, and his powers of memory by co-ordinating the impressions which he permits outside things to make on his mind, and his powers of reasoning by careful and ripe thought over what he has mentally gathered. The supervisor who has taken pains, to a greater or less extent, to make his mind into a trained mind will find it also a commanding mind and he and others will gladly obey it. Mr. Jenks tells us that the Norman conquest of England was largely due to "the administrative genius of the Norman Clerks, which seems to have been a blend, acquired during the century of Norman settlement in France, of the subtlety of the Gaul with the fiery energy of the Northman." True administrative genius is always a blend: it is the resultant of various influences, but it will always have as its basis the mental cultivation of the Norman Clerk.

This power of mind does not need articulation in speech. The loud voice of the dominating rebuke is not invariably a symptom of mental strength, but of mental weakness. "Do not," says Professor James, "for the mere sake of discipline, command attention from your pupils in thundering tones." We are only yet at the fringe of a great subject, but the impress of mind on mind is coming to be realised as a real factor in the management of industry. It is not a conscious or a deliberative power, that is, it must not be used dynamically. It is static. It is there. It is in reserve. It is a force of which all are conscious except the one who uses it, and immediately he is conscious of it he loses it. It is an emanation. Of course ours is a human world, after all, and communication is necessary between human beings, but the impress of Will need not always be by means of vocalised words. But vocalised communication of authority, when it is unnecessary, tends to weaken authority. Just so repeated commands tend to be ignored. The advertisement on the walls repeats itself again and again because it wishes to operate not on the conscious but on the sub-conscious mind. But supervision deals with the conscious mind. It must rebuke, but more than that it must insist on obedience to that rebuke, and it can afford to do so as long as its rebuke is enlightened and well-informed. If the workers know by the instinct of which Bergson speaks, the instinct which comes before intelligence, that the supervising mind can be trusted to think clearly and to utter its demands clearly and finally, there will be no need for repeated rebukes. I read of Marshal Foch that "officers who served with the Marshal through the war have said that the mere fact of his arrival at the head-quarters of a hard-pressed sector would sustain and restore harassed generals when all seemed wrong. He would ask a few simple, but essential questions; give some short words of counsel, and by sheer tranquility of mind and determination of character transform depression into optimism." Let me lay stress again that calm and trained vigour of mind must be a balance of developed faculties. You can train your memory by learning some poetry every day, but it will only be a memory for poetry. You can train it by learning groups of figures, but it will only be a memory which will enable you to remember the total National Debt or some such incomprehensible total. The one training of the memory is to allow clear and definite impresses to reach it, not confused agglomerations of impresses. So, the one training for judgment is carefully and separately to weigh up each balance of claim which approaches the mind.

But we must pass to greater subtleties. There are psychologists who make a very high claim for imitation. There can be no doubt that in our services there are evidences of what I would call group imitations. We have seen young women coming into the service, and showing signs of imitation of others, and this imitation is not always conscious or deliberate, nor is it always directed to a single individual. "Human beings have a capacity which is of the utmost use for purposes of collectivism," says Dr. Jung in his "Analytical Psychology," "and most prejudicial to individuation, and that is the capacity to imitate. Collective psychology cannot dispense with imitation, without which the organisation of the State and Society would be impossible. Imitation includes the idea of suggestibility, suggestive effect, and mental infection." This collective imitation is closely connected with what we may call Morale. We shall come to the value of the collective spirit more directly when we come to the study of feelings, but there is a community of the sub-conscious mind in the matter of its intellectual operations which is of enormous value. The spirit of our collective enterprise depends not so much on individual examples of particular supervisors but upon the collective spirit which informs and animates the supervision. Our world, like all industries, is a microcosmos. We are fashioning characters *ad rem*, for the purpose of the industry. There is something more than infective in the spirit of corporateness and fellowship which we ourselves develop, and those who enter into our little world will imitate, mostly unconsciously, the spirit which we manifest.

This has an even deeper aspect to which reference is made in the application of Psychology to teaching. Here again we may quote Dr. Jung's great work. "It is not the good and pious precepts, nor is it any other inculcating of pedagogic truths that have a moulding influence upon the character of the developing child, but what most influences him is the peculiarly affective state which is totally unknown to his parents and educators. The concealed discord between the parents, the secret worry, the repressed hidden wishes, all these produce in the individual a certain affective state with its objective signs which slowly but surely, though unconsciously, works its way into the child's mind, producing therein the same conditions and hence the same reactions to external stimuli." This is a most important truth. The resistance to supervisorial influence is often due to some defect in the corporate value of that influence, some brooding jealousy within the supervising ranks, some repressed hidden trouble. To say this is not to ask the supervising classes to be angelic, but it is to point out that the psychological influence of disharmonies extends far beyond the range which we might have expected. There is a restless and nervous discontent, the attitude of the chronic grumbler, which has a disastrous influence upon subordinates. There is a type of captious fault-finding which never will remedy the faults which it finds. Supervision which is to be stimulating, that is, in the technical language, which is to exercise its stimuli without giving rise to resistance and re-actions, must proceed from a healthy vigorous mind and must proceed with the concomitant stimuli of other healthy and vigorous minds or it will be an irritant. In short the stimuli must be an inspiration and inspiration is not readily explained. Professor James has some of his especially sane remarks for teachers on this point. "When all is said and done, the fact remains that some teachers have a naturally inspiring presence and can make their exercises interesting, while others cannot. And psychology and general pedagogy here confess their failure and hand things over to the deeper springs of human personality to conduct the task."

Just so supervision will do well to realise that as this unconscious influence is all important in respect of its own influence and authority so it is all-important in the work which is being done by the subordinates. The most valuable contribution which has been made by the modern study of psychology is in respect of the sub-conscious or unconscious mind. We are probably only at the very beginning of this study. The unconscious mind has been described as a "wild beast couched, waiting its hour to spring," and conscious moral life has been expressed in terms which make it appear to be only a tyrannical control of the fierce unconscious life. But this theory is being modified and we are learning that the sub-conscious mind can itself be trained. Here is Professor James again, "The more of the details of our daily life we can hand over to the effortless custody of automatism, the more our higher powers of mind will be set free for their own proper work." I think there is some objection to the words "Effortless custody of automatism," but if we regard the realm of automatism as the broad realm of the sub-conscious mind it will suffice for our immediate purpose. There is something a little humiliating at first blush in this idea of automatism. As Professor James Ward points out there is a certain glory attaching to the ox and the ass, since "the ox knoweth his owner and the ass his master's crib," but the ant and the bee, in spite of marvellous instinctive skill, would be regarded as automata. This apparent humiliation we must counter by the reflection that automatism "will set the mind free for its proper work." The first important fact is that we need to trust this sub-conscious mind. It is amazingly accurate. It is wonderfully efficient. It works and knows little of fatigue. It becomes errant and erratic only when it is disturbed. It has come from conscious or deliberative actions, and thus has been called "Secondary automatism," and it is in this sense that we are to understand Herbert Spencer's phrase "the child learning to walk wills each movement before making it." Thus our acquired dexterities proceed from the conscious to the sub-conscious, and when we drag them back again from the sub-conscious to the conscious we induce something of strain. If we worry or fuss the staff so that the operations of their minds constantly pass from the sub-conscious to the conscious and back again we are definitely increasing the nerve strain. What we should aim at is to provide for the hour-by-hour working of the sub-conscious mind, with as little disturbance as possible, and with as much psychological stimulus as we can give it by ourselves maintaining a spirit of encouragement and of readiness to help in the bearing of burdens when they do come. It is not easy to lay down strict lines, but there can be little doubt that the cultivation of the quiet working of mental automatism would do much to help in the efficiency of supervision for then we should find the truth of the paradox that really efficient supervision is the minimum of apparent supervision. It is always there when wanted: it is a presence and an influence at all times, but not irritatingly evident. Maybe, as a physical question and therefore rather aside from our present discussions, our instrument rooms are too noisy, though the sub-conscious mind is not much worried by persistent or continuous noise. It was James Mill who drew attention to the "acquired incapacity of attention" whereby sounds in which we have no particularised interest soon pass unnoticed. Indeed a sudden silence—the Irishman's "silence which could be heard"—is as effective in breaking the sub-conscious train as a clap of thunder. It is beyond question true that we allow too many factors to enter which momentarily break the flow of sub-conscious stimuli. Talking while at work is reprehensible, but even here there are psychological considerations. The thought inspiring the odd word which is exchanged is itself in the sub-conscious realm, but, as Professor Ward says "a striking impression or thought interrupts the performance of skilled movements." Against the occurrence of such striking impressions thoughtful supervision must struggle. There is an attentiveness of the sub-conscious mind which we have to cultivate. Errors arise in speech through the interruption of the sub-conscious mind by a train of dominant thought. There is Bull's story of the American party at which there was insufficient to eat. A guest speaking of politics to the host wished to refer to a "square deal" but his sub-conscious mind made him speak of a "square meal" and thus revealed his real thought. The point to remember is that supervision has

to consider many psychological factors; it will recognise that "there is a human restlessness which is always looking for support," and that restlessness is often satisfied by the mere consciousness (or, more accurately, sub-consciousness) that the support is available if needed; it will recognise too, that there are subtleties of absolute knowledge, such as that of the letter sorter who can tell weights with exactness and not merely that one letter is heavier than another letter; it will recognise that the region between the conscious and the sub-conscious mind is a region of varying depths. It will refrain from any crash upon the working of this sub-consciousness, only if it is urgently necessary; it will avoid any disturbance of attention which might alter the focus, quite content with the marginal attention, somewhere within the circle, which the sub-conscious mind gives to the work, provided that that marginal attention is undisturbed. It will remember that attention—the drill sergeant's "central word of discipline"—involves not so much concentrated attention, but, almost negatively, undiverted attention, and it will assist the attention not to be diverted. It will remember some of the later discoveries of experimental psychology, as, for example, that the number of successive quick beats or successive sounds which can be distinguished accurately without counting is about eight and that the memorising of meaningless syllables on a single reading has definite limits and is about six or seven, and that this is "the span of prehension." All these have a bearing on the capacity of the sub-conscious mind on our day by day work. Of course cataclysms come and events happen; wires fail and rushes of traffic come, and the keenest and most volitional conscious acts are required, but that is entirely different from the purposeful and perhaps wayward and unnecessary interruption of the placid working of the unconscious mind. Professor Adams in his book "The New Teaching," says, "It has been remarked that the hardest lesson for the clever teacher to learn is to let the clever pupil be clever in his own way." We may translate it and say that the hardest lesson for the really good supervisor is to let the unconscious minds of his staff work in their own way. It is a pressing temptation to pull up the mental plants to look at their roots, but it is a temptation against which we must struggle.

So far we have dealt only with what may be called the purely intellectual processes. There are other elements, just as much subjects for psychological research, which have to be taken into account. There is feeling or emotion, there is conation and volition. There is just as much to learn from a consideration of feeling and volition as from the consideration of what may be regarded as the intellectual processes proper. I leave aside the description of the feelings as given in the text books, and their relation to action, but all of us know that supervision has to consider feelings before it can regard itself as effective. There are deep antipathies which we must take into account, the not liking of Dr. Fell, and the impossibility of explaining the not-liking. It is usually a greater difficulty when it does not reach the stage of dislike. It has a passive stubbornness in that case which is much less likely to be affected by any reasoning process. The man who would rather be hated than scorned by the woman he loved came near to a fundamental psychological truth. That attitude of mind or heart which responds slowly to appeal is a prime difficulty and there is no golden appeal to it. We can only be patient. We can only strive that we shall be sincere, scrupulously just, scrupulously ourselves, well within control, but still ourselves.

There are said to be American ways in the management of industry for countering such feelings. String bands play at lunch time and the workrooms are lined with stained glass windows to affect the temperaments of the workers. I mention these, not as believing that there is much to be commended in such devices, but as proof that even scientific management which might be criticised as too mechanical in its methods recognises the temperamental difficulty to which I have alluded. But after all human characteristics can best be met by human means. The unresponsive temperament, or in some cases the antagonistic temperament, will respond sometime to treatment which is not itself just as antagonistic. It will respond to the social psychology of a healthy mental environment and the response of others with a less choleric disposition will come to its aid. The value thus of a healthy corporate life is again shown, though from another point of view. Feelings act upon feelings, just as mind acts upon mind and both sub-consciously. It is as Wundt shows, that the "individual consciousness stands in a necessary connexion with the life of the people and even of mankind at large, through speech, religion, social habit and custom. The individual will sees itself an element in a universal will by which it is determined in respect both of the motives which guide it and the end toward which it strives." We may apply this to our own microcosmos. The resultant in volition and in action is even more readily perceptible and the more prompt response we get to our appeals to the general sub-conscious mind the less likelihood there is for the individual unresponsive temperament to hold out against an appeal. Above all when trust and confidence are inspired the native antipathies vanish away. The line of least resistance then becomes not inertia to the stimulus but the response to the stimulus. No one expects to be universally beloved, or even wants in this complex world to be universally beloved, but it is a sufficient approximation to that unnatural beatific state to be generally trusted, not for being infallibly right but for being infallibly ready to take responsibility. This very individualism, the contribution of the individual, in our case the supervisor, is demanded by the very doctrine of corporate consciousness with which we are dealing. "The individual," says Höffding in explaining Wundt, "is supported by society, but re-acts upon it through the tendency of his own thought and volition. Individual consciousness is creative; social consciousness is retentive. The new is derived from individuals, but society makes it serviceable for later developments and thus subserves the continuation of spiritual life. Only the progressive spirits have a decisive influence in determining the tendency of the universal will." It is salutary to remember that orders come from the highest and we must obey; regulations tell of that which is regular and may therefore permit some aberration: instructions deal with enlightenment, the "how" and the "why," and he is a wise supervisor who realises the full meaning of "regulations" and of "instruction" and who sets out to take the responsibility of any departure from the regular and to give an intelligent "instruction" when occasion needs. He may be disliked, but it will be the dislike of men and women who, after all, respect him, and with such dislike he can afford to be patient. His day will come.

I have been very much struck with data which I have gathered recently as to the working of the sub-conscious mind. I find from figures taken in some offices that men telegraphists rarely remember a telegram which they have signalled; that women telegraphists do remember some, and that it is usually women of a somewhat nervous type who do so, that is, it is just the women who suffer from the sharp transfer of the mental operation from the sub-conscious to the conscious mind. In fact there is good authority for the claim that women have a more readily available sub-conscious mind than men, that is, it reaches the threshold of consciousness with a quicker response to the stimulus. Freud tells us that "women, with their fine understanding of unconscious mental processes, are, as a rule, more apt to take offence when we do not recognise them in the street, and hence do not greet them, than to accept the most obvious explanation. . . . They conclude that they surely would have been noticed if they had been considered of any consequence." There is a greater tendency for the sub-conscious to reach the conscious that is for telegrams to be remembered with Morse than with Baudot and greater with Baudot than with type keyboards. The reason is not far to seek. There is more nearly a conscious operation in the translation of the Morse code than in the translation of the Baudot code; the equability of signals in the five-unit system is a definite aid to automatism. So is the rhythmic sense of the cadence, and rhythm in telegraphy has yet to be studied; those telegraph artists who can telegraph a sentence in Morse to make it sound like "Tommy make room for your uncle," are the only experimenters as yet in this direction and one would hardly call them scientific. The art of working the type keyboard is as assuredly sub-conscious as playing the pianoforte seeing that all that is at issue is the relative position of the keys and not any symbolic code for each letter. Curiously enough phonogram operators more frequently remember telegrams than Morse signallers and this I assign to the fact that the occasional public irritation which the phonogram operator experiences raises the operation to the conscious mind and the telegram is remembered. I have found some odd data in comparing English, Scotch and Irish staffs and not all in line with what we should expect; Scotchmen and women seem to have a stronger re-action or resistance to those stimuli which would raise the mental motions to the conscious state. I have observed, too, that in sound reading, those who use the faculty of memory, that is who write a few words behind the sending, have no greater memory of the telegrams than those who write letter for letter, and it would seem that in their case there is a greater plunge into the sub-conscious mind by which the momentary holding of the symbols sinks deeply. This question of reading behind or after the signals is a subject which opens up infinite possibilities of research. There is reason to believe that certain aspects of our work, telegraphing at concentrator circuits, for example, by reason of the change in the signalling, do not permit the constant exercise of the sub-conscious mind, but introduce a "jar" whenever there is a change of connexion.

I have not gathered these data in the spirit of the so-called Science of Scientific Management. The efforts which were made in this direction produced valuable results, but I think they were one-sided results. The study of details of work with a view to the discovery of the best means of doing that work had its value, but it was only empirical value. I want to probe much more deeply; and not merely to discover the best way in which work should be done, but the best way in which we can make good workers, which is a different aim altogether. Scientific Management is too external, too merely mechanical, to achieve this higher aim. We must probe to the psychological roots of the facts. At any rate we seem to be on safe ground when we infer that the cultivation of a passivity of mind in which, to use Bain's language, "the subject will not re-act upon the presentation" will be the first aim, and that aim can only be achieved, I think, by such a comprehensive system of mind training as will hold the different capacities of the mind in such a balance that the active or contributory capacities will be gladly at rest unless there is a genuine demand for their operation. I think we are able to stand, like Joshua's spies, and overlook the promised land. You will at once see that my contention is that for really efficient supervision, as for really efficient telegraphy, we need trained minds, not in the sense that they must be educated on any conventional model, certainly not that I would have all our men and women students after the fashion of the young man of the Victorian epoch with his midnight oil. On the contrary I want us all to be observant, to be cultivating the instinct for judgment, to develop that spirit of psychological reverence which realises first and foremost that the human mind is a profound abyss which we have not yet plumbed. Those minds are not all alike. There is a difference between individuation and individualism. Like all industries our calling is a corporate calling and it can only be efficient when we adapt ourselves to each other. Scrupulous judgment must become a veritable passion with us. Let us remember that the sense of injustice, often unreasonably felt, is never blunted. Other feelings may be blunted; chemists can taste the nastiest mixtures without nausea. But the sense, the feeling of injustice rankles. There are two broad classes

of minds among us. There are those described by Dr. Jung, who "feel happier under compulsion from others than when faced to discipline themselves; there are others who are yearning for a self-realisation which must be, to a greater or less extent, a self-realisation through some absorption of elements in their environment, elements of human character among them." To find the golden mean of handling these classes is the art of supervision. It is not easy. Our judgments have carefully to be safeguarded. Napoleon, says Mr. Jenks, "knew a man when he saw him; his judgment of individuals as distinct from nations, or communities, was almost infallible." Our judgment has to be cultivated and always with the recognition of the danger of it being exercised on an incomplete series of facts. As the years increase our judgment is more broadly based upon a greater volume of sub-conscious experience. "There is less hopefulness," says Professor Ward, "but less fear, less sensitiveness, but more sagacity, in a word 'more presence of mind.'" Arnold of Rugby could impress his character on his pupils. Jowett could claim that Oxford taught an English gentleman to be—a gentleman. But we are not all Arnolds or Jowetts and we must seek humbler ways. The process of cultivation of judgment, with a view to making ourselves in some sense worthy of the leadership with which we have been entrusted, is a truly scientific process. It stands with hushed feet outside the temple of the human mind, but they are not trembling feet, for it is determined to do all in its power to attract men and women to do their best and to be their best. And this does not mean to make all equal—on the contrary it may emphasise differences, especially differences in quality, but it will leave each with something of the "glow" of accomplishment.

There is nothing of sentiment in this psychology of supervision. It is sympathetic in the strict sense of the word, because it is determined to "feel with." It is not sympathetic in a loose, sloppy sense, which forgets the value of discipline on human character, that is of true discipline, enlightened and reverent, courageous and far-seeing. It recognises that we are here to perform our service efficiently and in doing so to work towards the efficiency in the highest sense of those with whom we are associated in a relationship which is truly sacred. It would be a dreadful irony if so-called easy supervision resulted in easy-going characters. Those of us who have come from the rank and file run a grave danger of leaping away from the point of view of the rank and file. Alice had to grow small before she entered Wonderland. We have to place ourselves side by side with those whom we are to control, side by side in understanding. This is the only sympathy which is of real value. Bergson tells us that "if we were to look into ourselves closely we should see that our memories form a chain of the same sort, and that our character is always present at all our decisions—is, indeed, the actual synthesis of all our past states." We are all learning. It is a lost day in which we do not learn something more. Henry's First Latin Book promises that "he shall be brought past the wearisome bitterness of his learning," but Henry was a schoolboy who regarded learning as ended when he left school, and you and I know that it is just then that learning begins. I do not believe in softness in teaching or in administration. The mental forces are appallingly ready for degeneration if we allow them to degenerate, and the infection of even a slight degeneracy is enormous. There is some psychological truth in the custom of placing bunkers in golf courses, though there is more psychological truth in the statement that "no bunkers can compare with Nature's bunkers." I don't quite want to go as far as Mr. Bradley that "this is the best of all possible worlds, and every particular thing in it is a necessary evil," but for all that I would lay emphasis on the value, to our own characters, of the boldest and most courageous facing, at any cost to ourselves, of difficulties in the way, but the cost must be first to ourselves, and that marks the difference. The lady who complained to the teacher of the Kindergarten that as a method it was all nonsense,—"My boy is so bright that he saw through it immediately"—was met with an admirable response, "Yes, we shewed him how to overcome the difficulties which he did not see." And there is a lesson for supervision in the story.

I confess for my own part I face this study of psychology with eager expectation. I do not know how far it may take us. Not so far, I hope, as in Columbia University, where the Matriculation Examination now consists of some kind of a psychological, almost a phrenological test to discover the qualities or potentialities of the student. But, at any rate, if we learn something of the deeper workings of the human mind, we shall face the responsibility of leadership with a new direction of motive. Not all have the same qualities, not all will be able to make the best of human capacities; it is indeed probable that as we proceed we shall find the differences more marked which separate man from man. It may be, too, that as Bergson says, "a perfect being is one who knows all things intuitively, without having to go through the intermediary process of reasoning, abstraction, or of generalisation." We are not perfect beings, and we shall be compelled to struggle on with reasoning and with the training of our judgment. But we shall be surer in judgment, more positive, because more enlightened in direction, more comprehensive in aim, more exquisitely sensitive to mental profundities of which we have been unaware, more ready to learn, more generous to teach, more effective in silent rebuke, more readily helpful in encouragement. And that way lies an efficiency which will be the highest possible industrial efficiency, and will, indeed, be more than mere industrial efficiency, for it will be an efficiency which will enable us to hand on to those who come after us not merely a service of which we shall be proud, but a human process which we have learned to develop until it has become radiant with a deep spirit of fellowship—a spirit of fellowship which the cold mechanism of industry will find to be an undying inspiration.

THE NEW DISCIPLINE: AN IMPRESSION OF A MEMORABLE PAPER.

BY ONE OF THE AUDIENCE.

To the uninitiated, Psychology is a more or less mysterious system of word-spinning designed for the delectation of those who delight in the discussion of such knotty problems as the number of angels that can stand on the point of a needle. Without going quite so far as that, it was mainly in the expectation of an intellectual and literary treat that the writer attended the inaugural meeting of the present session of the Post Office Telegraph and Telephone Society. He found all he expected plus a great deal more—in the most brilliant and helpful paper that it has been his good fortune to hear.

Many of us have felt for a long time that there was something wrong with the Old Discipline, with its implied though always unformulated basic proposition that the Evil in man predominates over the Good. Some of us, blindly groping among the outward manifestations of that fascinating mystery, the action and reaction of associated minds and personalities, have here and there caught a glimpse, dim and elusive, of a Truth that seemed to give the lie to nine-tenths of the accepted axioms of industrial discipline of the Victorian School, but at the same time a truth which as yet lacked the force of ordered statement. To such, Mr. Lee's paper came as at once a revelation and an inspiration. Profound as were the psychological truths expressed, the message of the paper was as clear as crystal. It was nothing less than the fact that in the cold passionless judgment of science, the elder brother should dethrone the commissioned officer and the policeman as the type of the ideal supervisor, that weakness and humanity in supervision are *not* synonymous, that the best supervision is exercised by the direct impress of mind on mind, that the best supervisor is the individual who best supervises himself: and in short, that the New Discipline is a discipline for the supervisor even more than for his or her subordinates. A score of pregnant phrases, each the worthy subject of a separate paper, leap to one's mind: but, to the writer, some in particular were instinct with the force of a living truth.

"*The power of mind does not need articulation in speech . . . the impress of Will need not always be by means of vocalised words.*" The unexpressed discipline of the mastermind. To the Victorian disciplinarian, merely a fantastic idea: to the writer, the most potent fact of his business experience. A carelessly dealt with case, taken up by a master-mind and returned to the junior clerk for filing. On the surface, a little thing: but not so to the junior clerk. No word of censure was spoken: but the completed work was to the writer at once a censure and a revelation which lighted the fire of a desire for craftsmanship—the mastery of one's medium of expression—which, though it may glow but dimly and fitfully—never can wholly die. Is a Force that could so change even a single worker from a machine into something approaching an intelligence merely nothing? If so, then surely All is Nothing. To this day, the teacher is unaware alike of his teaching and of its effect. "*The power of mind is a force of which all are aware except the one who uses it, and immediately he is conscious of it, he loses it*"—for they who sit in Merlin's chair must lose themselves, though in that loss there is ever the greater finding. . . .

"*Really efficient supervision is the minimum of apparent supervision . . the hardest lesson to the really good supervisor is to let the unconscious mind of his staff work in their own way.*" Here, surely, is the golden key to work-interest, chief of all factors of true industrial efficiency. What is work-interest but the resultant of the worker's outlook on life—which colours his work in all its hues from gold to grey—plus the possibility of self-expression that his work affords? The minimum interference with personal liberty is thus a cardinal doctrine of the New Discipline. The old Victorian

Discipline of the parade ground, with its passion for irrelevant externals, must go. No longer must the supervising officer expect his staff to spring to attention, click its mental heels, and wait with bated breath for the oracle to speak. What elder brother would desire this? There must be a sacrifice of the shadow of outward show: but in its place will be found the substance of an instant and willing response to all reasonable work demands—or Psychology is falsely named a science.

"*I would lay emphasis on the value to our own characters of the boldest and most courageous facing at any cost to ourselves of difficulties in the way; but the cost must be first to ourselves*"—at once a warning and an inspiration. In a thousand industrial arenas, the New Discipline has entered the lists and is locked in mortal combat with the Old—a battle of mind with mind, silent as all the more deadly struggles ever will be—a battle of the discipline of Force inspired by Fear with that of Brotherhood inspired by Good Will. Fundamentally opposed as the two systems are, there can be no compromise. It is a duel *à outrance*. Now, the New Discipline fights against odds. To the exponent of the discipline of Force, the New Discipline must ever appear weak and contemptible "*but the cost must be first to ourselves.*" Nevertheless, though individual combatants may fall, the issue is not in doubt. Beneath all its strife, the world cries aloud for Brotherhood, and some day will find it.

Minds whose ideas of the Real are restricted to the more obvious perceptions of the senses and to which the crude materialism of the Victorian discipline must always make the more forceful appeal will find in the paper nothing more than the dream of an idealist—a mystic. Of necessity it must be so. But what are the most material of objects in their chosen universe by the visible expressions of Mind or Thought, and which is the more real, the Thing, or the Thought that creates the Thing? Surely the truth is better expressed in Stephen Phillips' lines:—

> "I tell you we are fooled by the eye, the ear,
> These organs muffle us from that real world
> That lies about us; we are duped by brightness.
> The ear, the eye, doth make us deaf and blind,
> Else we should be aware of all our dead
> Who pass above us, through us, and beneath us.

And as for mystery, what is the most concrete of all the objects of our perception but a mystery in the last analysis?

It is fitting that a paper which is the great appeal for a new and humane conception of industrial relationships should be published as it were on the eve of Christmas. Across the gulf of nineteen centuries the world's greatest Mystery calls for a new Brotherhood . . . and sometimes finds an answer.

LONDON TELEPHONE SERVICE NOTES.

THE current session of the Telegraph and Telephone Society opened on Nov. 4 with a paper by the President entitled "The Psychology of Supervision." The title probably sounded somewhat dry to many, but the name of the author was sufficient guarantee of a paper of real interest and merit. Compared with attendances at some of the war-time meetings of the Society there was a large audience, but unfortunately one saw few members of the London Telephone Service in the gathering. Either Mr. Lee's fame has yet to be known to many of our colleagues, or else it has been overlooked that all members of the London Telephonists' Society are eligible to attend the meetings of the Telegraph and Telephone Society. Those who were not present at the meeting will have an opportunity to read the paper in this JOURNAL, but they will have missed much of the enjoyment which fell to those who heard the author read his paper so clearly and with so much expression. The paper revealed the author to be a student of psychology in the field of labour, and it tells of the advance of present day thought in the matter of the attitude of the supervisor to the supervised. My fear is lest our readers, supervisors and supervised, regard the paper as being too deep and on that ground pass it over, thereby losing something which should be of real value to them, and through them to the Telegraph and Telephone Services generally. Sir Andrew Ogilvie referred to the authorities quoted in the paper, and remarked on the ability of Mr. Lee to read the books from which the extracts were made while so many of his hearers, although desirous of doing so, found that when they attempted the task they too often fell into the sub-conscious state. It is this same danger which gives rise to my fears in respect of Mr. Lee's paper, and I should like to see it abridged and written in a lighter vein for those who would find themselves better able to appreciate it in that form. The discussion showed that the audience was not awed with the seriousness of the subject. It was the turn of the telephone side to laugh when, to the dismay of our colleagues in the sister service, the Baudot instrument was likened to a sausage machine.

Phrenology as a means of judging an individual's capacity was advocated by one, while an adherent to the theory that human beings have an aura, or emanation, which can be photographed, and which will give an indication of the individual's virtues, described how he was able to lead the most vicious of mules—when he had an apple in his pocket. After these two speakers had finished, the sub-conscious mind of which so much had been heard recalled the words of the familiar song "Ora pro nobis."

The hall of the Sunday School Union was filled on the occasion of the second meeting of the London Telephonists' Society, when Mr. Hugh Marleyn was billed to give his chat on speech and song. He chose tone colour as his subject, and gave a number of examples both in poetry and song which were much applauded. Mrs. Marleyn gave delightful renderings of Liszt's "Hungarian Rhapsody" and Grieg's "Bridal March." There was little in the subject as dealt with by Mr. Marleyn for practical application to telephony, but the support accorded to the vote of thanks indicated that the meeting had been a most enjoyable one. Mr. Marleyn has been good enough to accept the office of Hon. Choirmaster to the London Telephone Service Choral Society which Mr. Pounds is organising, and it remains to be seen whether our members are more successful in reproducing Mr. Marleyn's emotional expressions in tone colour than he was in repeating the standard phrase "Number, please."

In the practice of our craft we find great emphasis is laid on tone in the rendering of the standard expressions. If the Controller of Stores had to describe the variety for use in Telephone Exchanges he would probably do it thus:—

Tone. Courteous, pleasant, cheerful, expressing eager service;

Colour. Silver, gold. (Bla—ck is not stocked.)

Mr. Punch, of our weekly contemporary, claims to impart the tone of cheerfulness in the homes of those who invite him, and who pay the nominal sum which he charges. What happens when he comes to the exchange as a permanent guest? "B" telephonists watch Park and tell us whether you notice the "A" telephonists at that exchange increase in cheerfulness. Sir Andrew Ogilvie has presented five bound copies of *Punch* to the staff of Park Exchange for their library. Needless to say, the gift is much appreciated.

* * *

Reference was made last month to the Gerrard swimming team in the London Business Houses Competition. This month we are able to congratulate them for having won the final against Harrods', Liberty's, Lyons', and Burberry's. It is no small achievement for a first-year club, and we hope to have a photograph of the team with their cup in a future issue of the JOURNAL. Now Trunks, look to your laurels! You call yourselves the premier exchange, but you will have to meet Gerrard yet in swimming. Mr. Pounds has offered a cup for competition among our exchanges. Who will get it?

The Gerrard staff is one of the foremost in organising entertainments for our wounded soldiers. In October they turned their attention to the Sidcup Hospital, where they arranged a Whist Drive. Lucky ladies who won prizes presented them to their last partners, and we are told the men were "very appreciative."

Holborn arranged a concert and as a result sent £21 to the Saturday Hospital Fund, and Lee Green, by means of a Whist Drive and Dance, raised £12 for St. John's Hospital.

London Wall has established a club for promoting social events amongst the Exchange staff. They have given it the name "Kia Ora." If it has anything to do with the reading of characters by an examination of auras after the manner we heard of at the meeting referred to above, some of us will fight shy of it. They held a dance on Oct. 22, but we are not told whether partners were chosen according to the degree of affinity between their auras or whether the more usual course was followed. As a very pleasant evening was spent, it seems probable that the latter was the case.

Hop held a social on Oct. 15, the principal feature of which was a fancy dress parade. The ladies' prizes went to an Indian squaw, an Eastern princess, and a Dresden shepherdess, while the gentlemen's prizes were awarded to a Spanish cavalier and a Dutch boy, whose efforts to "foot it featly" in wooden clogs caused much amusement.

* * *

The collection throughout the L.T.S. for the Civil Service Lifeboat Fund realised the sum of £66 10*s.* as against £48 5*s.* last year.

We are told that it is more blessed to give than to receive, but there are, doubtless, many of us who would be only too glad to be among the recipients of the prizes offered by various periodicals to the possessors of particular War Savings Certificates. So far members of the L.T.S. War Savings Association have won eighteen prizes of 20*s.*, two of 50*s.*, and five of £5 each. The more certificates *you* have the greater *your* chance of a prize.

* * *

Many members of our staff will have read with regret the announcement of the death of Mrs. Ella Wheeler Wilcox. She doubtless numbers among us many admirers of her poems, but in addition it will be remembered that in December last she visited Victoria Exchange and subsequently sent three verses written in her usual facile style, which appeared in the December-January issue of this JOURNAL.

* * *

An appeal is being made to all who are not yet members to join the Post Office Sanatorium Society. Only 32 per cent. of the staff of the L.T.S. are members, although the subscription is the small sum of 3*s.* per annum. Those who will not need benefit will surely not hesitate to contribute that sum as a thank offering for immunity, knowing that at the same time it is an insurance for themselves and a charitable contribution for others in the Service who are less fortunate.

* * *

The first anniversary of the Armistice has come and gone. The two minutes of silence was observed at all exchanges in the London Telephone Area. In addition to this general commemoration, several exchanges sent wreaths to the Cenotaph in Whitehall, that from Western bearing the words:

"All they had hoped for,
All they had, they gave
To save mankind,
Themselves they scorned to save."

* * *

Mr. J. Perry, one of the earliest members of the staff of the Controller's Office and famed for his negotiation of disputed accounts, has successfully negotiated the stages preliminary to domestic accounts. It can be said of no one in a greater degree than of Joe Perry that he has the best wishes of his colleagues.

CENTRAL TELEGRAPH OFFICE "WELCOME HOME."

ALTHOUGH its light has been somewhat hidden under a bushel for almost a decade, there can be no gainsaying that with its "Welcome Home" to colleagues returned from active service, the C.T.O. resumed at one bound its wonted place in the forefront of those offices in our vast Department which make social gatherings and musical and dramatic entertainments a part of their life.

Taking place at the Cannon Street Hotel on Thursday, Oct. 16, the function was in every respect a complete and overwhelming success.

From the outset the main problem confronting the Arrangements Committee had been that of securing adequate accommodation; with over a thousand invitations to be issued, a strict limitation upon the number of tickets for sale was a paramount necessity, and we understand the five hundred tickets so allotted could have been sold twice over. Supply does not equal the demand for large halls in London in these days, and the anticipations that the capacity of the Cannon Street rooms would be severely taxed were early realised. The number present was estimated to exceed 1,200, and while for the Bohemian Concert the Great Hall proved almost equal to the demands upon it, the young people who flocked to the Pillar Hall for the dancing which was proceeding concurrently were far too numerous for comfortable management.

However, everyone was content; happiness and good fellowship were the dominant notes; the evening was one long record of success and delight, a most auspicious inauguration of an era which all hoped and felt would be one of peace inside official circles as without.

Among the invited guests present were Sir Evelyn Murray and Lady Murray, Colonel Sir Andrew Ogilvie, Mr. and Mrs. John Lee, Miss A. Moore, Messrs. A. W. Edwards, W. J. Bond and F. T. Wadley, and Major A. A. Jayne, and the company included representatives of every grade.

For the formal "Welcome Home" the concert and dancing were suspended for an hour from eight o'clock, and the opening of this stage of the proceedings, when all present rose in their seats as a mark of respect for all those of the C.T.O. who had fallen during the war, was deeply impressive.

Mr. H. L. Upcott, Secretary of the London Branch of the P. and T.C.A., was in the chair, and speaking on behalf of the general body of the male staff, expressed the joy and relief with which they welcomed back to their midst the men and women who in such numbers had answered their country's call. From the C.T.O. in all over 1,600 had enlisted. Of the grades represented that evening—Clerical Staff, Supervising Force, Telegraphists, and Learners—1,250 men had joined up, while 34 of the girls had enrolled in the W.A.A.C.

There were still upwards of 160 not yet demobilised. None of the women were among the "casualities," though three were not to return, having married, and others had apparently gained decorations in the shape of engagement rings. Numbered among the men who had laid down their lives were 47 telegraphists and 6 learners, and briefly, but affectionately, the names of some of them were recalled. As ever, C.T.O. staff had acquitted itself worthily. Sixty had held commissions, and in that capacity had done conspicuously good service. Decorations and distinctions had fallen to C.T.O. men galore—British, French, Belgian, Italian, Russian, and those of other countries, for it was difficult to name a field of operations in which C.T.O. men had not served, and their excellent work had everywhere gained recognition. Nor had the full total of decorations yet been recorded, for with characteristic reticence some of the lads had refrained from reporting honours which had been bestowed on them, included among which was at least one D.C.M. But it did not need a recital of the list of these honours to demonstrate that C.T.O. men had creditably played their part. In common with the rest of the "Signals Service" they had well deserved the encomiums which had been showered on them for their consistent good work, but it was chiefly by the splendid way the boys and girls had "stuck it" in the dark days of the spring and early summer of 1918 that they had endeared themselves in the memory and established themselves enduringly in the esteem of their colleagues who remained at home, and who now so gladly welcomed them back.

Introducing the Controller, Mr. Upcott said the appointment to that post of so sympathetic and enlightened a man as Mr. John Lee denoted a desire to give a trial to new methods of administration which the speaker was convinced meant for the C.T.O. happier days than had ever previously been experienced. Recent events had amply revealed the soundness of Mr. Lee's ideas, and incidentally had already firmly lodged him in their respect and regard. The visits which Sir Evelyn Murray had paid of late to the C.T.O. were also accepted as an evidence of a desire for a better understanding, to which the willing response of the staff was assured.

On rising, Mr. Lee was very warmly greeted, and his felicitously phrased little speech was punctuated with applause. He likened himself to a local notability in his suburb, in whose epitaph it was recorded "he was the father of a large and respectable family." It was his hope and desire that the stimulating features of happy family relationship should find full play in the life of the office. Working together in a spirit of mutual helpfulness, bound as they were by many common ties, he was sure that his brothers and sisters of the staff—if he might then relinquish the position of a father—would find themselves on the right road. That these sentiments accorded with those of

his hearers was left in no doubt, and one of the returned men was afterwards heard to remark that to him it was like sitting down to a refreshing banquet after a long and dreary sequence of nothing but iron rations.

Miss Mary Herring expressed herelf as sensible of the privilege that, as an officer of the Union of Post Office Workers, it had fallen to her in the name of the women of the office to say how cordially they welcomed their returned colleagues. In 1914 there was a spirit of adventure coupled with a sense of duty which called the men to the colours, but after the rigours of the first dreadful winter campaign, when the bitter hardships became common knowledge, *the spirit of adventure necessarily waned, and it was alone the* sense of duty which impelled the men to join up. And not only the men, for when the time came that women were wanted, they willingly and nobly responded, and in so doing did more almost than ever previously had been achieved to demonstrate the fitness and readiness of the women to stand equal with the men in responsibility in endeavour and in risk. It was this memory of what had been done at the call of duty which the women of the office and the Service mainly cherished.

Speaking for the Supervising force, Mr. Herbert Parker expressed his happiness at the re-union. He evoked much laughter when he said that nothing had brought home to him more the gravity of the crisis through which the nation had passed when in its later stages he had, although within reach of the half century, himself been called up for attestation. Like those there assembled he had in due course been discharged and also like them he had been told he was not entitled to the "gratuity"! He could not, of course, claim to have been a witness of the horrors of war as they had seen them, but on the other hand, they perhaps did not fully appreciate what the war had meant to those remaining behind. The Service had fallen to a pretty pass, and the C.T.O. had presented some strange sights. On one occasion, for instance, he found himself the centre of amused interest because on a long row of circuits every clerk other than himself was a little girl with her hair hanging down her back! However, it has its other side, and he thought it would be difficult to give too much ere lit to those left behind, and by that he meant especially the women, for the way they had carried on.

Mr. A. E. Tarr, representing the Cable Room staff, added his words of welcome. He paid tribute to the services the men of the office had rendered overseas, and spoke feelingly of one or two who had made the great sacrifice. It was perhaps too soon to say the boys returning would find the C.T.O. a better place than they had left it, though there were many signs that they were on the threshold of happier days. He associated himself with what had been said as to the difficulties of keeping things going at home, and ventured to emphasise in particular the work done in the interests of those *who had been away by the officers of the London Branch of the Association.*

Acknowledging on behalf of those who had joined the various forces, Mr. H. S. Jordan said first how much they appreciated the welcome which had been extended to them. In spite of all that had happened in the office in recent years, there was unquestionably in the hearts of each of them a lurking tenderness for the C.T.O. That night had done much to strengthen the ties *of affection which bound them to T.S.* Wherever the fortunes of war had carried him he had found T.S. men working together happily as a band of brothers. The greeting of one T.S. man to another was always of the heartiest, and it was by no means only cupboard love, though it was true there was very often something doing in the way of good cheer when they chanced to meet. He was glad to know it was believed of them that they had gone out from a sense of duty. Nothing had impressed him more deeply than the abundant evidences of that in all his relations with T.S. men while on active service, and he thought he might claim for the men from the office that they had cheerfully and creditably borne their share of the burden of the work which had had to be performed. They had lost many dear friends and colleagues. He had shared experiences with several of those who had fallen, and he could only bear out what Mr. Upcott had said that different in type though they had been, they had all alike had hearts lof gold, and the Service and the office were the poorer for their passing.

The concert was in keeping with the rest of the proceedings. It was of the highest standard, and with the performers consisting exclusively of present or past members of the office staff, it demonstrated convincingly the wealth of talent at the command of the C.T.O. Miss Christine Gordon (Contralto) in "Coming Home" and Scots ballads, and Miss Ida Sherrington (Soprano) in "Grey Eyes" and "Little Dream Bird" were delightful. The tenor of Mr. Gerald Classey in "The Last Watch" and "So Fare Thee Well," and Mr. Merlin Vaughan's powerful baritone voice in the Pagliacci prologue and "Friend" were never heard to finer effect. That accomplished elocutionist, Miss Nellie Nichols, gained plaudits by her monologue, "An April Shower," and a rare treat from the point of view both of histrionics and *costume was provided in a scene from Shakespeare's "Henry V." by the* Misses K. Walters (Katherine), E. M. Wheeler (Alice), and G. E. Mathieson (Henry V.). Miss Emilie Wheeler was charming in light comedy songs; Mr. Frank Hudson for his interlude and "Living Marionettes," was accorded the reception of a popular favourite; and Messrs. Harry Parr and Will Jennings, though well known overseas as members of the "Iddy Umpties" Concert Party, were a revelation in their humorous duologues at the piano, bringing down the house with their "Telegraph Rag," crammed, as it was, with topical allusions and shrewd hits. The solos and accompaniments by Mr. C. E. Daggett were all that could be desired, and selections were beautifully rendered by Mr. Len Coombs' "Bon Accord" Orchestra, which afterwards did excellent service in the Dance Hall.

The concert was splendidly managed under the direction of Mr. Chilvers, but indeed great credit is due in every particular to the arrangements committee and the stewards. From first to last—and it was a long evening—*everything went with a swing, and the occasion will long be remembered.* It will stand as the finest in a brilliant record; it was worthy of the C.T.O. —and the men and women it was designed to honour. The C.T.O. has reason to be proud of itself.

One thing remains to be said: it occurred to many of those present that the reminiscences of those returned, seeing that C.T.O. men have served both by sea and land and on every front, or have been detached for duty in the Arctic, at Halifax, Nova Scotia, in Ostend in the early days, in Irish cable stations, one at any rate in a German prison camp, and another, soon, we hope, to return from Moscow, would prove more than interesting reading if a permanent record could be made of them. Beyond doubt an attempt should be made to arrange the compilation of such a volume.

It is to be hoped no time will be lost in taking this matter in hand.

CORRESPONDENCE.

SIGNAL SERVICE OLD COMRADES.

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

SIR,—As the first year's working of the two affiliated Associations (The Signal Service Association and the R.E. Old Comrades Association, Signals Branch) will shortly be completed, I feel sure that your ex Signal Service readers will be interested to hear of the progress made.

The total membership to date is 4,520.

The subscriptions, from all sources, exceed £2,000.

The Employment Bureau has placed 103 members in suitable employments.

Immediate grants of money have been made in 15 cases of necessity.

Legal assistance has been given to 6 members.

A first-class Cinema has been run at Bedford for the benefit of the Troops.

The Information Bureau has successfully dealt with hundreds of inquiries, ranging from Pensions matters to house finding.

Branches are now being established at Centres throughout the *Kingdom.*

The membership is gratifying in view of the unsettled conditions which have obtained during the past year. The membership is increasing daily.

The employment difficulty has been faced to the extent that I have been able this week to circularise the 20 members on our Register awaiting employment with a list of 80 possible posts. A number of applicants have *been placed only a few hours after registration and from experience I find* that we meet with greater success than the Government Labour Exchanges.

The committee has been reconstituted recently to reconcile with post-bellum conditions. The majority consists of demobilised and Territorial Force Officers, N.C.O.'s and men. In this respect it is a great pleasure to record that the invitation of the Executive to Col. Sir A. M. Ogilvie, K.B.E., to serve on the committee has been accepted during the past week.

The record of the Association after 11 months working amply justifies its existence. The work has been, of necessity, spade work, but it is hoped now to develop the social side and extend the membership. To this end the Offices are being moved to London in the near future, and it is intended to start a journal and open a club. To this end, also, it is hoped to enrol many more Post Office men as members. Post Office men made the Signal Service during the War, and, without a large representation of Post Office men in a scheme of this sort, the very excellent objects for which it stands will be rendered only partially effective.

May I again extend a cordial invitation to all ex-Signal Service Comrades to join. The subscriptions are:—

Officers: 5*s.* annually or £5 for Life membership.

Other ranks: 2*s.* annually or 30*s.* for Life membership.

Subscriptions should be sent to the temporary Offices—24, St. Andrews Road, Bedford.—Yours faithfully,

JOHN C. DALTON,
Hon. Secretary,
S.S.A., and R.E.O.C.A. Signals Branch.

24, St. Andrews Road, Bedford, Nov. 8.

THE KENSINGTON DANCE.

An enjoyable dance was arranged by members of the Kensington staff on Friday, the 31st ulto. It was held in St. Mary's Hall, Putney. Five prizes were given for fancy dress and were won by representations of "Oriental Lady," "Nellie Wallace," "A Courtier," and "Chinese Mandarin." Many thanks are due to the M.C. (Mr. Collins), the committee and stewards for the thoroughly enjoyable evening which it is believed everyone present spent. £17 has been sent to the Hospital Saturday Fund.

REVIEW.

SIR ISAAC PITMAN & SONS send us for examination a new book *The Psychology of Management*, by Mr. L. M. Gilbreth. It is an admirable statement of some of the later theories which are based upon the study of mind and of feeling in relation to ordinary work. It may be called a psychological analysis of the later statements of Scientific Management. Its value is not to be measured by the expedience or otherwise of its ultimate theories, for in respect of such a study as that of Scientific Management the process of argument upon which doctrine is based is really of more value than the doctrine itself. The study of processes, the careful analysis of methods of supervision, the clear definition of instructions, the reduction of clerical work, all these are germane to management and there is much advantage from studying them. At the same time there are reasons for apprehending that in its final conclusion, this theory makes the human mind too simple and too comprehensible. Not all the factors are yet known and we cannot dogmatise quite so readily as to the response which human beings will make in all circumstances. Leaving this consideration of the final application aside Mr. Gilbreth has given the best study of the material which has been gathered by recent exponents of Psychological Management, and his book is indispensable even to those students whose minds are directed somewhat in another direction. One curious point may be mentioned. In its own way the management of the Post Office comes much nearer to modern methods than might be supposed. There is more of careful analysis of mind than is generally realised; our little instruction books for example are not far away from the Instruction Cards of which so much is made in recent manuals: our distinction between Assistant Superintendents and Overseers is more nearly allied with functional control than we ourselves have believed. If it is true that someone once talked poetry unconsciously it is equally true that perhaps equally unconsciously our management is more scientific and more psychological than many of us have supposed. Other administrations of very varied industries are imitating the Post Office method of supervision, of pensions, of recognition and promotion, and unconsciously are paying it the highest tribute of respect.

PERSONALIA.

LONDON TRAFFIC STAFF (*Telephonists*).

Miss J. BLACK, Assistant Supervisor, Class H. Paddington Exchange, has resigned in view of her approaching marriage and was presented with a case of fish and fruit knives and forks and several other useful gifts.

Miss E. M. JEFFS, Temporary Telephonist, Dalston Exchange, resigned to be married Oct. 31, and was presented by the staff with a case of fish knives and forks.

Miss E. G. BARTRAM, of East Exchange, resigned on account of her approaching marriage and was presented by the staff with a tea service and case of tea knives and other useful gifts.

Miss M. K. ASHMAN, of Kensington Exchange, has resigned in view of her approaching marriage. She was presented by her colleagues with a silver cake stand and numerous other gifts.

Miss D. FINNIS, of London Wall Exchange, resigned on Oct. 31, on account of approaching marriage.

Miss W. G. SIMMONS, of Mayfair Exchange, has resigned to be married and was presented with a Lustre ware tea set, tea service and other useful gifts.

Miss M. L. SMITH, of Mayfair, has resigned in view of her approaching marriage and was the recipient of a cruet, toast rack, flower-bowl and other gifts.

Miss E. M. TOWNSEND, of New Cross Exchange, has resigned to be married and was presented with a dining-room clock and also many other useful presents from the staff at New Cross and other exchanges in the district.

Miss M. W. L. BRIGHTMAN, of Park Exchange, resigned on Oct. 31 on account of her approaching marriage and was presented with a pair of silver and cut glass vases by the supervisors, a case of fish knives and forks and numerous other gifts by the telephonists.

Miss E. A. EVANS, of Paddington Exchange, has resigned to be married.

Miss M. C. WITHERIDGE, of Western Exchange, on loan to Carter Lane School, resigned in view of her approaching marriage and was presented with tea knives by the Western staff.

Miss F. M. KING, of Victoria Exchange, has resigned to be married and was presented with a cruet and jam jar.

Miss C. L. FRASER, of Victoria Exchange, has resigned in view of her approaching marriage and was presented by the staff with a set of carvers in case and other gifts.

Miss A. NICHOLSON, of Victoria, resigned to be married and was presented with a set of tea knives.

Miss D. EMBERSON, of Victoria Exchange, has resigned to be married.

PROVINCIAL STAFF.

Mr. E. E. HUGHES, Male Clerical Assistant Chester, was presented with a marble clock on the occasion of his marriage.

Miss D. S. SEARLE, Telephonist, Plymouth, resigned on the 11th inst. in view of her approaching marriage and was presented by the staff with a silver cake basket.

PADDINGTON STAFF SOCIAL.

"How the time has flown!" So said a girl at 10.0 o'clock on Tuesday evening, Nov. 4, at the conclusion of a social evening held by the Paddington Exchange staff. The District Superintendent, Mr. White, acted as M.C. throughout the whole proceedings and kept everything going with a swing.

From 6.0 o'clock onwards we were all engaged in tripping the light fantastic, playing musical arms- which caused roars of laughter- and indulging in "whispers" which, when compared with the original, caused much merriment. The musical portion of the programme was also excellent; each item being rendered in first class style and vociferously encored. Opportunity was taken to welcome back from her duties in France, Miss Rosa Stokes, who also entertained us with her delightful recitations. All too soon we rose to sing the National Anthem and link hands for Auld Lang Syne. Thus ended a most enjoyable and happy evening.

CELEBRATION OF SOUTHAMPTON MEN'S RETURN.

Over three hundred sat down to dinner on Oct. 22 at Carlton Drill Hall, Southampton, to welcome the return to civil life of their comrades who had enlisted. The Postmaster (Mr. C. Carwithen) presided over the festivities, and with him at the head table were Dr. Russell Benecraft, Dr. Power (Medical Officer to the Post Office), Captain F. S. Crocker, and Messrs. W. Makepeace (Surveyor of South-Western District), C. Greening (Chief Superintendent), W. Howe (District Manager Telephones), T. W. Dunning (Superintendent Telegraphs), C. F. Courtier, S. O. Allen (Traffic Superintendent of Telephones) F. M. George (Contract Manager of Telephones), J. Naylor (Assistant Postal Superintendent), F. Paul and H. Caswell (Overseers), Heath, Foy and Lowe (Sub-Postmasters). Misses Gibson (Telephone Supervisor), C. Brock, I. Douglas, N. Dallimore and Duer.

The opportunity was taken to make a presentation to Dr. Russell Benecraft, the retiring medical officer. The dinner was followed by an enjoyable concert, whist-drive and dance.

It is a splendid record of service that the Southampton office can show. Almost every eligible man in every department enlisted, to the number of 386. Of these, alas, sixteen fell in action, and eight died on service. Two others were reported missing, three were seriously wounded, and five (who have now resumed duty) were taken prisoners. Four men, Messrs. L. T. Rabley, A. Grist, W. H. Butt, and F. C. Gough, gained respectively the D.C.M., the M.C., and Medale Militaire, and the Military Medal.

PRESENTATION TO MR. F. W. GEORGE.

Mr. F. W. George, who has been contract manager of the Southampton Telephone District for the last twelve years, has been transferred to a similar appointment at Brighton. Before vacating his old post he was the recipient of gifts from the staff, the presentation being made at a representative gathering of all sections of the Post Office telephone employees. The traffic and clerical staff of the district gave him a travelling case, and his own personal staff a fitted attaché case. Mr. S. O. Allen, the traffic superintendent, made the presentation.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.4.*

THE LONDON TRUNK EXCHANGE.

BY J. F. ROONEY.

THE subject of our illustrations, the London Trunk Exchange, has been selected as the most suitable example of an exchange with which to commence a new series of articles for this JOURNAL. Its position as the most important single exchange in the United Kingdom well entitles it to the position of merit at the head of the list which is thereby conferred. In point of staff, revenue-earning capacity, and the importance of its traffic, it could not fairly be placed otherwise.

Before describing the exchange as at present constituted, a short account of the history of "Trunks" may not be out of place. Its modest beginning was with one operator, the nucleus of the system being the two lines contained in the St. Margarets Sangatte French cable inaugurated in 1891. These were housed in a room forming part of the Cable Room in the C.T.O. They were followed by a few Brighton lines taken over from the National Telephone Company in advance of the main trunk transfer. These still worked in Brighton to the Company's exchange, and with their arrival the staff was augmented to two operators. Next followed a few short-distance trunk lines erected by the P.O., and in 1896 the transfer took place of the remainder of the London trunk lines still belonging to the Company, together with the staff. The staff in all at this period numbered about 10, and were responsible for about 20 circuits. One "Omnibus" order-wire had at this time to serve all London exchanges.

The exchange was visited about this time by the late King Edward, who spoke over the Paris lines.

The next stage was the removal of the exchange to a larger room in the C.T.O. (now occupied by the French Division), which was the first attempt at a proper exchange with switchboards and arrangement as now generally known. About this time also the staffing arrangements were revised, and women telephonists and unestablished male labour replaced the telegraphists who had previously performed the work. The exchange remained here until its transfer to the present building (known as G.P.O. South), in February, 1904.

By this time the staff and equipment had grown considerably, and the former had reached a total of about 100, including a Chief Supervisor, 2 Supervisors Class I, and 8 Supervisors Class II. The number of trunk circuits was 140, including 6 Continental lines, 213 out-going junctions, 50 incoming (record) junctions, 17 order wires to London exchanges, and 102 lines to subscribers renting direct circuits to the exchange completed the equipment.

Now let us consider the present exchange. At the moment of writing, the increase on the 1904 figures is about 700 per cent., on the trunk lines alone. The number of working positions is 195, comprising 177 distinct routes, and there is a total number of 981 trunk circuits. The latter figure includes 143 "incoming" circuits at present led into "Central" and worked as junctions owing to lack of accommodation in "Trunks" or "Toll," and 31 lines loaned as War circuits to other Government Departments and not yet restored. The equipment is completed with 230 incoming (Record) junctions, and 1,134 outgoing junctions, all to exchanges in the London Telephone Area, and served by 57 order wires. Taking this together with a staff increase to 578 Telephonists, 72 Supervisors Class II, 8 Supervisors Class I, and 1 Chief Supervisor, a truly remarkable advance will be noticed to have been attained.

The traffic records for 1904 are no longer available, but the present records show that an average of about 32,000 calls per day in both directions is now handled in the exchange. The outgoing traffic alone shows an increase of 36 per cent. for 1919 over the 1914 figures, and incoming traffic provides about 55 per cent. of the total work dealt with.

The exchange itself is divided into two main sections, the Trunk Exchange proper, and its extension the "Toll" Exchange, the latter term being borrowed from our American friends, to whom all good Telephone Administrations should look for guidance (*vide* Press), and indicating short-distance trunks, worked more or less on junction principles. Lines up to 50 miles in length are accommodated in this room. The main exchange contains 115 working positions, and "Toll" 80 positions. It should be mentioned that the building (which also contains "Central" and "City" Exchanges) was not specially erected for the purpose, having been occupied by the Savings Bank Department prior to its transfer to Kensington.

The photographs are intended to show a few of the special features of the exchange, which are, so far as is known, peculiar to it. No. (1) shows the "Record Distribution" and (2) some of

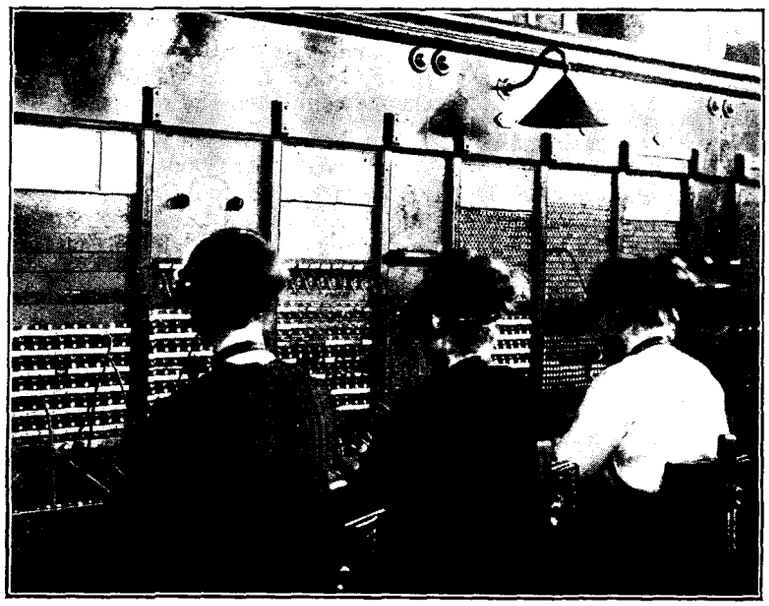
the "Foreign" positions. No. (3) shows the Pneumatic Ticket Distributor; No. (4) the "Enquiry" positions, and Nos. (5) and (6) general views of the Trunk and Toll Exchanges, with the "Delay" Boards and part of the "Record" tables. A word of explanation appears necessary as regards the photographs. These were taken under circumstances of extreme difficulty. The lighting conditions of the exchanges in the G.P.O. South were never good, since the building was never constructed for its present use. When in addition it is necessary to photograph interiors on a December day, with more than a few degrees of London's own particular brand of fog prevailing, the difficulties and length of exposure and danger of movements will be apparent.

All incoming lines from London Exchanges pass through the Record Distribution position. On a subscriber's demand for "Trunks" the "local" operator plugs him through on lines worked on the signalling-junction principle, which lights a signal lamp on the Distribution position. Three operators in Trunks are kept busy dealing with these calls, their positions being provided in all with 60 plug-ended junctions to "Record" operator's positions, all of which are in use during the "Busy Hour" in the booking of calls alone. What might be termed "dumb operating' is employed at the Distribution positions, the operators there being under no necessity to speak to the Record operators, whose attention is gained by a lamp signal, a key being provided at the Record position to speak to the subscriber and clear the Distribution junction after the particulars are taken.

A special ticket with a highly-glazed surface is employed in London for use in the Pneumatic Ticket Distributor. The first parts of this were installed in 1910 by the Western Electric Company, and it was the first of its kind in England, though some had previously been in use in Germany. The present one was actually built by the Company's (breathe it gently) German workmen!

It was found that owing to London's atmospheric conditions, tickets made of ordinary paper stuck in the tube, and special tickets had to be devised. After recording the details of the call, the Record operator folds the ticket at a point indicated by a deep line mechanically made during the printing, and inserts it in a slot in the "Record" table, whence it is carried by the air-pressure against the "sail" formed by the fold to a central Distributor perator, whose position is provided with slots corresponding to every position in the main exchange. The tickets are inserted therein and a button pressed, which admits the air-pressure and lights a small lamp which glows until the ticket reaches its destination, a matter of a very few seconds.

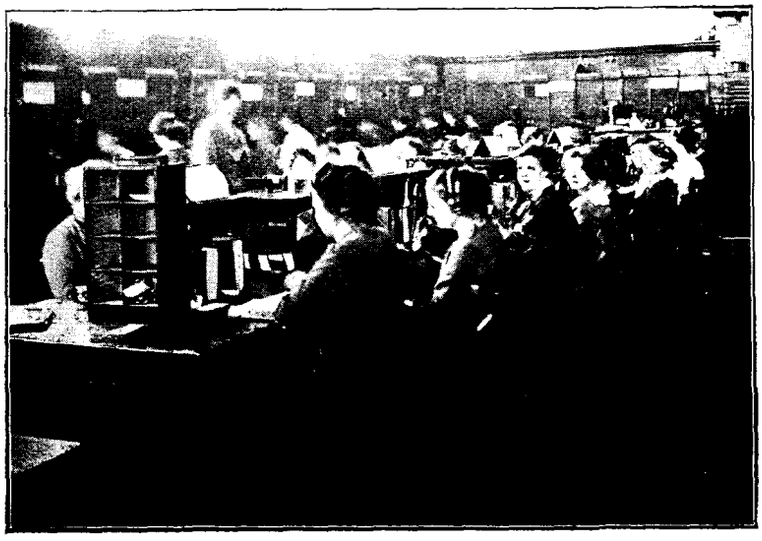
The introduction of the tube has effected an enormous saving in time and labour of circulating tickets, and since the initial difficulties were overcome has worked very satisfactorily. It is now being arranged to have the tickets folded mechanically, which



RECORD DISTRIBUTION.

SOME "FOREIGN" POSITIONS.

PNEUMATIC TICKET DISTRIBUTION.

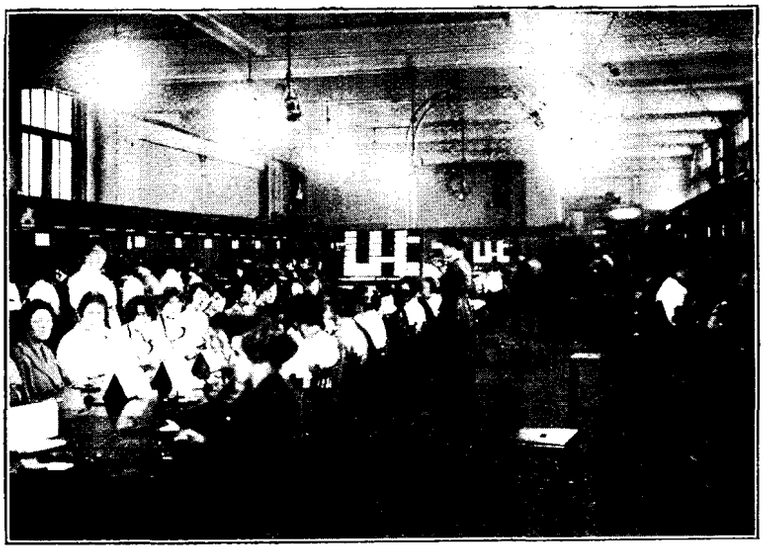


"ENQUIRY" POSITIONS.

will save further time and ensure their being folded quite straight, failure to do the latter having caused some cases of tickets sticking in the tube. No carriers are used throughout, except from "Trunks" to "Toll," where leather carriers are used, and the tickets circulated in the exchange by hand. A full pneumatic circulation system was not installed in "Toll" as the exchange was only intended to be temporary. The tube to the latter exchange was completed in 1913.

Two items of equipment, which, if not peculiar to London, will only be found in very large centres, may perhaps be referred to here. These are the automatic Time Check and the Calculagraph the former designed to give a visible indication of the duration of the call, and the latter a printed record of the duration.

The time-check switchboard apparatus consists of a button associated with the calling lamp of each circuit, and assists the operators in controlling the period of conversation. It is set in motion by pressing the button concerned, which actuates an electro-magnet, working in connexion with a revolving toothed wheel. This is arranged so that at the end of the three-minute period a contact arm engages with the wheel, closing the battery circuit of the lamp, which remains alight for about twenty seconds. To re-set the time check the button is depressed twice, once to restore the contact arm to normal, and the second time to place it once more in working connexion with the revolving wheel.



GENERAL VIEW OF TRUNK AND RECORD POSITIONS

The Calculagraph is an instrument having a clock face and mechanisim with revolving inner dials, and is fitted with a slot for inserting tickets, and two levers. The ticket is inserted face downwards in the slot, and the right-hand lever pulled over. This prints, in the form of a clock dial, the time of connexion, by means of a die striking through an ink ribbon, and also two blank dials, one showing quarters of a minute up to five minutes and the other twelve periods of five minutes each. The first stamping is made as near as possible simultaneously with the depression of the time check button.

On the termination of each call the left hand lever is pulled over, which leaves in the blank spaces the imprints of two stationary pointers. The ticket then shows the total duration of the call in periods of five minutes plus the additional minutes and quarters of a minute as shown on the first dial.

At present only 6 Foreign positions are worked as such, though 8 are allocated. The Continental service was only re-opened to the public on Oct. 28, but already the traffic has reached 700 calls in one day, which exceeds the pre-war figure. Considerable development of this traffic is looked for in the future. With the introduction of valve repeaters and loading coils on long-distance routes the speech possibilities are almost unbounded, and there is

GENERAL VIEW OF TOLL POSITIONS.

evidence that the business community will pay anything in reason to get rapid and clear communication on long-distance calls. Good speech to places in France not yet available for such, to Switzerland Holland, Germany, and even Italy, are possibilities, in some case certainties of the future. As regards the present service, it is hoped, when certain Government lines are restored to public services to double the present Foreign staff and positions, and the development of Continental traffic from now onwards presents a highly interesting study to those concerned.

The present Toll Exchange differs somewhat in equipment, from the main exchange. The switchboards are of a smaller type, and are not fitted with calculagraphs for timing calls on and off as in "Trunks." The junction multiple also is spread over 3 positions, as against 2 in "Trunks," but the positions being smaller and narrower, this is not felt to be a disadvantage. A new Toll Exchange with greatly increased capacity is now in course of construction, which it is hoped will relieve the present congestion in both exchanges. Consideration is also being given to the question of providing a new Trunk Exchange in a building specially erected as such. Although this is looking ahead somewhat, there is no doubt that the future of Trunk Telephony, so far as this exchange especially is concerned, abounds with possibilities. The Trunk Exchange staff intend to spare no effort to keep abreast of the times, and retain for their exchange, their position, not only as the premier British Exchange, but as the premier European Trunk Exchange, which, up to the present, neither France nor Germany, our principal Continental rivals, have yet been able to challenge.

Although this article has been written primarily from a Traffic point of view, it would be ungrateful if it were allowed to terminate without some reference to the good work and good fellowship displayed by our colleagues of the Engineering Branch in the exchange. As a model of harmonious working and mutual assistance, the relations of the present Traffic and Engineering staffs could not be excelled, and they have contributed greatly to the successful development of our telephonic facilities, that thrice-blessed word "Co-operation" in this case being a matter of solid fact and not merely a pious hope or the dream of an idealist.

At the time of going to press no announcement had been made respecting the successors of Sir A. M. Ogilvie, the retiring Joint Second Secretary, and Mr. L. T. Horne, the retiring Assistant Secretary, in charge of Telephones.

THE BAUDOT—IV.

(Continued.)

By J. J. T.

THE six wheels of the weight-driven gearing together with their corresponding pinions are toothed as follows :—

No. 1 wheel	55	teeth	engaged with	No. 2	pinion	22	teeth.
No. 2	..	90	..	..	..	No. 3	..	20	..
No. 3	..	110	..	..	..	No. 4	..	19	..
No. 4	..	110	..	..	..	No. 5	..	18	..
No. 5	..	105	..	..	..	No. 6	..	21	..

As the mechanical relationship of toothed wheels and parallel axled pinions for the above arrangement, where T=number of teeth of wheel and t= number of teeth of pinion, is :

$$\frac{T \times T \times T \times T \times T}{t \times t \times t \times t \times t}$$

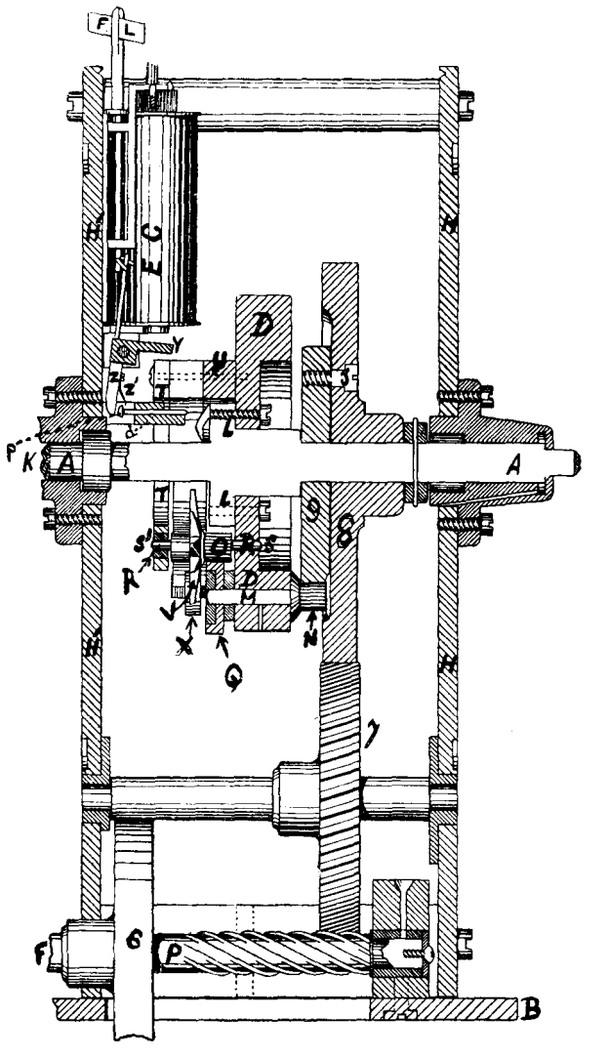


FIG. XVI.

then the number of revolutions developed by No. 6 axle from the single revolution of number one wheel would be :—

$$\frac{55 \times 90 \times 110 \times 110 \times 105}{22 \times 20 \times 19 \times 18 \times 21}$$

or 1,990 revolutions.

Number 6 wheel (Figs. XIV and XVI) is actually the fly-wheel, and its corresponding pinion P (Fig. XVI) extended beyond the caging H^1H^1HH at F, there carries the speed governor. At the other extremity, P automatically engages with wheel number 7 inside H^1H^1HH by means of helical gearing as soon as the distributor cage is placed in position on the base B.

Wheel 7 takes up the speed of P and conveys it to the toothed wheel number 8. To the latter is firmly fixed another and smaller wheel number 9, by means of two screws, one only of which J, is shown. These two wheels together run *free* upon the axle AA and are thus capable of rotation *round* the latter, *taking their drive from the governor and fly-wheel axle* P.

The same axle AA carries a solid metal disc DD (Figs. XVI and XVII) which in turn supports a train-work, DD being solidly screwed to the brush-axle AA at LL (Fig. XVI). Into this disc are fixed two smaller axles, one of which M is embedded in DD and carries a small pinion N which engages with wheel number 9. The pinion N is called the *satellite*. The other end of the axle M carries

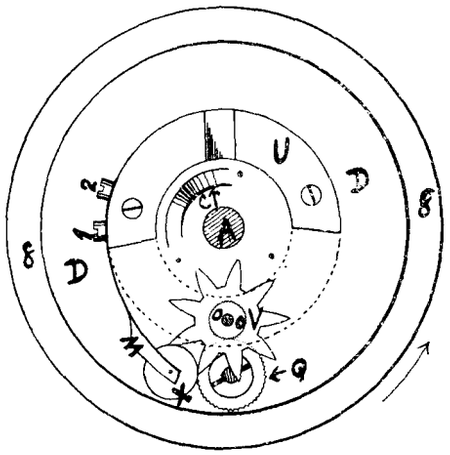


FIG. XVII.

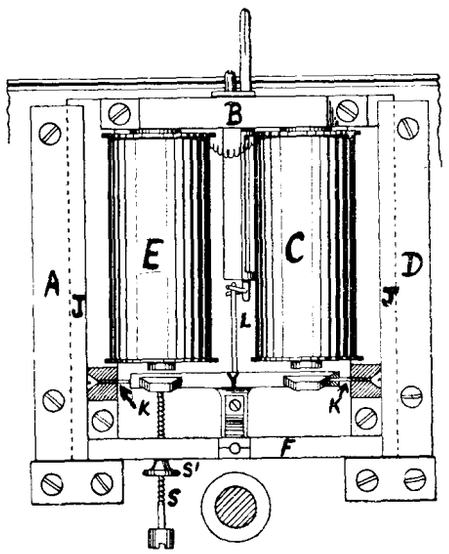


FIG. XVIII.

a somewhat larger pinion Q (see also Fig. XVII) which engages with a smaller pinion O carried in the middle of the second axle RR. The pivoting points of this axle are respectively placed (*a*) in the front portion of DD at S and, (*b*) in the gun-metal collar TT, see S^1. The collar TT is solid with a gun-metal bridge U (Figs. XVI and XVII), which is fixed to the face of the disc DD. The axle RR also carries a toothed wheel V known as the *star wheel*, which is positioned close up to the pinion Q. This wheel should have 9 teeth in a *double* distributor, and 12 for a quarduple or sextuple. Expert opinions have varied on this point of the number of teeth to be carried, a matter which need not at this stage trouble the student.

So far as we have gone with our examination of this portion of the apparatus it follows that if 8 and 9 are set in motion by the pinion P and the intermediary wheel 7 that as the former two wheels are *free* on the axle AA, *the effect would be to turn the pinion* N, *the axle* M, *pinions* Q *and* O, *and with the latter the star-wheel* V.

But on the gun-metal bridge, U (Figs. XVI and XVII) is fixed a laminated steel spring W (Fig. XVII) terminating in a roller cam X (Figs. XVI and XVII) which rests between two of the teeth of the star-wheel V. Tension is given to the spring W by means of the adjusting screws 1 and 2 (Fig. XVII) and with sufficient pressure the roller will hold the star-wheel V rigidly in position. By so doing the whole of the gearing on the disc DD is locked with the wheels 8 and 9 which latter thus carry the entire train-work round with them *including the axle* AA itself.

To arrive at the reason for this combination of wheels and axles and pinions and springs we must bear in mind the fact that one of the essential parts of the Baudot system or any similar multiplex form of telegraph apparatus is that not only should the system be synchronous but *iso*chronous.

The means by which this is obtained in the Baudot system is to maintain the actual speed of one distributor at a standard figure of say 180 r.p.m. This will be the speed of the *correcting* office, that of the distributor at the other end of the wire is fixed at about 2 per cent. higher 183 r.p.m. That is to say these will be the respective speeds of the two governors. The conditions thus obtained are therefore that the *corrected* office distributor always gains slightly upon that of the *correcting* office. In the case of two sets of clock-hands travelling in the same direction, but one slightly faster than the other there will repeatedly come a moment when they both point to the same hour: so with the brushes of the two Baudot distributors there must come a moment when the two sets of brushes are coincident in position. If now we so arrange that a synchronising current from the *correcting* office is only permitted to effect the *corrected* office distributor at the moment when the latter *begins to show signs of gaining upon the distributor of the former* but is *not* permitted to act upon the *corrected* distributor when its brushes are coincident or in phase with the *correcting* office, then we shall have accomplished all that is necessary. The medoth by which this is done will be dealt with in due course. We will now deal with the mechanism as it is affected when a correcting current comes into action.

Our present set is joined up as a *corrected* office.

Inside the distributor cage and behind the upper portion of its front plate H^1H^1 is a pair of electro-magnets EC and armature Y (Fig. XVI). They are contained in a metal frame-work (Fig. XVIII) ABDF provided with two brass cheeks JJ which slide easily into metal grooves, fixed on the inside of H^1H^1 (Fig. XVI). This permits of rapid replacement of the coils and attachments when a change becomes necessary or permanent removal when the distributor is arranged as a *correcting* office.

(To be continued.)

THE MOTOR EXHIBITION.

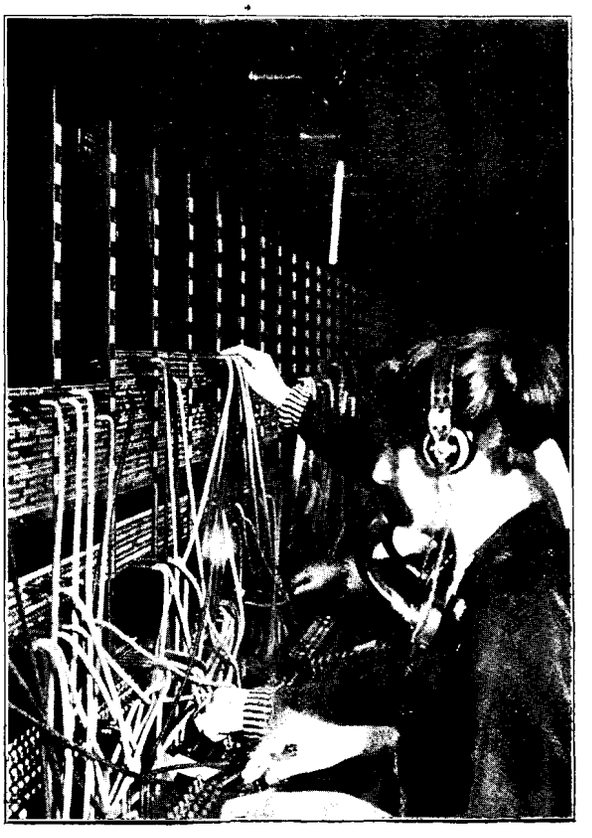
NOVEMBER 7-15, 1919.

BY H. M. VINCENT.

LINES of communication are the nerves of the commercial community. Without them the intricate operations of modern buying and selling could not be carried on, and it will be of interest therefore to record the measures which were taken to serve the exhibitors and the buying public with telephone facilities during the recent Motor Exhibition at Olympia.

The following photograph, reproduced by the kind permission of the proprietors of *The Autocar*, gives a good general view of the extent of the exhibition so far as the motor industry itself is concerned. The attendance of the general public was phenomenal in the records of exhibitions, and the number of orders taken at the stands was much in excess of those taken in any previous year. To complete the picture, therefore, one must imagine every available space in the corridors and the stands filled with a vast concourse of people. The daily scene in Olympia is then before us. This was the well from which was drawn the immense telephone activity which, as will be seen, had a big influence on the Hammersmith Exchange, in which exchange district Olympia is situated.

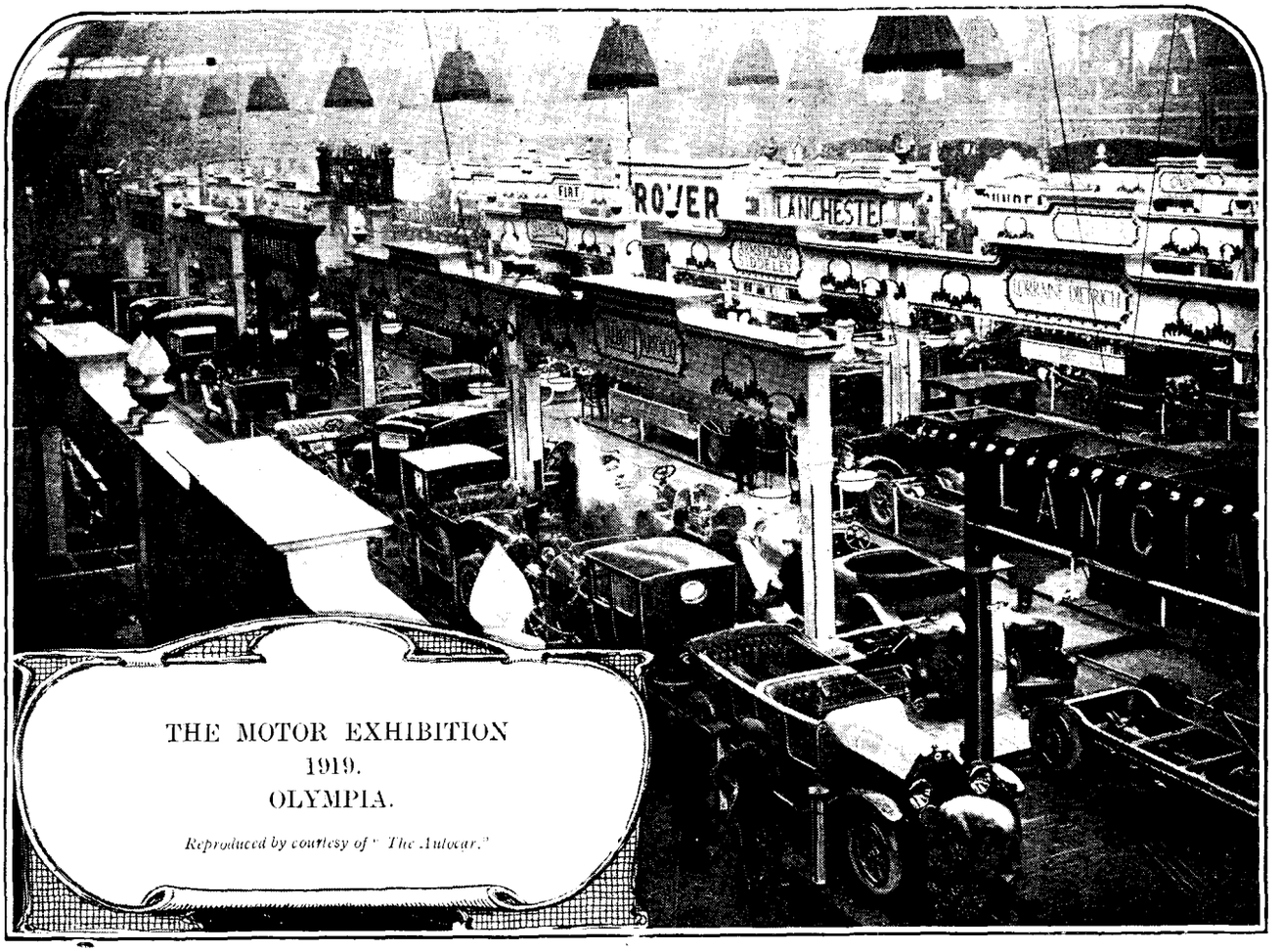
The exhibition was open for eight working days from 10 a.m. to 10 p.m. For the convenience of standholders 210 special circuits were installed under an "Exhibition" contract, and the work of fitting these threw a considerable strain upon the engineering staff. In the afternoon prior to the opening day very few of the stands were completed, and as the circuits could not be installed until the various firms had fitted up their offices it was evening before the work of fitting aparatus could be commenced. Nevertheless, by working all night, all lines were ready at 10 a.m. the following morning. That this must be considered an achievement of no mean order is borne out by the opinion of many of the exhibitors who, towards the end of the week, expressed admiration at the quick way in which the lines were put in. For the use of the general public there are eleven call-office circuits permanently installed in the building and there are six lines serving the management.



THE OLYMPIA POSITIONS.

From the opening day the traffic shewed a steady daily rise until Thursday, which was the busiest day.

The daily total of originated calls from all the circuits averaged 6,500, representing a calling rate of 31 per line per day, and of 3.7 per line per busy hour. The daily total of incoming calls to all Olympia circuits averaged 4,300, an average of 20 per line, and 2.8 in the busy hour. These two totals represent an increase of approximately 50 per cent. over the normal load of the Hammersmith Exchange. The fluctuation of this traffic from hour to hour is shewn in Fig. I., superimposed upon a curve representing the normal traffic. A feature of interest is that the load was spared out fairly evenly over the day between the hours of 10 a.m. and 6 p.m., after which hour there was a considerable drop in telephone activity. On the two Saturdays this decrease became evident at 2 p.m., corresponding to the normal commercial working hours for that day.



For outgoing traffic the circuits were connected to four A positions specially opened for the occasion. It is considered that, wherever possible, this is the better method as it ensures special attention to what is, in effect, special traffic. The alternative was to connect them to the positions already in use and thereby to distribute the additional traffic amongst the whole of the A staff. This could not be done because the existing positions are already fully loaded and, apart from this fact, experience has shewn that such a course would not have been wise because the Exhibition had the effect of making the ordinary Hammersmith circuits much busier than usual. This is accounted for by the large influx of people to the neighbourhood of Olympia to seek sleeping accommodation, and to the fact that many firms, unable to obtain stands in the building, opened temporary offices in shops in the vicinity.

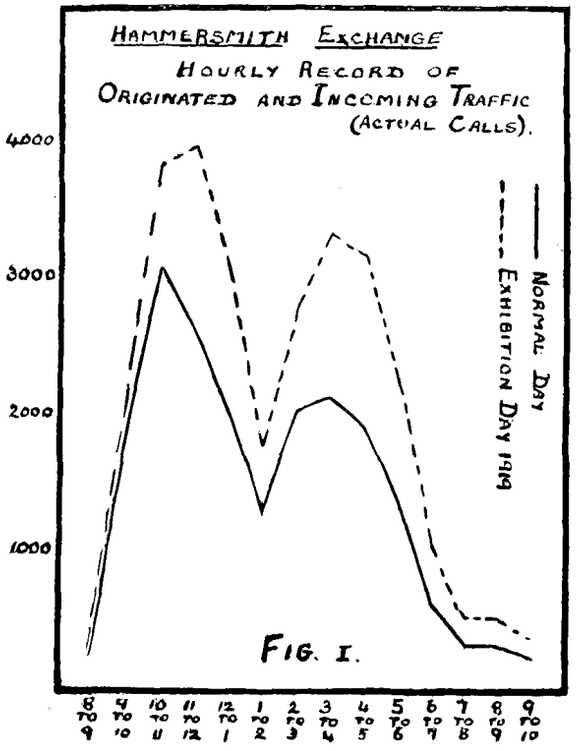


FIG. I.

Arrangements were made for dealing with the incoming traffic by ensuring that all renters of exhibition circuits were informed by letter beforehand of the number of the circuit which had been allotted to them. In addition, 20 filter circuits were provided from the B positions to the four special Olympia positions so that all traffic for the Exhibition which did not mature in the ordinary way was concentrated at one point, an arrangement which in practice worked smoothly. That the sending of the letters to which reference has been made did much to ensure quick working is proved by the fact that only some 12 per cent. of the incoming traffic was handled over the filter lines. It is worthy of note that of this 12 per cent. 2 per cent. were from callers who knew the *number* of the circuit they wanted but thought the exchange was Olympia, not Hammersmith; 3 per cent. were general enquiries such as for sleeping accommodation or for the hours of opening of the exhibition; and only 7 per cent. were for the stand holders from callers who had *no* information as to the telephone circuit they required.

The accompanying photograph is typical of the appearance of the Olympia positions during the busiest hours.

The chief difficulty experienced in operating was the inadequate provision of junction circuits to certain exchanges owing to the

shortage of cable spares. Fig. II. shews in diagrammatic form the junction routes over which the increased traffic flowed and the percentage increase in the various groups which were required in order to dispose of the traffic promptly. In previous years, when

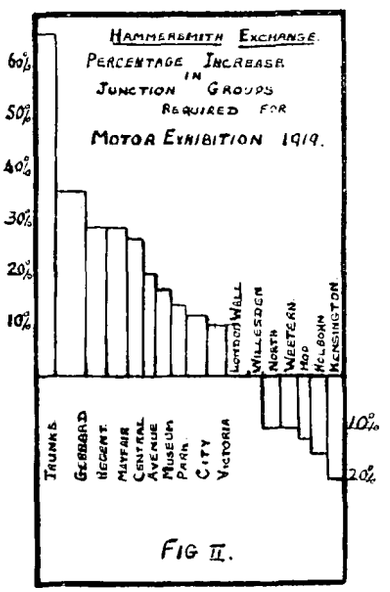


FIG II.

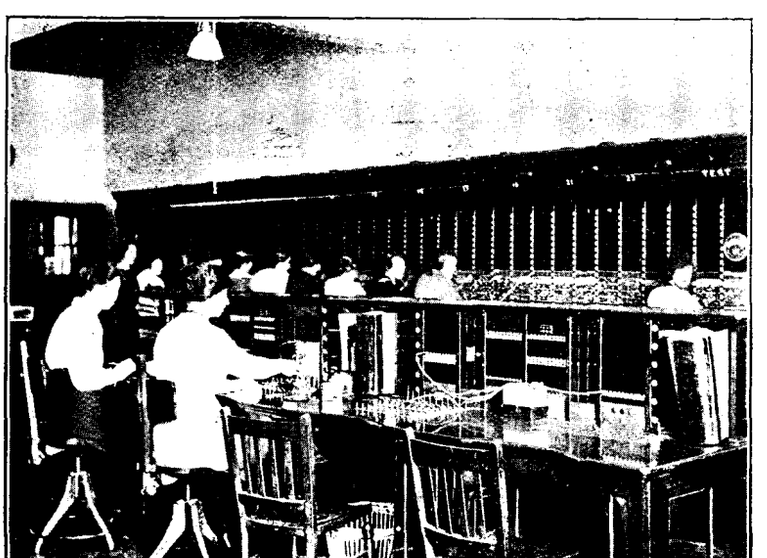
cable plant was more adequate, arrangements were made beforehand to increase the size of those groups most likely to be affected, but this year an attempt had to be made to re-group the existing junction lines. This problem could not be solved prior to the opening of the Exhibition because it was difficult to estimate with any certainty which exchanges in London would be least affected by the additional traffic. The loads on the various groups were kept under close review during the opening days, and as a result junctions to certain exchanges were cut out and taken into those exchanges which were experiencing greatest pressure. The extent to which this policy of transferring junctions could be carried out was very limited owing to the fact that most groups were busier than usual. Arrangements were made for traffic records to be taken on all groups so that definite information has been obtained by which adequate junction facilities can be asked for on future occasions, but whether this information will be as useful as it should be is problematical because it appears to be the general opinion of the Motor world that a larger meeting place must be obtained, if possible, for future exhibitions.

All the call-office circuits were extremely busy. Four of them which were *en suite* had been converted previously to attendant working. So great was the demand during the opening days, however, that arrangements were made for an additional circuit to be fitted to the suite and this considerably eased the situation. As a further measure special attention was paid to the time-limit for call-office calls, and as a result of tests which were carried out it was found that the average duration of these calls was four minutes. The total number of effective calls made from these circuits during the period of the Exhibition was approximately 5,050, of which 2,600 were dealt with by the attendant. It is worthy of note that the average number of calls dealt with per circuit in the suite was 650, as against 350 per circuit originated from the other seven situated at various points in the building. Probably this large difference is accounted for both by the fact that the site secured for the suite was an exceptionally good one, just inside the main entrance, and also by the fact that the attendant being there, did provide better facilities for the telephoning public than is secured by a coin-box circuit. It is considered therefore that the provision of an attendant was amply justified by results and that one should be in attendance at all large exhibitions of this nature.

THE "OLYMPIANS."

Towards the end of the week an effort was made to ascertain what opinion the shareholders held as to the quality of the service given them when such great pressure existed at the Hammersmith Exchange. They were unanimous in expressing themselves as thoroughly satisfied with the service rendered, many of them using the description "excellent," and several commented favourably on the "tone" of the telephonists. These opinions were not wholly unexpected, as observation tests made at the Exchange shewed that the speed of answer was approximately three seconds while the speed of clear was even below this figure.

The staff at Hammersmith was augmented by temporary withdrawals from other exchanges and, by this means, with the aid of extra duty during the afternoon and evening, it was possible to keep the boards adequately staffed to cope with the traffic. He would err, however, who sought in this fact alone the secret of the successful way in which the extra work was handled. Rather, I would refer him again to Fig. I., and there, at the summit of the Olympic peak, the discerning eye will see once again the old Greek god Zeus calling on the multitude to great endeavour. He did not fail in his appeal, and it is to the ladies of Hammersmith, working under consistent pressure with little opportunity for a slackening of effort, that the success is due, and so we have affectionately christened them "The Olympians."



THE "OLYMPIANS."

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Managing Editor - - MR. W. H. GUNSTON.

NOTICES.

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

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THE RETIREMENTS.

THE Telegraph and Telephone Services face the greatest loss which they could have to face in the retirement of Colonel Sir ANDREW OGILVIE and Mr. L. T. HORNE. The organisation of the Post Office, with its varied services, is not so clearly understood as is desirable. Sir Andrew Ogilvie, in the position of Second Secretary, was the head of the Telegraph and Telephone Services. Mr. Horne, in the position of Assistant Secretary, came next to him in command of the Telephone Service. The years which have passed since the transfer of the telephones to the Post Office have been grim years, and the transfer, though but yesterday, seems to belong to a bygone period. It is in respect of the transfer that our two chiefs are best known to the telephone world. It is not realised that the work of preparation began in 1904, that the negotiations and the ultimate arbitration occupied eight or nine years, and that our chiefs meantime faced the huge task of fitting in a commercial enterprise to the great Post Office scheme of things. There were criticisms in plenty. The Post Office was declared to be hardly suitable to such a business as telephony, but Sir Andrew Ogilvie and Mr. Horne, working with an intimate mutual confidence which inspired confidence in others, set out to adapt the old machine to the new conditions. The new wine was poured into the old bottles, and Scriptural expectation was belied.

Those who came from the National Telephone Company bore themselves with greater hope because of Sir Andrew Ogilvie and of Mr. Horne. The transfer went smoothly not because the arrangements were perfect—though they were more nearly perfect than most of us thought—but because their personalities dominated the movement. It was something of an achievement. Second Secretaries and Assistant Secretaries cannot travel much: we take leave to regret the fact, and to venture on the opinion that it is a pity they have not better opportunities for coming into contact with their staffs. They are hard-worked, and their personalities do not seem to be used to the full. In this case it is remarkable how this initial difficulty was overcome. Our chiefs were known and trusted by men and women who had never seen them. The strange impersonality of our service seemed to be overcome. Of course strong personalities scorn difficulties. They cannot help it, but their influence leaps over the barriers. It is not readily to be explained. The service knew by some inexplicable instinct that "AMO" and "LTH" stood for an ideal in workmanship, in efficiency, in service to the public, in protest against either thoughtless or interested criticism. That instinct was right.

Sir Andrew has long been associated with the control of the Telegraph Service. He was known personally to many in the times of the old "Middlesex" and C.T.O. men in plenty look back with pleasant recollections to those days. As Third Secretary and as Second Secretary and as Director of Army Signals he has been leader and chief of civil and of home military telegraphy. He has seen developments of modern telegraphy on a scale of inclusiveness unequalled in the world. The years of war bore heavily on him and to those who know how heavily, it is a great happiness to see his restoration to full health. Mr. Horne was particularly apt at imparting confidence to his juniors by friendly criticism and discussion. His kindly, almost fatherly, help did more than anything to assist his staff over the stressful times preceding and following the day of transfer. Even-tempered, with a keen sense of humour and a love for Nature, he was friend, counsellor and guide to all.

So, they pass officially from us. They led us through a critical stage in history and their names will be tender and immediate memories to all who look upon telegraphy and telephony as something more than bread-winning devices, as part of that speediness of communication which civilisation demands, which economic progress necessitates and which human gregariousness finds to be its very life. What lies before us we cannot guess, but that it is development both of telegraphy and telephony on a scale of which now we cannot even dream seems to be likely. Sir Andrew Ogilvie and Mr. Horne will watch us from their retirement, and it will be no mean resolve if we so direct our efforts that nothing which we do shall be unworthy of the leadership by which the work of the past historic years has been directed and inspired.

THE TELEPHONE DEVELOPMENT OF LARGE CITIES.

THE Hull Corporation Telephone Department in an advertisement which they display in the *Hull Daily Mail* say that "the last available figures of population per telephone show that Hull is the best telephoned city in the Kingdom. The figures are as follows:—Hull, 1 in 26; Liverpool, 1 in 40; Manchester, 1 in 47; Leeds, 1 in 59; Sheffield, 1 in 71."

We confess that these figures, so much at variance with the statistics in our possession, perplexed us somewhat at first and we wondered on what data they were based and whence obtained. We are only too well aware that accurate statistics of the relation of telephone development to population are difficult to procure. Not only is the total number of telephones a constantly shifting figure, not only is the census of a constantly growing population taken but once in ten years; but a greater difficulty arises. When the latest figures of telephone development of a town have been obtained and its population estimated it does not follow that the first stands in direct relation to the second. For example, the population of the city of Liverpool was 746,600 according to the last census, while the population of its telephone area was 1,140,000. The population of Boston, Massachusetts was 670,000, but we believe that that of its telephone area is over 1,360,000. Some telephone systems are confined to municipal boundaries, but most are not—indeed, in this country none is. Now as the boundaries of telephone areas are coterminous in no case with any recognised geographical boundaries, their population is necessarily largely a matter of estimate.

After the last census a close and careful estimate was made in the Post Office of the number of inhabitants in every telephone area of England and Wales and in some of those in Scotland and Ireland by ascertaining what boroughs and urban districts were contained within each, and by adjudging what proportion of the population of the rural districts lying partly within such areas should be added to the total. By this means a tolerably exact figure for each area was obtained, and a short statement of the relation of telephones to population, based on these figures, was subsequently published in the *P.O. Electrical Engineers' Journal*.

While therefore we were trying to conjecture what boundaries and what populations the Hull Corporation had assigned to the cities which they cite in support of their contention, it occurred to us to refer to this statement, and we discovered that their statistics and those of the Journal are identical and relate to a state of things existing in 1911, when, if the recent tales of African travellers are to be believed, the last brontosaurus may yet have been in existence on this earth. Much has happened since then and we have revised the figures in the light of more recent information. We find that the first place is now occupied by London with 1 telephone for every 25 inhabitants: Hull comes second with 1 to 29; Glasgow third, with 1 to 30; while Liverpool is a good fourth with 1 to 31. Then come Edinburgh with 1 to 32, Manchester with 1 to 35, Bradford with 1 to 37, Dublin with 1 to 41, Leeds with 1 to 49, Newcastle with 1 to 51, Birmingham with 1 to 53, and Sheffield with 1 to 56. Only areas with upwards of 10,000 telephones have been taken into consideration. There may be smaller cities and towns which could lay claim to a better average, but we believe there is none beside these mentioned with less than 30 inhabitants per telephone. We should add that we have no late official information of the number of telephones in Hull, except that there was a decrease of 1,500 during the war; but it is not unlikely in our opinion that, when the figures for 1919 are obtainable, Glasgow and Liverpool may take precedence of Hull in the table.

"HINTS TO TELEPHONISTS ON WRITING POETRY."

MR. JOHN LEE gave a lecture recently to the London Society of Telephonists on the above unconventional subject, in the course of which he said, "I am not at all sure that telephonists want to write poetry. I am not at all sure that they want anything. Their lives already are so filled with excitement that writing poetry may appear to be a dull business in comparison. However I have to give some hints to them on something. I can hardly tell them how to knit stockings or to make blouses. Stockings, nowadays, seem to be a fact of considerable importance. They need no help to make themselves beautiful. They certainly need no suggestion to speak softly and tenderly on all occasions. There seems to be nothing left but poetry, so I take poetry. It does not mean that I want every telephonist to be a poetess. On the contrary, while I would encourage them to live poetically I am not at all sure that I would encourage them to write poetry."

Nevertheless in the course of an amusing and whimsical paper, Mr. Lee contrived to suggest some "standard expressions," if we may so put it, of which we quote the following examples:—

The instruction lamp lights slowly on the board,
The long long train of operators hear,
They bend in silence, and at length, restored,
The listening keys go back and all is clear.

Behind the chairs they march, the lofty band,
One for our ten, who guard us day by day,
Our mute Napoleonesses whose command
With lowly reverence gladly we obey.

Full many a super-genius of her kind,
Our dark unfathomed twinkling switchboards knew,
Full many a Boadicea, heart and mind,
Born to be rulers, herein bloomed and grew.

A Joan of Arc, slow, stately, firm of will,
A Mrs. Pankhurst, feminist and strong,
A true Corelli, romancing until
The tale was weary and the tale was long.

A Mona Lisa with a witching smile,
Another (loveable) a smiling witch
A Cleopatra who would Kings beguile,
A Dorcas drooping-eyed with stitch on stitch.

These be our goddesses. They come, they pass,
We give them fish knives or a silver pot,
When the day comes that we must part, alas,
Well, they are human—but we love the lot!

NUMBER, PLEASE.

What are you like, whose voice so sweet and tender,
Comes at my calling, answers to my sigh?
Are you a blonde, a Saxon slim and slender,
Are you a Latin, dark and stern of eye?
I seem to know you better by degrees
Each time I hear you murmur, "N'mbr pl'se."

So swift to answer and so kind to render,
Service so faithful, madam, I would give to you
All that a meek admirer should surrender
If but to me your faithfulness be true,
So my impatience would I fain appease
Until I hear your greeting, "N'mbr, pl'se."

Are you in black or brown or fawn or navy?
Have you of stockings red or maybe blue?
Is your coiffure or bobbed or is it wavy?
Thus, somewhat vaguely, must I dream of you.
Whate'er your costume or your colour these
Are trifles to your precious, "N'mbr, pl'se."

Sometime, perhaps, a Fate will overtake you,
Someone will whisper when the shadows fall
That come what may he will not e'er forsake you,
His queen you are—his sunshine and his all.
Then when the wind, too, whispers in the trees
Will come your welcome whisper, "N'mbr, pl'se."

HIC ET UBIQUE.

WE have to express our regret to many contributors that it has been necessary to hold over their articles—some of them of topical interest—owing to great pressure on space. It is a happy position for the Editing Committee to be in possession of so much good material, but on the other hand they are extremely reluctant to postpone the publication of contributions for one and even two months.

A FAREWELL gathering to Sir Andrew Ogilvie and Mr. L. T. Horne took place at Headquarters on Monday, Dec. 22. Full particulars will be given in our February issue.

A DINNER is being held in Sir Andrew Ogilvie's honour at the Connaught Rooms, Gt. Queen Street, on Jan. 23 to which members of the Post Office who served in the Royal Engineers Signal Service or were associated with him in connexion with his duties as Director of Army Signals, Home Defence, are invited. Tickets (10*s.* 6*d*) may be obtained from Major A. A. Jayne (Traffic Section), Major H. Brown, and Mr. Mountain (Engineer-in-Chief's Office), and Messrs. W. H. Jayne, Swann and Knight (C.T.O.).

TRUNK telephone service between Germany and Sweden was opened on Dec. 1 and will be at first confined to communication with Berlin, Hamburg, Bremen, Lübeck Rostock, Schwerin, Stettin and Stralsund. The charge for a call between Berlin and Stockholm is 6 kroner (about 6*s.* 6*d.*).

WE take the opportunity of wishing our readers a Happy and Prosperous New Year.

TELEGRAPHIC MEMORABILIA.

ANOTHER excellent paper was read on Nov. 25 before the members of the T. & T. Society at the new rendezvous, the S.S. Union Lecture Hall, Old Bailey. It was good to see so able a representative of the rank and file as Mr. H. Booker at the lectern. The lecture was the result of a fortnight's study of French telegraphs as viewed from the Paris side. A more well-balanced study it has seldom been one's good fortune to hear even from the high standard of this Society. For one hour without visible effort and with a delicate choice of words and well-poised sentences the lecturer held his audience. Crtitical, kindly, sympathetic, and as those who have had similar experiences across the water can testify,it was a charitable though just appreciation of our French colleagues and their environment.

He humourously touched upon the situation created by the retention of the married woman telegraphist in the Service. She required and obtained a special duty so that Louis or Louise should not be unduly inconvenienced in the feeding line by the absence of his or her *maman* at the regulation hours. During the absence of *maman* at the office grandma or an aunt usually took charge of *bébé* but should this autocrat of the home prove too fractious then *maman* would weigh matters as against *le bureau* and would leave the latter to fend for itself. A most motherly and laudable decision so the audience seemed to think, though attended by certain official inconveniences not easily overcome in a large office, apparently unprovided with "sick-replacers."

The discussion which followed, for the most part left the lecturer alone and resolved itself into a cross-fire between members of the audience. The woman Baudot dirigeur does not seem to have proved a success in Paris, but if she were as un-tenderly dealt with by the French capital as by certain of the audience at this gathering where the sterner sex predominated, one does not wonder. She was, however, not without her champions in the knightly field, but even then one left the hall with the painful impression that like many another war warrior, the conflict over, some have forgotten already the useful part played and the duty cheerfully done during the war. One lady put the interesting question to the chairman (Mr. John Lee) as to whether he or Mr. Booker could say whether the retention of a married woman in the service and in the same office made for happiness in the home and a better comradeship between the sexes! The Controller of the C.T.O. was most emphatic in declining to reply to the question "for domestic reasons," and adroitly handed the query to the lecturer who, having no vicar, was compelled to deal with it which he did and very subtly!

The question was recently asked in connexion with international telegraphy, what was the secret of dealing with a foreign correspondent so as to obtain the best possible understanding. A knowledge of his language is undoubtedly the spring and centre, but what is to be the standard of knowledge? I dare not pose as an unquestionable authority on a matter of this description. A good grammatical grounding in the foreign tongue is of course essential (How shall we manage when we get to Czecho-Slovakia?), but this only holds good in all circumstances up to a certain point. To be understood across the wires one must endeavour to obtain something of the view-point, atmosphere and mentality of the man at the other end. Stilted French for example is useless, and we have passed that period when it was thought in certain quarters that so long as one had an English-French dictionary beside one all would be well. Fact! All I dare do is to counsel that we should endeavour to avoid mere literalisms. Let us remember that for example the word "superintendent" has little of real meaning for the foreign speaking telegraphists, and that although at the word "chef" the British mind immediately flies out to the kitchen it carries a very special atmosphere of respect when dealing with all continental offices, and "Chef de bureau" a perfect halo of reverence. Our title "Controller," I am sorry to say, more often than not connects the French telegrapher's mind with the ticket collector or preferably the check-taker at the door of his favourite theatre, while their *Inspecteur* would feel positively hurt to be confounded with our Inspector of Messengers. They probably do not know the dignity which surrounds so respected a class in this country. I am positive too that a German *Telegraphen Inspektor* would feel equally pained at the supposed resemblance, although the latter would have no difficulty in fixing "Overseer" with its close resemblance to "*Aufseher.*"

The French "*tubiste*" is recognised at once in our tube attendant, but "*bouliste*" appears to have been denied entry even to its own national dictionaries, and certainly would not be easily connected with our budding telegraphists on collecting duties. "Collector" again in the opposite direction could but bring up visions of the tax gatherer to, let us say, a Parisian. So one might continue did the patience of the reader permit and the pedantry of the writer persist.

Sir Charles Bright in October last, before the British Association at Bournemouth, referred to the congestion on the submarine cable routes throughout the world, and this statement, regarding war-time conditions, seems much inclined to remain a factor for some lengthy period. East and west, north and south, there is congestion so that a private company was driven to request the public not to send Christmas greetings. Sir Charles referred to the transportation of urgent messages by air as frequently saving time on congested cable routes, a method actually adopted between this country and the continent, weather permitting!

The main difficulty so far as Anglo-Continental cables are concerned is the fact of the indifferent condition of the land lines on the other side, a fact which specially refers to France, Belgium, and Germany. One of the main causes is of course the war which has absolutely dislocated the telegraph system of these countries.

The cables themselves could easily carry much more traffic than is the case at present and given stable land lines on the other side and a twenty-four hours' service, after the manner of our own Imperial cable and the cables of the companies, would doubtless carry twice the present amount at present possible.

Naturally more staff would be required and that on both sides of the Channel and North Sea, but the present condition of affairs gives a minimum output with a maximum of laborious labour.

It is pleasant to turn from foreign to home conditions where matters have smoothed down wonderfully and the huge machine is working with little observable friction.

In thus writing we should not of course forget that our own island has marvellously escaped the horrid ravages of war. The low-lying parts of Belgium especially have suffered alike from the enemy and from the recent continuous rains. The latter have doubtless severely tried the temporary sluices and locks so that in the surrounding lands poles have given way like ripe wheat. France, too, in her marsh-lands has not been without her troubles in this direction.

In an article extending over nearly sixty pages of the September number of *Les Annales des Postes, Télégraphes et Téléphones* our old friend, M. Montoriol, *Inspecteur des Postes et Télégraphes* deals with *Les différents systèmes de Télégraphie Rapide* from a French point of view and writes on the developments of Wheatstone, Creed, Murray, Siemens, Pollak-Virag, Rowland, Murray Multiplex, Mercadier Multiplex, the Buckingham-Barclay, the Morkrum, and naturally the Baudot to which also naturally he gives first place. It would take an entire number of this JOURNAL to deal adequately with the many interesting points upon which the author touches, and these could with much profit be discussed. One or two references will suffice to show the nature of the debateable ground laid open. For example :—" *Le multiple Murray est un Baudot destiné à fonctionner exclusivement en duplex.*" He further claims that the method of synchronising without special synchronising currents was inspired by Picard's own arrangement, that the code used is in effect the Baudot code and that the complicated mechanism necessary to give page-printing is by no means justified as not only does it *not* increase the output but actually decreases it by 7 to 8 per cent.

M. Montoriol is not very hopeful as regards duplex working, and here I quote his exact words in case I should misinterpret him by the slightest nuance :—"*Avec le réseau aérien tel qu'il existe en France, le duplex, au delà de* 400 *kilometres devient extrêmenent aléatoire, c'est-à-dire que, pour les communications de Paris, avec les grands centres, els que* Lyon, Marseille, Nice, Montpellier, Toulouse, Bordeaux, &c., *il n'y faudrait pas songer.*"

What should we say in this country if our engineers had felt compelled to make a similar announcement to the effect that duplex was unthinkable on any wire in the United Kingdom over two hundred and fifty miles in length ?

It is also interesting to note that none of the lines which fall into this category in France are to be found in the devastated areas of that country. The paper it should be added was first read before *la Société française des Électriciens* in June last.

I have been reminded that the Marconi Company was by no means first in the field with the introduction of a Welfare Superintendent, but that the Western Union Telegraph Company's staff have for a long time enjoyed the benefits to be derived by this modern adjunct to commercial effectiveness. Apologies to the latter for not being more up-to-date myself !

A small shoal of promotions swam into the C.T.O. waters last month, Mr. J. W. Fisk being promoted to Class C Superintendent ; Mr. C. J. Faunch, Class B ; Messrs. J. Kellet and W. H. Offord, Class A ; Messrs. J. Bearman, H. T. Edney, R. M. Fennings, H. E. Higgins and W. E. Jones, Assistant Superintendent, also Mr. A. W. Judd to Assistant Superintendent, " J.D." To the Overseer Class, Messrs. T. H. Brookes, G. C. Farthing, A. W. H. Hooper, J. H. Mitchell, H. W. Pendry, H. M. Robinson, A. J. Rowlands, R. Shoyer and A. G. Treby. To all congratulations. Readers will note that Mr. Pendry the author of a well-known book on the Baudot is amongst the fortunates. May this prove a good augury for the new edition of his work.

J. J. T.

LONDON TELEPHONE SERVICE NOTES.

THE first column of London Telephone Service Notes in the first volume of the "TELEGRAPH AND TELEPHONE JOURNAL" contained the words " Let London lead." London certainly gave liberal support to the JOURNAL in its early days but whether it continued to lead throughout the war period is doubtful, for it needed no microscope to recognise the drop in circulation. Now that we are again turning our activities to peace conditions we find the members of the London Telephone Service renewing their interest in the JOURNAL and London may congratulate itself that it is still leading, seeing that the circulation has doubled in the interval between the October and December issues. Several exchanges have more than doubled their previous orders while others, alas they are among the larger exchanges, have so far not intimated their need for any increased supply. Harrow Exchange tops the list in London with 100 per cent. of the staff taking copies regularly each month. The position is very gratifying and there is no reason to anticipate that it will not further improve when all the exchanges have finished their canvass.

At the meeting of the Telephone and Telegraph Society held on Nov. 25, Mr. H. Booker, of the Central Telegraph Office, read a paper entitled " Paris Telegraphs." It embraced some of the author's experiences while on an official visit to Paris and included information concerning the Paris Central Telegraph Office of considerable interest to telegraph specialists. The majority of the telephonists who went to the French capital from the London Telephone Service to operate the telephone installation provided for the Peace Conference, have now returned, and we who were not among the chosen are looking to them to write an account of their visit for the JOURNAL. Will those concerned please take this as a personal invitation to write an article and send it to the editor.

Mr. John Lee, the Controller of the Central Telegraph Office, was the author of a paper read before the December meeting of the London Telephonists' Society. The weather on the night in question was very bad, but nevertheless a large number attended curious to hear how Mr. Lee would deal with so unique a subject, " Hints to telephonists on writing poetry." Those who came were amply repaid for the effort, for Mr. Lee's versatility could hardly have been shown to greater advantage, and those who had heard him read his paper on supervision were best able to appreciate the extreme facility of his pen. Many were the questions asked beforehand as to how Mr. Lee would associate poetry with the telephonist and her craft. Needless to say he did not seriously attempt the task but kept his audience completely amused with parodies and examples of verse on such subjects as Supervisors, Superintendents of Traffic and Controllers. Of course he eulogised the telephonist and the dulcet tones she uses in the repetition of the standard telephone expressions, and he suggested that those tones were used not only to one over the telephone but to one when one was alone with one. Probably he is right. One who has filled the position of Deputy-Director of Telegraph and Telephone Traffic and Organisation should know. Perhaps he has seen the picture advertising the play " The Kiss Call." Telephony, however, is not the only craft which lends itself to the romance of life, just as it is not the only means of bridging space for the purposes of communication. Some individuals claim to achieve that end with the aid of telepathy, so we were told by a colleague in the Central Telegraph Office at a recent meeting, and others by means of telegraphy. Apparently this point occurred to a member of the audience for the following lines were found on a scrap of paper after the meeting :—

" Come unto this circuit, Maud,
For the black coat boss has flown ;
Meet me at this circuit, Maud,
I am here at the key alone.
For the woodbine spices are wafted abroad
As I key K (for Kiss) to my own."

The meeting was undoubtedly one of the most popular that the Society has held. The paper was aptly described by one as

"A paper of beautiful nonsense." When Mr. Lee favours the Society with another visit the Committee will need to cater for an extra large audience.

* * *

Socials have taken place as usual. Dalston Exchange held a dance interspersed with musical items, and Regent held its first social event of the season at St. Bride's Institute on Nov. 21, Messrs. Buckeridge and Howe officiating as M.C.s. The evening was a great success, dancing, musical items and various competitions providing amusement for all. In response to a request from the staff for a repetition of the evening a dance and social has been arranged for Jan. 16 at the Holborn Hall.

Victoria Exchange, as the result of a social evening, has contributed £20 to the Hospital Saturday Fund, and £15 to St. Dunstan's.

Park Exchange held its second sale of work in the rest room, which was transformed to such a degree for the event that we are told it was unrecognisable as a part of a Government Office. The function was opened by Mrs. W. J. White and realised the sum of £74 16s: £20 has been sent to the Hospital Saturday Fund and a similar amount to St. Dunstan's: the remainder being retained to provide a Christmas tea for poor children.

Members of the Regent Exchange staff visited Gifford House, Queen Alexandra's Hospital Home for disabled men, in November. A very enjoyable afternoon was spent. Tea was provided and musical items were well rendered by members of the staff. Another visit was made in December, when a tea and whist drive was arranged, Mr. Buckeridge acting as M.C.

The Choral Society with which the L.T.S. has for some time been threatened is now in existence and, judging from the number and enthusiasm of the members, promises to be a great success. The Society which will be known as "The Langham Choral Society" is fortunate in having Mr. Pounds as President and Mr. Hugh Marleyn as Honorary Conductor.

So great has been the response from the female staff that the Society has had, with reluctance, to close its doors to the fair sex, but there are still vacancies for male voices, and any men in the Post Office or other Government Departments who wish to join and also officers of both sexes who wish to join the Orchestra, which is being formed in conjunction with the Choral Society, will receive a hearty welcome. They are asked to send their names to Mr. E. A. Pounds, West District Traffic Office, L.T.S., G.P.O. South, E.C.4.

* * *

The month has been full of excitements in the Controller's Office—wars, promotions and rumours of promotions! One regular reader of "Red Tape" had the surprise of his life when informed by a colleague that an additional "A.C." had been appointed to the office and discovered later that the magic letters, being interpreted, referred to the genus Assistant Controller and not the genius Assistant Clerk. Anyhow, there is no member of the Traffic staff who does not join the general chorus of congratulation to the new A.C., Mr. J. F. Edmonds. The announcement of this promotion was preceded by that of Mr. P. W. Coleman's succession to the Postmastership of Hastings. Students assure us that the other outstanding date in the history of the place is 1066. Our own knowledge of dates is poor. We are technical rather than classical. Mr. Coleman takes with him to his new sphere of action (this is quite a justifiable expression in the case of a Postmaster) the heartiest goodwill of all whose lot it was to work with him in the L.T.S. These two advancements have brought in their train further promotions, and Messrs. W. B. Benham and M. C. Pink take the coveted posts of Superintendents. It has been written that there is more joy in the home of one just promoted than in the homes of ninety and nine just persons who have had no promotion! We go to press too early to name the new ornaments to the class of Assistant Superintendents of Traffic, Class I, but with the modesty for which the Traffic Branch is rightly famed it can be positively asserted that be they who they may they must be real good men.

Mr. E. Wyatt who has been an Assistant Clerk in the London Telephone Service since September, 1913, has, owing to ill-health and domestic circumstances, found it necessary to resign. He is seeking good fortune in Australia and he takes with him the hearty good wishes of his colleagues for a successful career.

A gold wrist watch was presented to Mr. Wyatt as a token of esteem and goodwill.

* * *

The following report was received by our Deputy-Contract Agent at Harringay:—"A fortnight ago two men were observed behaving in a mysterious manner outside this settlement. Suspicions were aroused and upon enquiry it was found that they were looking for a hole belonging to the Telephone Company. The interest of the natives was aroused when the men explained that they would not be surprised if a telephone was fixed the next day. Alas, they were surprised!

* * *

A Contract officer who, with commendable courtesy and accuracy, explained to a would-be subscriber how the lack of equipment was the cause of the inability to supply him with a telephone was met with the enquiry, "If it takes 12 hours to lay an egg, how long does it take to lay a telephone cable?" The Contract Officer with his customary speed replied, "Exact agreement." It is recorded that the agreement was duly forwarded.

* * *

In contrast with the attidue of some subscribers who have no good word for the Telephone Service the following extract from a subscriber's letter will be appreciated:—

"To be fair to the operators I must also cite an example of splendid work done last Sunday, Nov. 30. I was called in on Sunday to see a child choking from diphtheria—every second counted—and I am pleased to be able to report that nothing could have gone more smoothly and there was no delay—with the result that the child reached the fever hospital in good time and that his life—at any rate up to the present—has been saved."

LONDON CONTRACT STAFF RE-UNION.

THE staff of the Western District Contract Office held a "Re-union" dinner at the Boulogne restaurant, on Thursday, Nov. 20. Mr. Pegden, District Contract Agent, was in the chair, and among the visitors were Mr. Preston, Mr. Valentine, Mr. Muirhead, and Messrs. Brown, Cardrey, and Woollard, of the engineering department.

After the usual loyal toasts Mr. Pegden read a letter from Mr. Taylor, in which he expressed regret that, owing to ill-health, he would not be present and his high appreciation of the work done by the staff during the very trying times they had gone through.

Mr. Preston, in responding to the toast "The L.T.S.," extended a warm welcome to the men who had returned from military service and congratulated them on their patriotic spirit. He referred to the strenuous work done by the men who had remained at home, and remarked that an officer of the contract department had to be a diplomat of the highest order, with an abundance of tact, good humour, knowledge, and intelligence. Without these qualifications he could not perform successfully the various and difficult duties entrusted to him. Mr. Preston went on to comment upon the hostile and unfair Press campaign directed against the London Telephone Service, and stated that the department had done good work under trying conditions. Five thousand of the best telephonists had retired, their places had been difficult to fill, but notwithstanding this and other difficulties the service was infinitely better than that given in other countries during the last two years of the war. In these countries the authorities had prepared the public for a falling off in the service. Unfortunately this had not been done in London. He held the view that if the difficulties were more widely known the public would be more reasonable and sympathetic. Since January last nearly 1,000 new telephones had been added each week to the system, notwithstanding the fact that in some districts they were unfortunately unable to join up lines owing to the absence of plant. In conclusion, he said that they were determined to give London the finest telephone service in the world, that no amount of ill-natured criticism would deflect them from that purpose and that, as ability to do things lay in the disposition to do them, their aim would surely be attained. Meanwhile criticism, however unjustified, should be met with good humour and there should be no relaxation of effort to meet public demands. He thanked the company for the splendid response made to the toast.

Mr. Muirhead, in proposing the toast of the Western District Office, said that he was glad to have the opportunity, on the occasion of the first Contract Re-union since the close of hostilities, of emphasising the work done by the London Contract Staff during the war. Had those in high places had any conception of the amount of war work done by the London Contract Department, had they had any conception of the number of private branch exchange and other installations created by that department for Government offices and the various war departments—over 50,000 items in all were dealt with—Munition firms, and other subscribers engaged directly or indirectly in the prosecution of the war, had they had any conception of the enormous amount of additional work thrown on the Contract Department due to the special war arrangements in connection with surcharges, transfers, removals, alien enemies, and foreign-named applicants and subscribers, then, when recognition was given so freely to other departments for war services, the London Contract Department would nor have been overlooked. After referring to the various councils and committees who controlled their destinies—the Arbitration Committee, the Whitley National Council, the Whitley Local Council—and to those who wished to do so, he said that he would like one of their friends who controlled or criticised, to accompany him on one of his visits to a District Contract Office and gain some insight into the work done. Their friend would be amazed at the amount of work and its intricacy. He trusted that the day was not far distant when the department would realise that the recognition hitherto given to District Contract Agents and their staffs was not commensurate with the volume of work done, its importance, and its complexity.

Mr. Pegden, in reply, took the opportunity of thanking his staff for their loyalty and splendid co-operation during the past 5½ years. They had met to do honour to those who had served their country in its hour of need. They had all done their bit during the war, whether they had gone abroad or stayed at home. While our comrades had been at the front they at home had looked after the citadel; some had found time to help with munitions and other work, others had joined that "highly paid" and eminently respectable body, the Metropolitan Special Constabulary. He appreciated what had been said about the work done by the staff, which he could endorse to the full.

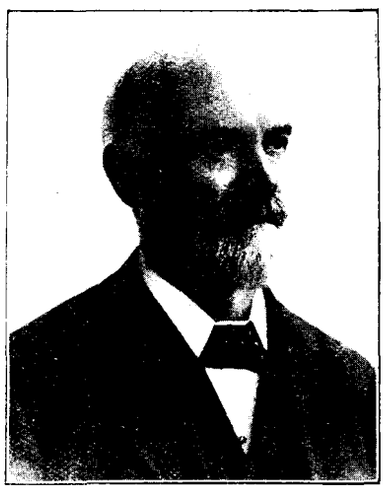
Mr. Child, in proposing "The Visitors," said that if they did not succeed at the present time in satisfying intending subscribers it was no fault of theirs. As the Controller had said their organisation was as complete as it could be, but they were hampered with the difficulty of obtaining material.

Mr. Cardrey, in reply, said that he had always met with cordial co-operation from the Western District Office, and added that, if one of the many friends refered to by Mr. Muirhead visited them, he would be glad to show him one of their new 1,000 pair cables and take him down one of their man-holes, preferably one of the deeper ones.

The toast of "The Ladies" was proposed by Mr. Bayley in a racy speech, in which he compared and contrasted the ladies of different countries, and responded to by Mr. Mackirdy, who evoked considerable amusement by saying that, although their system of instructions could hardly be more complete, he had found nothing in them which helped him in his present difficulty.

A first class musical programme, all the items of which were received with keen appreciation, was contributed by Mr. Harry Neil (piano), Messrs. Child and Horlock (baritones), Mr. Bradshaw ('cello), Mr. Swain (bass), and Mr. Ricketts (humourist), and the evening was unanimously voted a thoroughly successful one.

FIFTY YEARS OF TELEGRAPHY.



MR. THOMAS MORRIS.

To few men in Government employ is the opportunity given of actively maintaining a continuous service of half a century, and at the end emerge vigorous and agile.

This record, however, within a month or two, has been actually established by Mr. Thomas Morris, Chief Superintendent, Post Office Telegraphs, Liverpool, whose earlier retirement, at the urgent request of the Department, was deferred owing to the exigencies of war.

It is a curious coincidence that the transfer of the Telegraph Company to the State took place on the same date as the appointment of Mr. Morris as a Telegraph Clerk, viz., Feb. 5, 1870. Mr. Morris held the secretaryship of the P.T.C.A., 1881-1885, relinquishing the position on official promotion. He took the initial steps in organising the movement of 1880-81, and at his suggestion the memorable meeting was held in the Concert Hall, Lord Nelson Street, in November, 1880.

The first Conference held in the Service matured in Liverpool on Jan. 15, 1881, and the second Conference, also held in Liverpool, in July of that yea, Mr. Morris acting as Chairman at both. At the second Conference, it was decided to establish a permanent Association which was finally launched on Dec. 3, 1881. Those were anxious days for Mr. Morris, who in imagination alert, in expression coherent, and in argument sound, free from invective, was whether at work or at play, always a doughty champion.

As an appreciative tribute to Mr. Morris's popularity a large and representative body of officials and other friends, including Mr. W. M. Simpson (Postmaster Surveyor), Mr. P. R. Smart (Assistant Postmaster), and Mr. B. Cadman (Chief Superintendent), recently assembled to bid him farewell, and offer some definite tokens of their esteem in the form of a dining-room clock and autograph album, numerously signed.

In making the presentation Mr. Simpson said he regretted his personal connexion with Mr. Morris had been so limited as to preclude his enlarging upon his many reputed good qualities. They would, however, find ample elaboration by many of his old colleagues present, and who seemed so anxious to speak. He felt that he could safely identify himself with all that they said and that they would fully make good any deficiency of his.

He, however, could not take leave of Mr. Morris without saying that in losing him he was undoubtedly losing a very capable officer, and if corroborative testimony were required he had only to point to the admirable way in which the telegraph work had been handled during the unprecedented strainful war-period.

The leisure to which Mr. Morris was now going he was more than entitled to, and he hoped the closing years of his life would be fraught with peace and happiness.

The speaker then called upon Mr. N. Hoolihan to read the address contained in the Autograph Album, and which ran as follows:

"Colleagues of all ranks wish you to know how sorry they feel at your official departure.

"Your whole career, from whatever point regarded, appears to us to have been of the greatest benefit not only to your co-workers, but also to the outside public, and the Department, and in our opinion you have left behind you as splendid a record of services rendered as could possibly be accomplished in the lifetime of a single individual.

"Your appointment some few years ago to the highest post in the Liverpool Telegraph Branch, created widespread satisfaction and your efficient, sympathetic, courteous and impartial administration more than justified the appointment.

"It is the subscribers' wish that your future years be blessed with all the happiness that an honourable and usefully spent life merits; and it is in this spirit and as tokens of esteem and goodwill, that we would have you look upon the signatures inscribed in the Album."

Continuing, Mr. Hoolihan laid stress on the high quality of Mr. Morris's personal character and characteristics—his keen sense of honour, his consistency, his manliness, and the thoroughness with which he dealt with every question. Mr. Morris's fine character was built on a sound moral foundation, it never altered, never deteriorated, neither rank nor power could injure it. If their good old colleague had never risen to be a Chief Superintendent, if he had never done the great deeds he had done for the betterment of the conditions of his co-workers, he would still have been worthy of the highest honour they could bestow on him. But Liverpool, especially, and the Service generally, owed a great debt to Mr. Morris, and they would have disgraced themselves had they failed to make an effort to discharge that debt.

Messrs. J. Ball, J. E. Scott, T. D. Venables, O. G. Lee, W. G. Ollason, Misses Hannah E. Johnson and others also spoke in similar strain.

In reply, Mr. Morris (who on rising received musical honours) and was deeply affected by the warm reception given him, said:

"He was overwhelmed with gratitude for the sympathy and goodwill which had followed him through all the phases of his career and this further evidence of their continuous kindness would sweeten his retirement immeasurably."

Proceeding, he gave a long and highly interesting review of telegraph history during the last 50 years, paid a reverent tribute to his old comrades, conspicuous among whom were James Wilkinson and Henry Abbey.

He then went on to say: "The qualities shown by the 'old Guard' had made Liverpool great in the eyes of the Service, and he was proud to have been a member of such an office. The progress made in telegraphy during the period they had laboured together could only be described in the words of old Dominic Sampson, 'Prodigious.'"

He contrasted the conditions which existed at the transfer with those of the present day as regards apparatus, tariff, offices open and traffic, and continuing, said that the average weekly traffic throughout the Kingdom in 1870 did not equal that now done in the Liverpool office alone.

In detailing the staff conditions which had been immensely improved in every direction he further said that for some time after the transfer, no meal reliefs were provided, the staff took their food at the instruments and that in 1880 there were only 28 operators in Liverpool who received more than 35s. per week, while other offices were much worse off only 12 operators at Birmingham exceeding that sum.

After referring to the establishment of the P.T.C.A. in 1881 which was the first organisation of its kind in the Civil Service, and of which he was the first General Secretary, he said the time had now come for him to bid them an affectionate farewell, and continuing he said:—the break of association was to him a sad and painful one. He was an old telegraphist fast falling into the sere and yellow leaf, but yet, he hoped, possessing something of that afterglow which was wont to be associated with the kindly autumn of life, and he assured them that he would always cherish the pleasant recollections of his telegraphic career, the priceless friendships he had formed and the many happy days he had spent inside and outside the office. They had travelled together a long way and their journey had been a bright and pleasant one, and now that he had come to the parting of the ways there was a lingering reluctance to quit the scene.

Those of them who had reached an alpine summit after hours of arduous toil knew the exquisite delight they felt in surveying the world at their feet. At such a moment all the difficulties of the ascent were forgotten and they were enraptured and absorbed by the beauties of the landscape. All too soon the guides told them it was time to be moving but the impression of that crowded hour of glorious life would always remain with them. And so it was in his telegraphic career. The panorama before him then stood forth in all its radiant beauty and he would fain linger over the scene of such sweet memories. Time, however, bid him hasten on but the impression was ineffaceable and would remain to cheer him on his way as long as life should last."

The company then dispersed, Mr. Morris receiving many congratulations from officers who were prevented by official duties from being present.

THREADNEEDLE STREET AND STOCK EXCHANGE B.O. RE-UNION DINNER.

On Tuesday evening, December 9th, a most successful dinner, and one which reflected great credit on the organisers, was arranged at the Abercorn Rooms, Great Eastern Hotel, in order that a welcome home might be given to our boys who have been on active service.

The Controller of the C.T.O., Mr. John Lee, M.A., presided over the gathering, the vice-chair being ably filled by Mr. R. J. Taylor, supported by Mr. A. W Edwards (Deputy Controller), Messrs. W. J. Bond, D. M. Ford, J. G. Hopgood, S. E. Pearce, A. R. Partridge, W. G. Heritage, and others.

The dinner was served in excellent style and an unusually good musical programme followed.

The toast of the King was proposed by the Chairman and responded to most heartily, after which that of "Our returned confreres," also proposed by the Chairman, was duly honoured.

The Chairman said that in offering a welcome home to their brothers who had returned from active service they had to mourn the loss of one comrade who had made the supreme sacrifice, viz., Mr. Pat Coulter, and he asked the company to show its respectful memory by rising for a few moments in silence.

Apart from this he said it was a happy occasion on which they were assembled to welcome their brethren back. He was sure they were glad to be back. Telegraph offices were not always lovely palaces, but there were few who had had to spend our days in telegraph offices who had not in their hearts happy memories of what perhaps were not very lovely corners. He wished he could say that the Threadneedle Street building was all that they should like it to be, still he would say the the question of improving it was well in hand, and he hoped that those who had returned would find in it, as he was sure they would, the warm corner for their enthusiasm and energy which previously they had found. Their brothers had been all over the world, in East Africa, in Mesopotamia, and Salonica, in Egypt, and some of them to the wilds of the Murman coast where the snow, as he understood it, was either eighteen feet or twenty-four feet deep according to the mood of the spectator. They had obtained many fresh visions in their journeys through the world and had come back to them with views enlarged and, he dared say, with minds broadened. It was for them to be ready for them with their own minds broadened for the new vision. One of the most gratifying features of the temporary withdrawal of their brethren had been the uniformity with which they had all covered themselves with glory. They had made their colleagues proud of them in their absence, proud of the service of which they are all part, and proud also, he ventured to think, of the work to which they had returned. Telegraphy was a closer link than many perhaps had thought, and it was in the sense of the fellowship of telegraphy, above all the fellowship of the Central Telegraph Office, and in part Threadneedle Street Office, that he asked them to drink the toast of their returned brethren.

Mr. E. T. Nash responded to the toast in the course of which he excelled himself in a descriptive account of the experiences of himself and his confreres during the period of their Army service.

Special reference is due to the well-known artistes who contributed to the immense success of the entertainment which was thoroughly enjoyed by the audience, viz., Freddie Brown, Miss Bullard and Frank Bullard, Emlyn Jones, Reg. Lucas, Jim Rutt, Harry Mountain, Miss Nina Johnson, Stanley Bearne and Dick Thain.

Particularly pleasing was Mr. Frank Hudson who is always appreciated with his living Marionettes, and his quaint reference to some of the notable ocal celebrities of the office was thoroughly enjoyed, especially by those who readily identified the individuals referred to.

During the evening Mr. H. Totterdell performed a pleasant duty on behalf of the staff in asking Mr. S. E. Pearce, Assistant Superintendent, to accept tokens of appreciation of his services on his recall to the C.T.O. for duty there.

Mr. Pearce was considerably affected by the personal references to himself and in suitable terms thanked the staff for their appreciation which found expression in so pleasing a form.

Several old members of the Stock Exchange staff were present and their presence was highly appreciated judging by the warmth of welcome accorded to them.

Mr. B. T. Little, the junior demobilised man, proposed a vote of thanks to the Chairman for having kindly consented to afford them an opportunity of making his acquaintance as their Controller, and Mr. Lee having suitably responded, the gathering concluded with the hearty singing of "Auld Lang Syne."

W.G.W

DRAMA.

AT Cripplegate Institute on Dec. 8, the ladies of the Interkom Klub, gave an admirable rendering of *As You Like It*. The Interkom Klub is an association of women who are employed on the inter-communication switch, one of the principal features of the Central Telegraph Office. In their time they have performed various plays but generally in a private way. On this occasion at the instance of several of their admirers they used the Cripplegate Institute, and a large audience assembled. It was a notable performance in every way. The interpretation of the various parts was individual and thoughtful and admirably pourtrayed. All the parts were taken by the women themselves, and the make-up was exceedingly good; some of our best known friends being disguised for the moment in juvenile or in venerable masculine raiment, a disguise through which in many cases it was not easy to guess the identity of the actor. There were excellent interludes of music, and altogether we spent the happiest of evenings and left with the profoundest respect and admiration for the dramatic, literary and artistic abilities of the members of the Interkom Klub. The highest credit is due to Miss B. Luffman who acted as stage manager, and we give the complete cast below:—

CASTE—

Duke (senior), *living in banishment*	Miss Edith Hodgson
Duke Frederick, *his brother and usurper of his dominions*	Miss Kate Walters
Amiens, Jaques } *Lords attending on the banished Duke*	Miss Gertrude Mathieson / Miss Mary Tynan
Le Beau, *a courtier*	Miss Amy Hodgson
Charles, *a wrestler*	Miss Dolly Atterbury
Oliver, Orlando } *sons of Sir Rowland de Bois*	Miss Gertrude Mathieson / Miss Nellie Nicholls
Adam, Dennis } *servants to Oliver*	Miss Mabel Hodgson / Miss Florence Redding
Touchstone, *a clown*	Miss Euphrosyne Wheeler
Sir Oliver Mar-Text, *a Vicar*	Miss Dolly Atterbury
Corin, Silvius } *shepherds*	Miss Ellen Bentley / Miss Ivy Duncan
William, *a country fellow*	Miss Amy Hodgson
Lord, *in attendance on banished Duke*	Miss Dora Rainger
Rosalind, *Daughter to banished Duke*	Miss Margaret Murdoch
Celia, *daughter to Frederick*	Miss Dolly Dawe
Phebe, *a shepherdess*	Miss Amy Cutting
Audrey, *a country wench*	Miss Kathleen Stapleford

Stage Manager	Miss B. M. Luffman
Music arranged by	Miss M. T. Tynan
At the Piano	Miss M. S. Hamilton
Business Managers	Misses I. L. King and M. T. Tynan

A "WELCOME HOME" AT COVENTRY.

A dinner was held at the King's Head Hotel to welcome home, after service with H.M. Forces, men connected with the Post Office telephones attached to the District Manager's staff, Coventry.

Mr. John Mewburn, district manager, presided, being supported by the whole of his staff, except five members who were away on account of illness, etc. He expressed his pleasure in being allowed to welcome home every man who had responded to the call, and stated how grateful all were that there were no casualties. The toast, drunk with enthusiasm, was responded to by Messrs. W. H. Taylor, J. Smith, and S. J. Adkins, of the traffic, accounts, and contract sections respectively. The opportunity was taken of presenting suitable gifts to Mr. H. L. Brown on his transfer to the Leicester District Office, and Mr. E. A. Mansfield relative to his return from the Naval wireless station at Broadstairs and the Royal Air Force in Italy, gifts having been presented to the other members of the staff on different occasions. A thoroughly enjoyable concert followed.

PERSONALIA.

LONDON TELEPHONE SERVICE.

PROMOTIONS.

Mr. J. F. EDMONDS has been appointed Assistant Controller (Traffic).

Mr. P. W. COLEMAN has been appointed Postmaster, Hastings.

Messrs. W. B. BENHAM and M. C. PINK have both been appointed Superintendents (Traffic).

Messrs. O. M. T. CLARKE, A. B. WILLIS and C. E. HAYES, Assistant Clerks, have been promoted to Second Division Clerkships and have taken up their new appointments at the A.G.D.

Miss F. RICHARDS has been appointed Assistant Supervisor, Class II, at London Wall Exchange.

Miss F. HOLTHAM has been appointed Assistant Supervisor, Class II, at Dalston Exchange.

Miss G. A. BELL has been appointed Assistant Supervisor, Class II, at Trunk Exchange.

Miss G. SWINDELL has been appointed Assistant Supervisor, Class II, at City Exchange.

Miss A. P. CHAMBERS has been appointed Assistant Supervisor, Class II, at Hop Exchange.

Miss C. S. CLIST has been appointed Assistant Supervisor, Class II, at Gerrard Exchange.

Miss B. A. HOWCROFT has been appointed Assistant Supervisor, Class II, at Gerrard Exchange.

Miss N. F. PARNCUTT has been appointed Assistant Supervisor, Class II, at London Wall Exchange.

Miss M. B. IRWIN has been appointed Assistant Supervisor, Class II, at Museum Exchange.

Miss C. A. WAKELIN has been appointed Assistant Supervisor, Class II, at City Exchange.

Miss K. M. L. WILSON has been appointed Assistant Supervisor, Class II, at Holborn Exchange.

Miss M. F. LANE has been appointed Assistant Supervisor, Class II, at Museum Exchange.

Miss N. B. SWEENEY has been appointed Assistant Supervisor, Class II, at Holborn Exchange.

Miss M. J. FARRANT has been appointed Assistant Supervisor, Class II, at London Wall Exchange.

Miss G. M. HARDING has been appointed Assistant Supervisor, Class II, at Sydenham Exchange.

Miss E. A. STRUDWICK has been appointed Assistant Supervisor, Class II, at Mayfair Exchange.

Miss C. M. P. MAFFEY has been appointed Assistant Supervisor, Class II, at Trunk Exchange.

Miss H. M. HANDSCOMB has been appointed Assistant Supervisor, Class II, at Redhill Exchange.

Miss D. A. PAYNE has been appointed Assistant Supervisor, Class II, at Trunk Exchange.

Miss LANDON, Telephonist, of Harrow Exchange, has resigned.

The following resignations have taken place on account of marriage :—

Miss J. R. BLACK, Assistant Supervisor, Class II, Paddington Exchange.

Miss A. M. MAXWELL, Assistant Supervisor, Class II, Paddington Exchange.

Miss E. CLATWORTHY, Assistant Supervisor, Class II, Avenue Exchange.

Miss J. ACWORTH, Telephonist, Avenue Exchange.

Miss D. BOYLE, Telephonist, Avenue Exchange.

Miss R. HART, Telephonist, Gerrard Exchange.

Miss C. SMITH, Telephonist, Royal Arsenal.

Miss D. H. POULSON, Telephonist, Park Exchange.

Miss GOVIER, Telephonist, Croydon Exchange.

Miss D. J. COOPER, Telephonist, Victoria Exchange.

Miss TAME, Telephonist, Trunk Exchange.

Miss SIMPSON, Telephonist, Trunk Exchange.

Miss R. P. JENKINS, Telephonist, Holborn Exchange.

OBITUARY.

IT is with deep regret that we have to chronicle the decease of three former National Telephone Company worthies who have been associated with telephone development from its inception in the United Kingdom and were well known to telephone men both in London and the Provinces.

Mr. THOMAS FLETCHER or, as he was universally described by his very numerous friends, "Dear old Tommy Fletcher," was born in London in 1849. He was educated in Jersey, returning to the Capital to pursue a career as architect. In 1868, however, he entered the service of the United Kingdom Telegraph Company as an engineer but left two years later to enter the service of Henley's Telegraph Works. In 1873 by request of Sir William Thompson he assisted the latter in the development of his Siphon Recorder at the Glasgow University. About this time he was occupied with the testing of the Brazilian submarine cables at Millwall which were manufactured to the designs of Sir William and Fleming Jenkin. The succeeding year he was back at Henley's and after considerable experience with submarine cable laying found himself in the Post Office with the then Engineer-in-Chief, Mr. W. H. Preece. The latter introduced him to the Telephone Company in 1878 where he stayed through the various developments into the National Telephone Company, once more coming into the Post Office service at the transfer of 1912, retiring from the latter in 1914 having passed the usual age limit for retirement.

A fuller account of the telephone career of Mr. Fletcher, who was a man of high intellectual attainments, appeared in the *National Telephone Journal* of November, 1907.

Mr. C. G. WRIGHT.—An account of Mr. Wright's retirement on reaching the Civil Service age limit appeared in the August-September issue of this JOURNAL.

Mr. Wright passed peacefully away during a short holiday in Norwich. His death will be received with universal regret as he was very widely known and much liked by all telephone men.

After being District Manager in Glasgow for many years he was appointed Inspector of Stores premises for the National Telephone Company, and in that capacity he travelled all over the country for several years prior to the transfer in 1912.

The hope so cordially expressed last June by Mr. Allen, O.B.E., Controller of Stores, when presenting Mr. Wright with a case of cutlery, that Mr. Wright would enjoy a long and happy retirement, has unfortunately not been fulfilled.

Mr. R. H. WILLIAMS, who was formerly Chief Electrician of the National Telephone Company, Liverpool district, and since the transfer, an Assistant Engineer on the West Internal Section in London, died after a painful and prolonged illness in a London Hospital.

"Robert," as he was affectionaly called by his friends, was an unassuming man who worked loyally in succession for the Telephone Company and Post Office, and his premature death will be received with much sympathy.

Miss FLORENCE J. MINTER.—Many old friends of Miss Minter will be sorry to hear of her death which took place in the Piraeus on Dec. 8. Miss Minter was on her way to Constantinople to resume her duties with the Telephone Company of that city when she became seriously ill and had to be put ashore and taken to a hospital where she died.

Miss Minter's connexion with telephones covered a long period. From 1888 to 1899 she took charge of the exchange at Canterbury—her native city. Her health having failed, she resigned, but in 1901 she re-entered the Company's service and was promoted to the position of Interviewing Matron—a position which she held until the transfer of the National Telephone Company to the Post Office.

Miss Minter's career in the Post Office was short, for in 1913 she resigned her appointment and accepted the position of Directrice to the newly formed Constantinople Telephone Company. Her work in Constantinople was entirely of a pioneer character and she was successful in raising and training and excellent staff from the women of the country. She even succeeded in inducing Turkish women of the educated classes to emerge from their secluded lives and in the face of public opinion to enter the business world.

Miss Minter's work in the East was interrupted by the War and she and the other English members of the Company were ordered to leave Constantinople. On their journey to the frontier they were arrested and sent back to Constantinople where they were imprisoned. The Turks do not imprison their women and had no suitable prison for the English women and children who had been arrested by German orders. They were, therefore, thrown into a common prison with men of different nationalities and varying classes. Fortunately through the efforts of the American Consulate the imprisonment was short and the party was released on parole.

After many difficulties Miss Minter arrived in England, but the hardships she had undergone had impaired her health.

After a period of rest for recuperation, Miss Minter accepted a position as Woman Superintendent in the Western Union Telegraph Company who were then organising a female staff.

Miss Minter's work there was highly successful, but was again interrupted by a breakdown in health and she resigned her appointment in the Western Union Company in March 1919.

The last eight months have been spent in endeavouring to regain sufficient health and strength to face the battle of life again, and in the autumn Miss Minter felt herself sufficiently recovered to accept the offer of the Constantinople Telephone Company to resume her duties with them. She sailed in November, but apparently the rough voyage was too much for her enfeebled constitution and she died before reaching Constantinople.

Miss Minter was a woman of many gifts; she had some literary ability and in her youth wrote stories for the magazines. She had also considerable artistic talent and as a girl studied painting under the late Sidney Cooper, R.A. She possessed clear, sound business instincts combined with high principles and a love of justice which prevented her from looking upon those she supervised as mere units. Her loss will be regretted not only by her friends in Great Britain but also in Turkey, a land she loved and in which she once expressed a wish to die.

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THE

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CONTENTS.

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Photograph by Langfier.

MR. A. R. KIDNER.

MR. KIDNER, the new Assistant Secretary in charge of telephones, was born in 1879, and educated at Dulwich and St. John's College, Cambridge. He entered the Post Office in October 1902, and was Private Secretary to Sir H. Babington Smith from 1907 to 1908. He was appointed Assistant Director of the Investigation Branch in 1911, and became Principal Clerk (Home Mails Branch) in January 1913, being transferred to the Telephone Branch in March 1919.

TELEPHONE DEVELOPMENT STUDY.

By GEO. E. NICHOLLS.

It has been said that officers responsible for furnishing forecasts of Telephonic development covering a period interrupted by the war have cause to be grateful. However that may be it is clear that conclusions arrived at as the result of the work performed in the years 1912 to 1914 must be the subject of interest and criticism for many years. In these circumstances it is thought that a record of the procedure adopted in the London Telephone Area and some of the difficulties met with in carrying out the work, may be of interest to officers engaged in similar duties in other large cities.

The principal considerations in view were to facilitate:—

1. The design and lay-out of external plant.

2. The design and lay-out of internal plant in large buildings.

3. The choice of the ideal centres for the location of Telephone Exchanges.

4. The design of exchange equipment.

When the Post Office acquired the business of the National Telephone Company, on Jan. 1, 1912, the Department was faced with the difficult task of continuing the supply of service although in the greater number of areas the plant had been almost entirely absorbed. The provision of adequate additional plant to meet future requirements was necessarily the subject of serious consideration. Fifteen years was considered a reasonable period for calculation, both as regards the life of the plant and ability to forecast growth.

The London Telephone Area by reason of its wide extent and variations of wealth, presented an unique problem for telephone development study.

In the first instance it was decided to divide the London Telephone Area into three zones, namely Central, Inner and Surburban and to use maps of the following scales:—

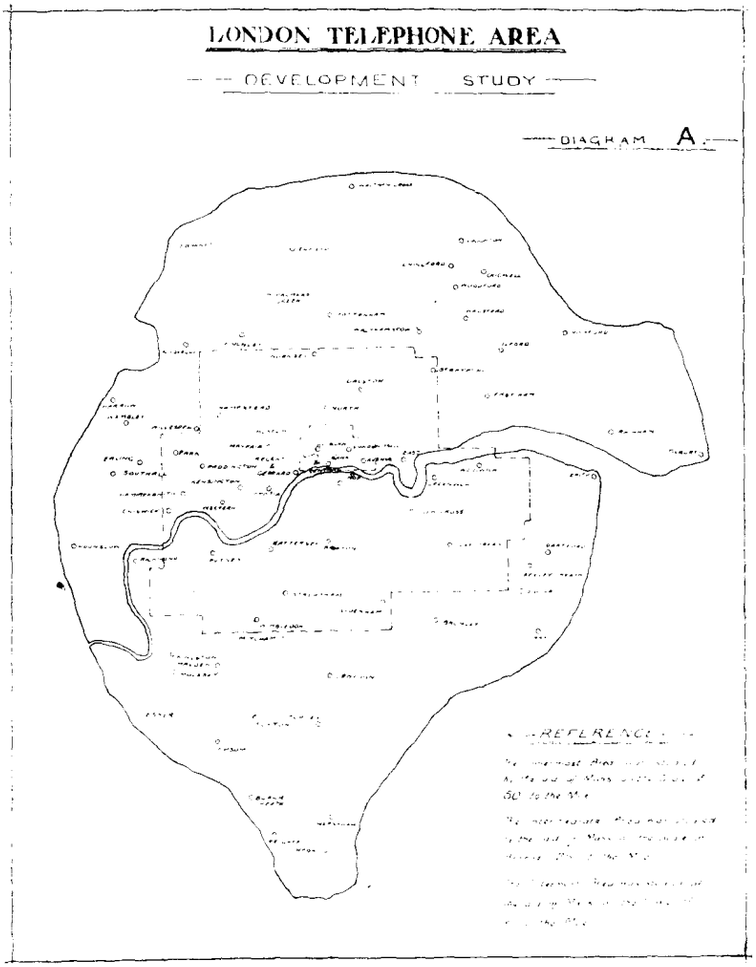
Central	... 60 in.	= 1 mile.
Inner	... 25 in.	= 1 ,,
Surburban	6 in.	= 1 ,,

See Diagram "A."

As a general rule this method proved suitable, but as is well known London is not defined by a regular circle nor equally represented by population. Many of its outer suburbs are as congested and important from a commercial standpoint as areas comprised within say a four mile radius of Charing Cross.

The following table shows the number of ordnance sheets used and the areas represented :

No. of Maps.	*Scale.*	*Area Studied.*	
		Sq. Miles.	*Acres.*
125	6 in.	$616\frac{3}{4}$ =	394,720
103	25 in.	$134\frac{1}{2}$ =	86,080
21	60 in.	$3\frac{3}{4}$ =	2,400
249		755	483,200



The total area covered exceeds that generally quoted as within the London Telephone Area, i.e., 640 square miles, because certain districts outside the boundary are served from London Exchanges and were studied in connexion therewith.

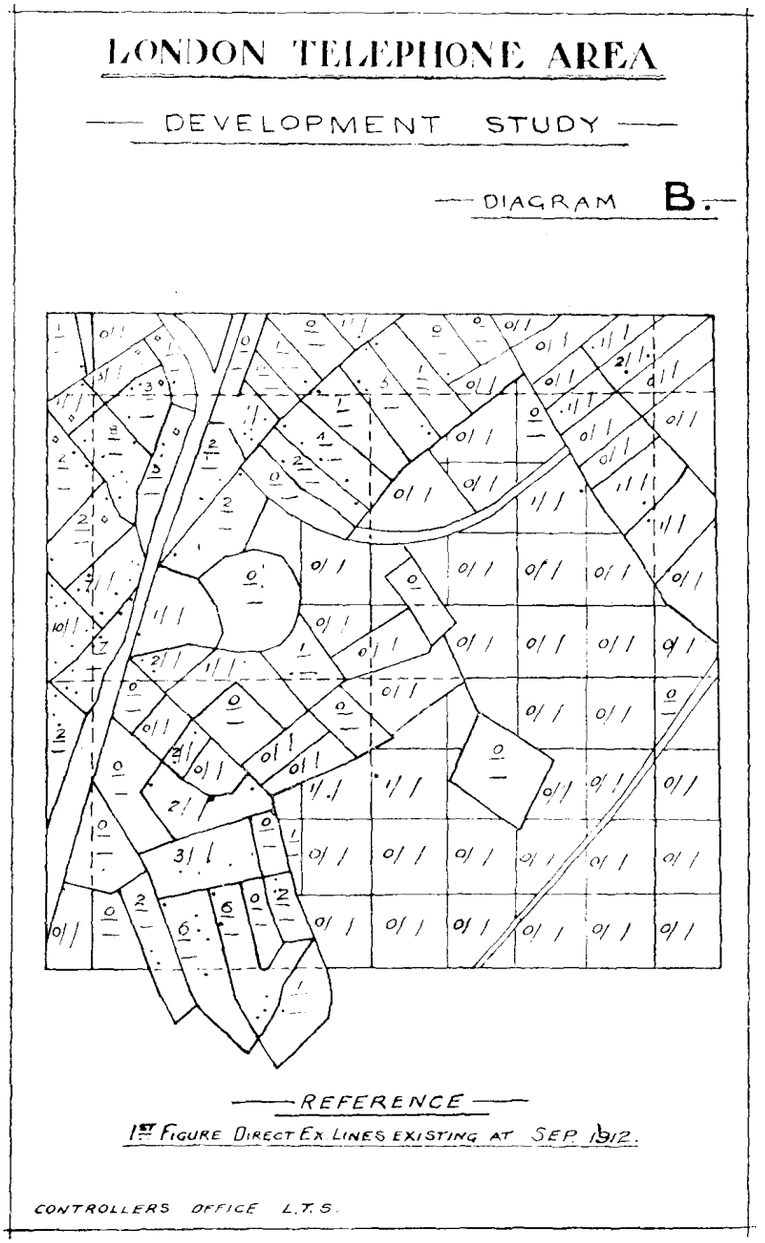
At the time the study commenced the country had experienced an abnormal period of financial and industrial prosperity and it appeared probable that, with satisfactory Treasury grants of capital, the time had arrived for a substantial increase in telephonic development.

The proposed introduction of new rates was an adverse factor against an accurate forecast based on existing rates, but it was decided to proceed on the basis of the present rates, and on the assumptions that a normal degree of canvassing would obtain in all districts and that plant restrictions would be negligible.

The method adopted for carrying out the study in the Surburban areas was very shortly as follows :

The engineers obtained government maps in duplicate and prepared "spottings" of the existing direct exchange lines. One set of maps was forwarded to the contract branch accompanied by two linen tracings ruled in suitable squares or blocks of territory. See Diagram "B."

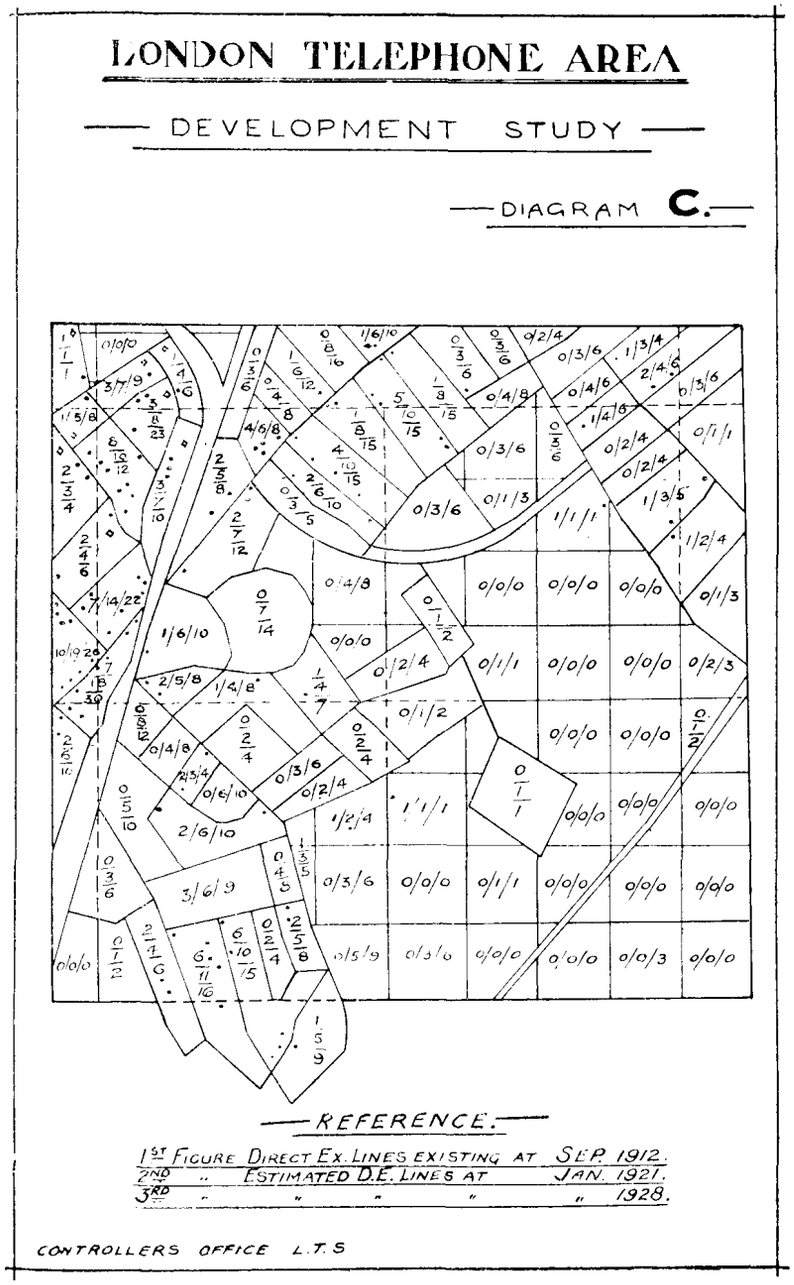
A selection of contract officers considered competent to undertake the duty of forecasting was then made. The changes which had taken place in London during the preceding fifteen years were impressed upon them in order that they might better gauge the possibilities and probabilities of the future. The period in question, namely, 1897 to 1912, covered the introduction of



nearly all the tube railways, the electrification of the former underground railways and the introduction of motor traffic. New suburbs had come into being during the period, some of which had progressed with almost unparalleled rapidity.

With these and other factors in mind the field officer commenced the review of the area allotted to him. The maps furnished by the engineers contained "spottings" of existing direct exchange lines, and the result of the survey was to be shown in the forecasted number of lines for the periods of eight and fifteen years. Numerous enquiries were necessarily made regarding possible re-building

schemes, new estates and the development of new railways, etc. Generally the land agents and promoters of various schemes were of course, optimistic as to the future, and the information obtained had necessarily to be discounted to a considerable extent. It was observed at the outset that some of the officers were inclined to anticipate a growth during the few years immediately ensuing far in excess of the ratio allowed for the second period of the forecast. It was necessary to point out that the telephonic development of any one district of London would be affected to an extent by its relation to the area as a whole, and that there was every possibility of at least as quick a rate of progress in the second period unless the point of saturation had been approached—an unlikely eventuality.



It was manifest that the location of existing lines would be desirable as a guide to the field officers and, as this could be more readily shown individually on maps relating to suburban districts the suburbs were dealt with first and the more central districts last.

The field officer was given a map and one tracing which he took to the respective ground, and filled in on the tracing his estimate of the growth in direct exchange lines for the two periods under consideration, viz., eight and fifteen years. After careful checks the approved estimates were copied on the second tracing, and furnished to the engineers. See diagram "C."

In the Central Area it was necessary to distinguish the following categories of buildings:

(1) Those of low telephonic value and so not requiring a separate forecast.

(2) Those of moderate telephonic value "calculated to require fifteen or more external circuits in the near future", and so justifying a separate cable feed.

(3) Those of high telephonic value "calculated to require seventy or more stations in the near future" and so requiring a forecast of internal as well as external circuits sufficiently detailed to enable a scheme to be prepared for wiring the building in advance.

The maps were prepared accordingly and a number of prints furnished to the contract branch. Those buildings which appeared likely to demand a special cable feed were distinctively outlined and numbered, and the remaining property was divided into suitable distributing areas. The buildings which required internal cable distribution were hatched for detailed schedules to be furnished. Diagram "D" shows a portion of territory ready for forecasting. Diagram "E" shows the schedule of the buildings specially surveyed, which accompanied the map as per diagram "D."

The first problem of importance to be considered was to try to decide if possible a basis or unit value for a prospective subscriber. The American practice, which is to use the rental value of the premises as the prime factor and to tabulate the records for every street showing the tenants, class of business, floor space occupied, etc., could not be readily adopted in London owing to the different values of districts and the vast area in respect of which calculations were urgently required.

It was found, too, that a large percentage of businesses and residences which, to all appearance should have the service, were indifferent to the necessity and the ideal state of telephonic development proved to be more distant than a reasonably accelerated growth could attain within the period of the study. In the circumstances it was decided, after careful consideration to rely upon the judgment of each officer.

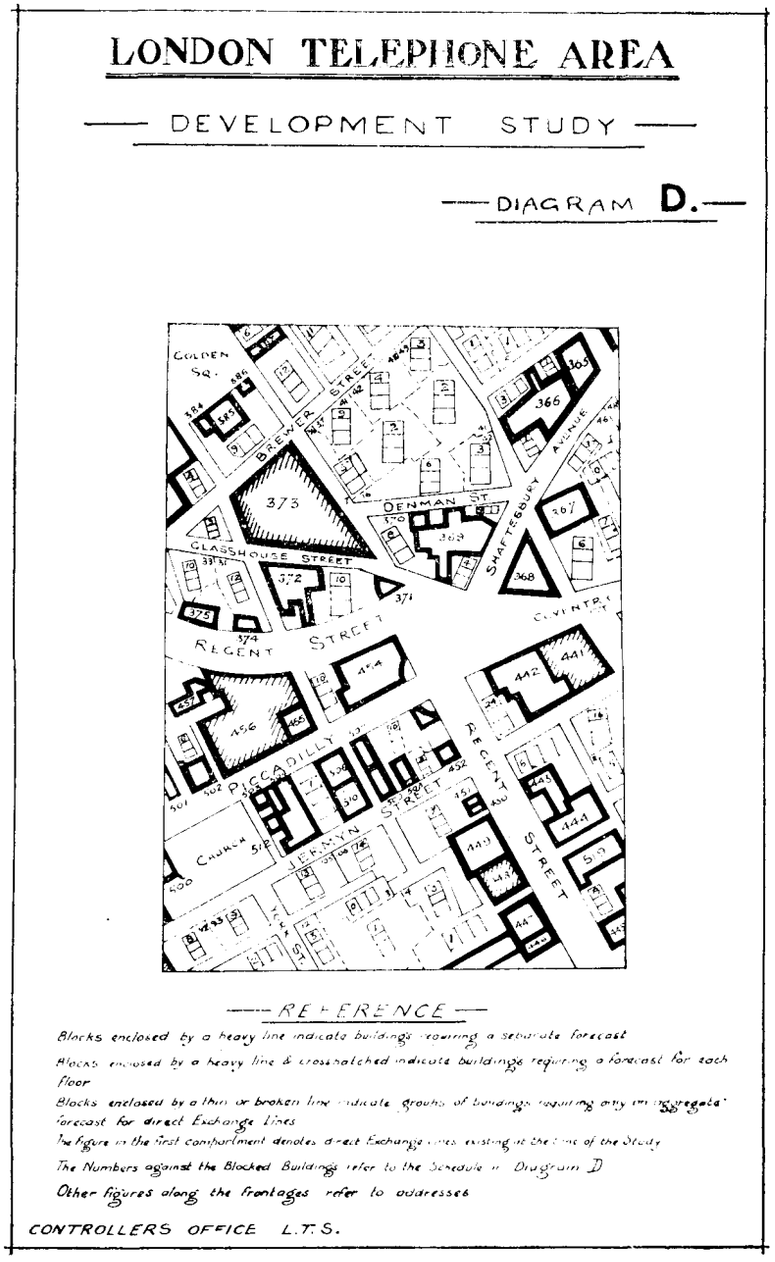
The map of London and its environs shows that building has generally followed the main railway lines and that considerable tracts of land in the suburbs still await full development owing to comparatively restricted means of locomotion. In order to arrive at the potential values of land which might be reasonably expected to be utilised for building purposes during the period covered by the study, the method of dividing the maps into squares was adopted as a basis. In the central districts this procedure was departed from, however, by outlining blocks of property suitable to be served by separate cable feeds. The squares had primarily half mile sides, that is, an area of a quarter square mile. If some portion of the territory already gave signs of development the divisions were reduced to 1/64 square mile, namely, a portion of territory measuring 220 yards each way, in other terms 10 acres.

One of the chief purposes of the study being to facilitate the systematic provision of all external plant, a calculation had to be made not only in respect of direct exchange lines but of miscellaneous lines, such as private lines, external extensions, news distributing lines, fire alarm lines, ringing and power leads. There is a considerable demand for such circuits in the Central Area, and future growth could only be gauged by a precise record of the existing circuits and their location. As the engineers' records did not permit of this information being readily furnished it was decided to estimate for direct exchange lines only, except in those cases where buildings were singled out for an independent cable feed as referred to hereafter.

A percentage could then be added to the cable capacity to provide for miscellaneous circuits based partly on data furnished in respect of block buildings and partly on information obtained

locally. The figures in respect of exchange lines were of course, shown separately in order to estimate for exchange equipment.

Information obtained relative to population and rateable values with a view to comparing the growths under these heads with the anticipated telephonic development, proved of little value. In the city the resident population was negligible, and the change in rateable value had no relation to the probable increase in telephone service. In the Inner zone a decline in population coincided in some instances with an increase in rateable value, presumably because of changes from residential to business property, while in the Outer suburbs there were exceptional developments to contend with, such as that experienced at Golders Green, Palmers Green, Ilford, Purley, etc. It would be rash to anticipate other new suburbs until their advent can be seen and the phenomenal



differences in social grades found within a few yards, makes a forecast based on a population factor an impossible one in London. Apart from these considerations it is almost invariably the case that an exchange area covers the areas or portions of the area of several municipal councils, and it frequently happens that a portion of a municipal area included in an exchange area furnishes rateable and other values appreciably different from those of the municipal area taken as a whole.

Some difficulty was found in limiting the forecast to reasonable figures in respect of the Exchange areas as a whole. For instance, a terrace of say, twenty houses would be shown as possessing subscribers equivalent to 30 per cent. of the total number of occupiers and with reasonable possibilities of increasing to say, 60 per cent. within fifteen years. Another adjacent terrace of equal rental value would be shown to have only one line or perhaps none at all. It was seen that to forecast 60 per cent. development for all property of such value would create a growth curve out of proportion to any known ratio.

The difference in value for telephonic purposes between certain districts was remarkable. For instance a terrace of thirty-two houses in a particular suburb which were rented at the small amount of £36 per annum, was specially canvassed in order to see if an

CENTRE EXTERNAL SECTION.

Diagram E.

Ordnance Sheet No. LXI.

List of Buildings to be Specially Surveyed.

Sch. No. Address.	No. of Direct Exchange Lines. Existing.	Anticipated in 8 years' time.	Anticipated in 15 years' time.	Misc. Circuits, viz., Ext. Extens. Private Lines, &c. Ext.	Mc.	Ext.	Mc.	Remarks.
365 Apollo Theatre 31 Shaftesbury Av.	1							
366 Lyric Theatre 29, Shaftesbury Av.	1							
367 Trocadero Res. & 24, Shaftesbury Av.	7							
368 The Pavilion M.H. Piccadilly Circus	9							
369 Cafe Monico, Shaftesbury Av.	2							
369A. Piccadilly Mans. 17, Shaftesbury Av.	16							
370 Coventry Club 20, Denman St.	11							
371. County Fire Office. 50, Regent St.	1							
372 Cafe Royal, 68, Regent St.	5							
373 Regent Palace Hotel Sherwood Brewer, Air & Glasshouse Sts.	25							
373A & 9, Sherwood St.	15							
374 C. Packer & Co., 76 78, Regent St.	2							

underground scheme were justified and the result produced promises for four orders within the first year and several possible orders in prospect. This instance indicates the value of canvassing, although it is not suggested that similar results would be obtained generally. It is clear, however, that unless the forecast for such property is a liberal one the distribution of external plant might not be effective. This difficulty is a general one and is referred to later in its more acute form in respect of the City area.

It has been proved that the forecast of a section of a district does, in some cases, aggregate a higher total of lines than the district as a whole will normally produce, and must not be accepted as the only guide in determining the provision of Exchange equipment.

Two districts appear to emphasise particularly this point, namely, Woolwich and Purley. The former district is almost entirely working class and the tradespeople scattered all over the area, as well as such houses as would be utilised by army officers, had to be provided for in the forecast. The total calculation made on this basis proved to be three times the rate of growth experienced during the preceding ten years. In the case of Purley, almost every house is of such rental value as to warrant a telephone, but it is difficult to imagine an outer suburb attaining such development within the period under consideration. It is true that many roads in South Kensington and Hampstead can be quoted as having reached the ideal of having a line for every house, but the conditions are incomparable with that of Purley.

Consideration of the outer suburbs was influenced mainly by

(1) Means of access to the City.

(2) Social status.

(3) Availability of suitable areas for new residental estates.

One of the important considerations in the study was to determine the value to be placed on undeveloped land. At the time of enquiry the building trade generally was at a very low ebb of activity; but evidence pointed everywhere round London to considerable progress having been made during the preceding fifteen years, and many portions of territory less inviting than those now available for building purposes had been covered by estates of considerable telephonic value. This led to a consideration of the development on an acreage basis in respect of territory which it was thought would be built upon on the assumption that some average factor could be applied derived from forecasts furnished for the surrounding district. It was, however, rarely possible in London to define an easily measurable territory containing one class of property. Although houses below a certain rental are of little value telephonically, a large number of such houses can be provided in a small area, consequently, merely because of the large number of houses the district assumes value from a telephonic point of view; on the other hand there was a risk of one road showing an exceptional demand for which adequate provision may not be allowed. It might be considered desirable for future studies to be based on possibilities instead of probabilities, and for plant to be designed capable of the required elasticity without an undue capital expenditure in the first instance. A calculation on this basis would necessarily have to show the gradations in value of the possibilities, in order that the plant might be provided in those centres where the forecast would more certainly be reached.

In dealing with the inner suburbs it was still possible to apply an acreage factor having regard to the "tone" of the district and the proportion of business houses to residences. The maps in these territories were on the 25-inch to the mile scale and consequently led to a closer examination of each block of property than conditions permitted in the outer suburbs. Endeavour was made to average the forecast where it was seen that a considerable number of houses were of a similar type; but special care had to be exercised to provide for factories which in many cases were found hidden away in places so chosen to be within easy distance of the employees. The variable number of existing lines in proportion to businesses and residents of apparently similar standing emphasised in a marked manner the possibilities in the future growth of the services. It might be thought that the inner belt of suburbs where residential property is generally depreciating did not contain any special features for consideration. Many city firms are however providing warehouses and factories in these districts, a circumstance which will affect telephonic growth.

The improvement of railway facilities is almost invariably the chief factor in the development of suburban districts, but in central London where railway facilities abound the principal factor is the mode of living. In the neighbourhoods of Kensington, Maida Vale, and part of Hampstead, many of the larger houses which in the Victorian era were occupied by single households, are sub-divided into two, four or five flats or maisonnettes. As the districts concerned continue to maintain the distinction which association has given them the value of the property cannot be said to depreciate, and telephonically is increasing. Another important consideration is the replacement of buildings due to the expiration of leases or other causes. It is frequently the case that the anticipated demand for lines at a given point, increases ten and twenty fold by the erection of a block of flats in place of lesser value property.

In view of the probable introduction of new tariff rates it was thought desirable to adopt some method of coding the squares and blocks so as to show the telephonic percentage value of the property. The method adopted, however, was discarded partly because new building developments in any portion of the square or block altered the value at any time.

The study of Central London, that is, the portion bounded on the West and East by Paddington and East Exchanges respectively, presented different problems.

The study resolved itself into a study of blocks of buildings, the forecast in each case being required to determine two special purposes:

1. The cable feed into each building.

2. The internal cable lay-out.

In calculating the external cable feed the figures for a group of buildings forming one block would be totalled and furnished to the engineers. The estimated number of exchange and miscellaneous circuits for each building was first obtained, but in addition the engineers required information as to the probable internal distribution of the circuits, and this involved a calculation of the circuits between the various floors. The extent of different subscribers' installations is, of course, variable, and none of the department's records indicated on which floor of a building apparatus was fitted. In these circumstances it became necessary for an examination to be made of all the larger buildings to ascertain the location of existing installations and to forecast the probable extension, and for this purpose field officers were employed, the information being given in tabular form.

See samples attached marked "F" and "G."

The approximate number of buildings so treated at the outset was 4,300.

Of the buildings specially referred to there were about 450 which required internal distribution. In many of these buildings

SUMMARY. Diagram G.

Field Officer ... Address ...

Block No. ...

Map ... Exchange Area ...

Floor.	Present Development				Anticipated Development. In 8 Years.				In 15 Years.				Additional pairs for flexibility.
	A	B	C	D	A	B	C	D	A	B	C	D	
Basement													
Ground Floor													
First Floor													
Second Floor													
Third Floor													
Fourth Floor													
Fifth Floor													
Sixth Floor													
Totals													

Diagram F.

Field Officer ..... **Map** ..... **Address** .....

Date Study Commenced ..... **Block Number** .....

Date Study Completed ..... **Class of Block** ..... **Exchange Area** .....

Floor	Name of Tenant.	Business or Profession.	Number of Rooms.	Index Letter on Floor Plans.	Existing Telephone Facilities.				Anticipated Development in							
					Direct Exchange Lines.	Miscellaneous External Circuits.	Internal Extensions.		8 years.				15 years.			
							From Floor to Floor.	On same Floor.								
					A	B	C	D	A	B	C	D	A	B	C	D

it was found that the floors, etc., were constructed of ferro-concrete or other material which would render the provision of additional circuits a very expensive item if adequate cable runs were not arranged in the first instance.

In the City area existing buildings are frequently replaced by taller buildings which have a higher potential for telephone service, and experience has shown that the number of circuits in buildings of some years' standing cannot be taken as a safe guide to the demands of newly erected buildings of a similar grade.

With a view to exercising a check on the forecast, endeavours were made to find an average value by classifying buildings on the basis of floor space and similarity of business. This, however, proved ineffectual. Individual subscribers were found to rent abnormal installations regardless of accommodation, while adjacent large buildings tenanted by one firm—perhaps a bank—rented one or two circuits only. It was difficult therefore to anticipate an equal demand for services at any future date, either in regard to space occupied or in relation to the industry of the tenants.

In order to meet this difficulty, the ideal method would be to have the major part of the cable serving a street accessible from each building; but such a system would create many serious disadvantages from an engineering and maintenance standpoint. In these circumstances it was considered necessary to rely on the forecast given for each separate building.

The checking operations consequently occupied more time than was anticipated. The particulars furnished in respect of existing installations were of course readily available for comparison purposes.

The following were among the results obtained:—

In sixteen buildings on the South side of Old Broad Street the number of existing external circuits per 1,000 square feet of floor space ranged from ·1 to 3.

In twenty-five buildings North of Lothbury, the number ranged from ·1 to 6 per 1,000 square feet.

In twenty-five buildings between Leadenhall Street and Fenchurch Street, the variation was from ·2 to 2·6 per 1,000 square feet.

Twenty-five banking firms in the City rented an average of ten external circuits with a range from 1 to 34.

Twenty-five insurance offices rented an average of four external circuits with a range from 1 to 23.

Given a knowledge of the existing installation and the accommodation in the possession of a firm, it became feasible to give a shrewd forecast of the future requirements in most cases; but there were exceptions, as for instance, a building near Liverpool Street Station, situated between a Butcher's shop and an eating-house, and occupied in the basement, ground and first floors by Lyons' tea rooms, was found to contain 41 exchange lines, 35 of which were divided amongst thirteen turf accountants.

In the East End lines were found to exist in the meanest looking streets. They were probably rented by working tailors at the expense of their employers, but it was impossible to say that the maximum demand had been reached. In the district known as China Town, near the Docks, the foreign sleeping-houses were connected with the Exchange system in order to receive quick warning of the probable arrival of visitors at any hour of the day or night at which a ship was berthed.

One feature of interest in the West End was the development of residental flats. Generally upwards of 50 per cent. of those commanding a rental say of more than £100 per annum were found to be connected, and it was reasonably anticipated that the whole would be connected within the period of the forecast. There were, however, a very large number of flats in the North-West district in respect of which it was difficult to form an estimate. The rentals ranged mostly from £50 to £150 per annum and there were numerous blocks containing 20 to 150 flats. The number of existing lines was found to be slight, but probably the majority of the residents will become users of the service in a few years. If allowance is made for additional blocks to be erected it is conceivable that the forecast will need considerable amendment in that part of the area.

On the completion of the wiring of one or two city buildings in the early stages of the study the immediate demands from certain incoming tenants exceeded the forecast of the respective floors, owing to the exceptional nature of their business. This revealed the necessity of affording some means of transferring circuits from one floor to another, so as to make full use of the total plant allowed for the building. Usually all floor to floor extensions and 25 per cent. of the external circuits in the cable feed for each building are intercepted at the main distributing frame so as to be interchangeable between the various floors. Where one floor demands more circuits than the number forecasted, additional circuits must be provided to each floor to carry them, and in many cases such an increase of the installation indicates a possible demand for additional floor to floor extensions.

It will be seen that the estimate for internal circuits is dependent for its accuracy on a knowledge of the intended positions for subscribers' switchboards. In the absence of that knowledge some provision over and above the forecast is necessary for flexibility purposes. It may be possible to standardise the extent to which flexibility is economical.

The provision of power leads is economical in large areas where installations are numerous, the number of circuits required for the purpose being dependent on the number of stations connected to subscribers' switchboards and the route distance from the exchange. In these circumstances the calculation is left to the engineer, but provision must also be made in the allowance for internal circuits of buildings.

In buildings where the walls dividing wings are impenetrable and tenants rent suites in two or more wings, the extension circuits are generally run via the main distributing frame situated in the basement, and therefore utilise a lead in the riser cable of each wing, and this had to be provided for as far as possible.

On completion of the forecast for an Exchange area, the results were summarised and reviewed in relation to the past growth and available Exchange accommodation. Comparison with the past growth not infrequently led to further investigation of the forecast and occasionally revealed important considerations not apparent in the preliminary survey. For instance, the subdivision of West End houses is in many cases concealed to the ordinary observer, or a single street may retain its "tone" with individual tenancies, although in the same neighbourhood as subdivided houses.

Where it is shown that the existing Exchanges serving a district will be unable to meet the anticipated development there are two or three methods of providing relief.

(1) By building a new Exchange in the same premises as the existing Exchange, if the latter Exchange serves a particularly congested area.

(2) By building a new Exchange in the position calculated to afford the best relief to two or more adjacent Exchanges.

(3) By amending the Exchange areas to take advantage of spare accommodation on Exchanges outside the group showing congestion.

The method first mentioned has been adopted in Central London, at Central and Gerrard.

In considering the advantages of adopting the alternative methods 2 and 3, close investigation is necessary to determine the economical effect on each Exchange concerned. Special care is required to keep the Exchange within reasonable distance of its own theoretical centre and to provide at the earliest date working routes conforming with the ultimate lay-out of the plant on economical lines.

In this connexion the case of the proposed Sloane Exchange may be cited. The group of Exchanges—Victoria, Kensington and Western—was concerned. It was seen that if the new Western Exchange were provided and the equipment at Kensington and Victoria increased in each case to its full capacity, the growth of the combined districts could be met for many years, but in order to secure equalisation of growth it would be necessary to amend the respective areas to such an extent that the Western Exchange area would actually include the Kensington premises. It was clear that the existing lay-out of plant could only be effectively utilised by the introduction of a new Exchange between Victoria and Kensington.

The third method, namely, to take advantage of spare accommodation on Exchanges outside the group leads generally to transfer of subscribers' circuits to an extent which outweighs the advantage of the arrangement. The proposals must also be carried out with due regard to commercial and social interests, so as to avoid a division of territory between two Exchanges which would lose its value because of the increased junction requirements.

Generally the Development study serves the purpose of furnishing the necessary data for the provision of plant, but the information obtained should prove valuable to the commercial branch in the control of canvassing, with a view to advantageous utilisation of the plant. If adequate return is to be obtained on capital outlay, plant should be made revenue-earning at the earliest possible date after its provision. Success in this respect is generally dependent on the canvassing energy expended, and districts which attain a high degree of development are probably readily susceptible to canvassing influences. In these circumstances forecast figures may be reached if not exceeded before the plant in other districts has been justified. Presuming that plant will be provided on a development study and based, to a certain extent, on possibilities, considerable publicity will be occasionally necessary to secure the desired results. To ensure the creation of a demand corresponding to the forecast it will be necessary to keep records of the growth in every area. These records will show at the same time whether additions to the plant provided as the result of the forecast are necessary.

THE FAREWELL TO SIR ANDREW OGILVIE AND MR. LEONARD HORNE.

A LARGE gathering assembled in the deputation room of the General Post Office on Dec. 22 to say good bye to Sir Andrew Ogilvie, K.B.E., C.B. (Joint Second Secretary), and Mr. L. T. Horne, C.B.E. (Assistant Secretary in charge of telephones). We have pleasure in printing in full the speeches of the Assistant Postmaster-General and the two retiring officers on this occasion.

MR. PIKE PEASE said:

Ladies and Gentlemen, It has fallen to my lot this evening to perform this task, which is a sad one, as I am sorry to say that the Postmaster General is not able to be here to-day owing to illness. He has written me a letter saying how sorry he is not to have the opportunity of being here to-night and to express his regret that Sir Andrew Ogilvie and Mr. Horne are leaving the service of the Post Office. I have had the opportunity of meeting Sir Andrew many times during the war, and have admired his splendid faith in his country, exhibited on all occasions. There are two kinds of faith, the one which knows about the danger and the other, the blind faith, which believes that this country could never be beaten under any circumstances. If Sir Andrew had the opportunity of expressing on paper all he knows with regard to the War and the great part which the Post Office played he could contribute a page in our national history which would be very interesting, and perhaps now he has more leisure he may have the opportunity of placing on record a statement of the greatest possible interest. I will read a letter which has been received by Mr. Hare, from the Chairman of the District Manager's Committee:

"Yesterday, I learned, incidentally, that Sir Andrew Ogilvie and Mr. Horne are retiring at the end of the year and that there is to be a meeting in London to-morrow to bid them good-bye.

The happenings of the last five years have not permitted the telephone men in the Provinces to see much of either of them, but in conversation with my colleagues from time to time I have always heard Sir Andrew and Mr. Horne referred to in most kindly fashion and in terms of regard and esteem.

I am sure the District Managers would not like to have the occasion pass without an expression of their appreciation and of their wish that Sir Andrew and Mr. Horne may have good health to enjoy many years of freedom from official cares. If you have an opportunity I wish you would convey the sense of this letter to them."

As some of you may be unacquainted with the actual record of Sir Andrew and Mr. Horne I should just like to make a few remarks with regard to their great records. Sir Andrew entered the Secretary's Office in 1881 and served in the Telegraph Branch until 1888. He joined the Post Office Rifles in 1882 and served to 1905 in various ranks from Second Lieutenant to Lieutenant-Colonel. I am sure that his work has been an inspiration to the Post Office Rifles and I know well that he has made very many friends among them. He has always taken a great interest in everything affecting their interest and especially when they went to France. He acted as Personal Assistant to the Financial Secretary of the Post Office from 1888 to 1891. Many of you were only just born about that time (Laughter). He was one of the founders of the *St. Martin's le Grand Magazine* with Mr. E. Bennett and the late Mr. F. J. Beckley. He has had the fortune—or misfortune—to be Private Secretary to the following Postmasters-General:—Mr. Raikes 1891; Sir James Ferguson 1891-2; Mr. Arnold Morley 1892-5; and finally to the Duke of Norfolk.

He was specially selected to take charge of the Telephone Branch in the Secretary's Office in 1899 and took a leading part in the negotiations

resulting in the acquisition of the National Telephone Company's system. I remember very well the debates in the House of Commons at that time. I am sure that a great deal of work was required. He afterwards supervised the re-arrangement and improvement of the service. The work was strenuous, calling for the exercise of high administrative skill, and the success which attended his efforts forms a lasting tribute to his ability, and I am sure the way in which it was carried out was due to the characteristic energy which he always displayed. Sir Andrew became Assistant Secretary in 1907; Third Secretary in 1911 and Second Secretary in 1914.

He was appointed Director of Army Signals (Home Defence) in 1913, and at the outbreak of war became responsible for the organisation of the extensive system of Telegraphs and Telephones required for Military purposes in the United Kingdom. He was also responsible for the supply of the enormous quantities of telegraph and telephone line material and cables sent to the Armies in the various theatres of war. I do not know whether I mentioned it, but when I was in France at the end of the War at one of the Headquarters there were no less than 7,000 or 8,000 telegraph and telephone messages on the day I was there, and I should think very few people in this country, if they were asked the number of messages received on a particular day would have thought it could be more than 300 or 400. I should also like to say that Sir Andrew was for some time in France, and, as a result of his efforts, a great improvement was effected in the Signal arrangements at the Front. The duties were very exacting, and there is no doubt that the thoroughness he showed led to such splendid results. As far as the Signal equipment of our Armies was concerned it would compare with any Army in the history of the world and this has been due to the splendid administration which was shown by those responsible for the Post Office service. We have all had an opportunity of congratulating him on his knighthood, and I am sure we hope that he will live long to enjoy that honour. The Post Office was his first love but I suppose now that he has more time to think of other things (laughter) I will leave it with you.

I will now say a word with regard to Mr. Horne, whom we are all very sorry indeed to lose. We sympathise very deeply with him on account of Mrs. Horne's illness. Mr. Horne's great efficiency is recognised by the P.M.G. and all who have come in contact with him.

May I say a few words about Mr. Horne's record which, as everyone knows, is a very creditable one. Mr. Horne, C.B.E., joined the Secretary's Office, Post Office, in 1883. He first served in the Foreign and Colonial Branch and for a considerable time was engaged on the organisation of the Foreign and Colonial Parcel Posts under Mr. F. E. Baines and Mr. Buxton Forman. He prepared the many Agreements which it was necessary to make with Foreign Administrations on the subject, and the way in which this work was carried out gave an early indication of the great ability he possessed.

He was Private Secretary to Sir George Murray during his Secretaryship of the Post Office. He joined the Telephone Branch, Secretary's Office in 1905 and became Assistant Secretary in 1911. In this Branch he took part with Sir Andrew Ogilvie in the negotiations for the acquisition of the system of the National Telephone Company and, after the transfer, in the measures taken for the improvement of the service. He was appointed Chairman of a Committee charged with the organisation of the staff arrangements in connection with the transfer, and you can imagine that that was one of the most difficult tasks that could have been allotted to anyone responsible for the service and those who knew the position in reference to the National Telephone Company's sytem at that time will realise that it required very delicate judgment and also great activity to overcome the difficulties.

In 1917 his services were placed at the disposal of the Ministry of Pensions I am glad to know that he prefers the Post Office to the Ministry of Pensions. To-day we all recognise this, in the light more of a very sad occasion because we are losing two of those who are very much appreciated in the Post Office; men who have made innumerable friends and probably no enemies in whatever sphere they have been placed. May I be allowed to express to them the affection we feel for them, and a wish that they may enjoy prosperity, and also happy memories of the Post Office in their future lives.

SIR ANDREW OGILVIE said:

Mr. Pike Pease, Ladies and Gentlemen. I must thank you most heartily for the kind words which Mr. Pike Pease has been good enough to say about my services, and for the very kind and hearty reception you have given to his expression of good wishes on my departure. If there is anything that could soften the painful occasion it is, I think, to feel that one leaves with the goodwill of those with whom one has worked for so many years, and I feel very grateful to you for asking me here to day to receive a share of this kind reception which is also to show your appreciation of Mr. Horne's service. It is a painful thing to feel that one's main work in life has come to an end. That is an aspect which certainly strikes one. It also seems to strike other people a good deal. But personally I must confess that I hope still to have some limited sources of enjoyment left (laughter), and I hope still to be of a little use in certain directions, sufficient perhaps to justify one's existence for a few years longer. One always takes a sanguine view of one's own affairs. As far as the Post Office is concerned I hope to keep in touch for a time with one of the Committees now sitting, and so shall have the pleasure of seeing you again from time to time and perhaps I may be of some assistance, though I know that Professors of Ancient History have only a limited sphere of usefulness.

As regards outside occupations I have had various suggestions made to me. The only thing certain is that I shall not have time to do them all. I hope at any rate to keep in touch with the Post Office Societies, Journals and Magazines in which I have always been interested. Mr. Pike Pease referred to the fact that I had been associated with *St. Martin's-le-Grand Magazine*. That is a very pleasant recollection to me, but I am afraid that I left most of the work to one of my partners Mr. Bennett, who has edited the Magazine with so much charm and efficiency, but who is, I am sorry to say, following my own example at the end of this month. All reader of *St. Martin's-le-Grand Magazine* and all his colleagues will be very sorry to hear this. I certainly shall keep in view the hints which Mr. Pike Pease has given. I may perhaps indulge in writing my official reminiscences in *St. Martin's-le-Grand Magazine*, but if I do I promise not to use any bad language, and in speaking of my late colleagues I will not call on the Postmaster General to "sack the lot." (Laughter.)

I do not know really that one can say much when one looks back on one's career. Things seem to have gone on from time to time in such a matter of fact way that no striking impressions remain although one realises that great changes have occurred. But one's ordinary work somehow or other leaves little mark, and one feels more or less one's words have been written in running water. However, I suppose one may feel that during the years the Post Office has been trying to learn its business of conducting the telegraph and telephone services one has helped a little to clear up some of the difficulties and tangles that arose in those early times, but one cannot help feeling, too, that there is very little to show for it at present. I hope, however, for a much better and more effective future in those services in time to come, and I look with confidence to the men who are in responsible position in the Secretary's Office now many of whom are comparatively young, and full of energy and ideas to make them fully efficient. The times are more favourable now. We have Parliamentary chiefs who are very anxious to facilitate and improve the working of our service. We have a young and energetic Secretary, and I am very glad to say that he is showing a keen and personal interest in the practical side of the services of the Post Office and is not devoting himself entirely to the staff side like many of his predecessors. This is very hopeful for the Telegraph and Telephone Services and I can only say, in thanking you all for this very kind reception, that I shall look forward with keen interest to their prosperity in days to come.

MR. HORNE said:

Mr. Pike Pease, Ladies and Gentlemen. I, too, wish to thank you very heartily and very simply for the kind words which have been said both publicly and privately on my leaving the Post Office service. It is a great wrench, but it is a wrench which has to come to everybody sooner or later, and I rather congratulate myself that it happens to come at the same time as it comes to Sir Andrew Ogilvie, because certainly I should not know the telephone side of the Post Office without him. I consider that I have had a really good time in the service, and people have always been extremely good and kind to me from those early days when I learned the business under Mr. Baines and Mr. Buxton Forman. I learned from Mr. Baines that the great thing about the Post Office Service was to get things done even though they might not be done in the best style and with the greatest accuracy. Then I learned from Mr. Buxton Forman that you must cultivate style and accuracy. Those who served in the F. & C. Branch in those days will know that I had very good training. And then I had experience in higher administration under Sir George Murray and Sir Henry Babington-Smith, both of whom were considerate to me. I always consider that one of the best strokes I did for the Post Office was when I recommended Mr. Raven as Private Secretary to Mr. Babington Smith. Then came the long association with telephones and Sir Andrew Ogilvie, and I have always said to people that I thought I had the nicest post in the Post Office, because Sir Andrew took the responsibility and the Branch took the work. I very soon found that, as I told Mr. Beckley long ago the Head of a Branch in the Post Office is not a sort of Commander of a ship whom you see in a uniform on the ship's bridge doing conspicuous things with levers and speaking-tubes, but he rather resembles the man you see in the bowels of the ship with a big oil-can dropping a little oil here and there to make the machinery run smoothly. Well, that has always been my ideal and I do think that any success which we may have had in the Telephone Branch in the days gone by has been due to the fact that we tried to do team work. I always think that whatever success we had was because we had such a good team. May I just mention a few: Hainworth, Wissenden, Stuart Jones and Lee; Twinn and Elgar, and a number of others, and then when we took over the National Telephone Company, we had the splendid trio, Dalzell, Valentine and Scott; and Hare, Napier and a crowd of others. All worked so splendidly together with such a desire to make the telephones succeed that we were bound to have a certain amount of progress and if it had not been for the War we should have had the British telephone system as good as any in the world.

It is rather painful to think that these interests will now pass into other hands, but I am quite certain they will be in very good hands and in very good heads, and that the Telephone Service will in future be one of the greatest achievements of this country. I thank you very heartily for what has been said and for all your wishes.

REVIEWS.

"Text-Book on Wireless Telegraphy" in two volumes by Rupert Stanley, B.A., M.I.E.E., Professor of Physics and Electrical Engineering, Temporary Major R.E., and Chief Wireless Instructor, B.E.F., France.*

In these volumes the author has evidently borne in mind the needs of those attending classes with the intention of becoming wireless operators and of those amateurs who although quite expert in the ordinary manipulation of radio-apparatus miss much of the fascination of this interesting hobby because they do not understand the fundamental principles on which it is based.

The first volume deals with general theory and practice. Many treatises on Radio-Telegraphy are as a general rule only suitable for comparatively advanced students, and Major Stanley's text-books are therefore all the more welcome for those who wish to begin at the beginning. The progressive study of magnetism and electricity in this volume is in terms, so to speak, of Radio-Telegraphy and there is no possibility of the student getting "rattled" in trying to reconcile theories he has learnt from other books with theories in these under notice.

The second volume deals with valves, continuous waves and Raido-Telephony: and it is pleasing to note that the author pays a generous tribute to that clever and amiable soldier, General Ferrié, of the French Military Service Establishment, who with his zealous band of assistants took the lead among the Allies in developing valves and valve apparatus.

These text-books are done well. The diagrams and plates are clear and easily followed. Every student should make an effort to get these books, even if it does involve some self-sacrifice to raise the money.

A. A. J.

* Longmans, Green & Co., 15*s.* nett, each volume.

"The Principles of Commercial History." By J. Stephenson, M.A., M.Com. Pitman's, 7s. 6d. net.

Some day or other, when we come to study the development of telegraphy and telephony scientifically, we shall take into account the commercial history which lies behind that development. Mr. Stephenson's story is the romance of commerce. It shows its history, both generally and separated into the different departments of trade and into the different countries of the world. It is full of good maps and diagrams, and some of the diagrams are of especial value, showing the progress of trade in particular directions and in conclusion there is a fine chart of trade, commerce and condition of the people since 1851, a sort of combination in ready form of complicated government statistics. Upon the basis of this book there is room for a welcome history of inland and international telegraphy and telephony and Mr. Stephenson just touches upon it, mentioning the postal service of the University of Paris in the fourteenth century and the town messenger system in German towns even earlier. As a matter of fact there are still earlier systems, the bon-fires of Greece and the communications along the great roads of the Roman Empire. It would be a fascinating subject for research and might make a complementary volume to this excellent study of the history of commerce.

CORRESPONDENCE.

RURAL PARTY LINES.

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

SIR,—Whilst not endeavouring to anticipate the introduction of the telephone tariffs, it is apparent that increased mileage charges are inevitable. In these circumstances it is hoped that the problem of developing outlying rural territory will receive sympathetic consideration. Having had a particularly successful experience in developing outlying rural territory by means of rural party lines, it seems to me that such service is the true solution of comprehensive rural telephonic development.

The rural party line service can serve all classes of the community in outlying territory who cannot be served by means of exclusive lines, except by the application of extra mileage charges which may in some cases be an insuperable bar to development. Viewing the problem from the standpoints of National interest and telephonic development, it is better to serve rural districts by means of rural lines embracing all classes of rural residents, than to run a few exclusive line services to subscribers who are in a position to regard extra mileage charges with equanimity. Although the rural party line service cannot claim to possess all the advantages of the exclusive line, the facilities afforded are adequate for the needs of outlying residents, and the popularity of the service may be judged from the fact that amongst the subscribers may be found: Admirals, stock-brokers, farmers, village storekeepers, millers, clergymen, and all classes of outlying residents and traders.

It is not suggested that rural party lines should be provided excepting in scattered districts, where it would not be practicable to establish a subexchange profitably, but energetic contract work in connexion with the provision of rural party lines will enable the Telephone Service to be carried to the heart of Rural England, and so ensure the comprehensive telephonic development which is the objective of the Contract Departments.

F. W. GEORGE,
Contract Manager.

Brighton, Jan. 2, 1920.

THE TELEPHONE SITUATION. A PLEA FOR ADVERTISEMENT OF THE ACTUAL FACTS.

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

In this article it is not my desire to advocate "advertisement" as an aid to the extension of the telephone business, the demand at present being greater than the supply. What I do wish to advocate, however, is advertisement, by means of the public Press, of the actual facts which give rise to the situation that causes such dissatisfaction to-day. The Press has been only too ready to vilify the Department on account of its supposed lack of foresight and organisation, and I have no doubt that, given the true facts of the situation for publication, it would recognise that in justice to the Post Office there is another side to the question and in so doing, would accord it "fair play" with the same spirit as has always been shown in any controversial discussion worthy of public notice.

The Controller of the London Telephone Service proudly stated in a recent speech that our organisation is as complete as human ingenuity can make it, and so far as the machine can be kept running, it is working admirably. There are, however, certain factors outside the scope of the Department, which have the effect of "clogging the wheels," such as lack of plant, shortage of exchange equipment and certain types of apparatus, shortage of skilled labour, &c. The general public is only made aware of this at present when a member of that "great body" makes application for a line, and to make him aware of the position, a standard letter is sent which the recipient probably consigns to the waste paper basket. The result is, in a few days he writes again, sometimes to the Department accusing it of discourtesy in not replying to his letter, sometimes to the Secretary, who calls for a report. This involves further clerical labour, and in the end gives little or no satisfaction to the applicant, who probably writes to the Press complaining of the laxity of a Department which exists to provide means of communication but cannot or will not do so.

What is the reason for the Departmental reluctance to use the Press as a means of keeping the public posted in the real circumstances which prevent a service being given commensurate with an organisation well able to cope with any reasonable demands made upon it. Surely, seeing that the Press garners its information from the four corners of the earth by telegraph, telephone and other means of communication, the Department which supplies those means should keep the public apprised of events or circumstances which militate against an efficient service being maintained or extended to keep pace with public demands.

The saving in clerical labour, in indexing and recording would, in my opinion, be enormous, if the Press were authorised to publish a clear, concise statement of the causes which are preventing the Department from giving now—a year after the Armistice—what the public expected within at most a month or two after the cessation of hostilities, viz., a reasonably efficient telephone service.

Experience in the Western District has taught us that if you can get the applicant to the counter you can put before him the facts clearly, and I venture to think that through the medium of the Press the applicant or intending applicant would realise the position and accept it with a better grace than he does the efforts of a staff harassed by the continual pressure of correspondence which is the direct outcome of the Department's reluctance to use the Press as a means of communicating its own difficulties as readily as the public uses it as a means of airing its grievances against that Department.

It is now a by-word of a famous publication that—

"If you see it in ..... it is so."

After this slightly to "If you see it in the Press it is so," and I venture to say in conclusion that the public would soon realise that the main facts are staring them in the face, that the Department is not to blame to the extent to which they believed it to be. The saving in labour to the Department, and time and temper to applicants, would be enormous and well worth the experiment. At any rate it is worth a trial!

(Signed) W. R. CHILD.

The Telegraph and Telephone Journal.

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Editing and Organising Committee - - JOHN LEE. J. J. TYRRELL. J. W. WISSENDEN. W. A. VALENTINE.

Managing Editor - - - W. H. GUNSTON.

NOTICES.

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

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RECONSTRUCTION.

MORE than a year has elapsed since the maroons announced to us in London the signing of the Armistice and heralded the Peace which is now ours at last. During these anxious months we have groped after the threads dropped in August 1914, and endeavoured to re-adjust our ideas in the light of the experiences of four years of war. Not all the problems of reconstruction have been solved, but indications are not wanting of a return to more stable conditions. The readers of the JOURNAL have an outward and visible sign in the reappearance of the monthly number.

The Telephone Service has been called upon to play its part in "reconstruction," and a section of the Press would have us believe that it has been found wanting. Some there may be who expected to see exchanges opened by the dozen and cables laid by the thousand in order to meet the enormous increase of traffic which manifested itself within a few weeks of the Armistice. But even in normal times switchboards and cables cannot be conjured up out of thin air and the times are far from normal yet. For four years all the resources of the service in personnel, in material and in invention were necessarily diverted to the needs of the fighting forces. When the call came at home, with surprising suddenness, could it be expected that the pre-war standard of efficiency would be found unimpaired? Rather, we should marvel at the spirit in which the crisis was met by a staff jaded through years of unremitting work, often attended by danger, and beset by such discouraging circumstances as inadequate switchboard plant and the attacks of successive epidemics of sickness.

Much has been done during the past year towards restoring the plant of the Telephone Service to its former state of efficiency and extending it to meet present-day traffic requirements. But it was necessary first to revise and amplify the schemes prepared before the war. Progress has been further delayed by difficulties incidental to the transition of industry from war to peace: even difficulties which, like the shortage of houses, appear at first sight to have little connexion with telephone requirements. Nevertheless, many works are well on their way to completion: and if we experience sometimes a slight sense of disappointment, we may be permitted to take comfort in the thought of what the position would probably be now, if the war had ended differently.

The future is uncertain. Difficult problems have to be faced in the revision of rates and the extension of automatic exchange systems. But we may look forward to more rapid expansion in the coming year and there is no reason to fear that the Service will fail to respond to any demands made upon it, if we continue in calmer times to work always for the common end—the efficiency of the Service—in the spirit which animated all during the stirring years of the war.

A. R. KIDNER

HIC ET UBIQUE.

'Phone Muddle cause of Train Smash lightheartedly says an *Evening News* headline. Fortunately it was not "the" 'Phone muddle which caused the calamity but only a misunderstanding on the railway telephone system.

AN American Journal *Commerce and Finance* has the following paragraphs entitled "Too Much Telephone Talk":

IT has been customary to accuse "Central" every time an annoyance or delay of the telephone occurred. Lately, there has been more of this than ever. The telephone people have confessed they had reached the end of their resources in supplying operators. The proportion of human beings suitable to preside at a switchboard is small. The ideal girl has a metallic voice, a patience sublime, a marvellous memory and nothing in the form of "nerves." Now and then a girl of this kind crops up and makes many men happy and then, suddenly, she quits to accept a lifelong job of making one man happy.

Marriage is the reef on which the telephone gets stuck over and over again. The 'phone people have done a lot to make the hello girls' task as light as possible, but it is no use. They will marry. And when they marry they divorce themselves from the switchboard.

All the telephone exchanges in America will be equipped with the automatic switchboard in time but until the change comes about the companies must depend on girls. Just at present conditions are worse than ever. The companies are very short of operators. They are begging, coaxing, pleading, doing everything they can to get girls. The advertising in the newspapers brings only a moderate response. Apparently the market is bare. Apparently the 'phone does not appeal to the girl as it formerly did.

While the companies are sorely pressed, the public is adding to the woe. The time spent in conversation averages 25 per cent. longer than in the war period and the number of calls has increased 18 per cent. In New York 20,000 persons who want 'phones cannot get them. And yet a lot of persons have 'phones—731,794 in New York—and some of them cuss the instruments and possibly the company if not the operators.

It is apparent that we talk too much. You can help the telephone people, and incidentally, yourself by being terse. Women overuse the 'phone. What would they do without it? And yet it is not so long since the telephone was little known and little used.

WE notice that the newspaper world in referring to a recent paper on "Telephone Service through Newspaper Eyes" before the Telephone and Telegraph Society of London, calls the lecturer Mr. Horace Dives. We know now where they think he ought to go.

PARIS TELEGRAPHS.*

By H. BOOKER.

LAST June it was my privilege to go with five of my colleagues on an official visit to the Paris Central Telegraph Office. The visit came about quite unexpectedly, and we prepared for it at short notice. The day of our departure from London was one of the most historic, for it was the Saturday upon which Peace was concluded with Germany, and before returning we witnessed the wonderful spectacle of the triumphal procession of Allied military forces on July 14. During that period of little more than a fortnight we saw much that impressed us. I must, however, confine myself this evening to matters of a more professional interest, which were the object of our visit, and which should rightly be the principal theme of a paper before such an audience as this.

We were introduced to the Paris C.T.O. by Colonel Waley Cohen, the Chief of British Signals. Monsieur Tallendeau, the Chef de Bureau, received us with the warmest cordiality. We were conducted over the office and introduced to the various gentlemen with whom we should be brought into contact during our visit. We were there at the invitation of the French Administration, and the arrangements for our going had been made on the strength of a telegram proposing an exchange of six officers between London and Paris, so that, while we had been travelling to the French capital, six Parisian officials were travelling in the reverse direction on a similar mission. Our programme was suggested in very broad outline by the French officials. It was our common desire to ascertain what could be done to increase the output of the available circuits between our two cities, in order to keep up as closely as possible with the work during the day-time and reduce excessive night duty. I ought to add that the staff association over there, which had taken a leading part in promoting the movement for the interchange, has long cherished the idea of periodical international visits as a means of improving working relationships.

During the War the Anglo-Continental Telegraph Service had passed through the most trying time in its history. Since the fateful month of August, 1914, *the growing armies in France and Flanders had demanded* an increasing number of telegraph communications, and the Cable Room found itself more and more restricted in the number of wires for its use. At one period the number of military and other special circuits to France represented over 60 per cent. of the telegraph resources, and our people had to do the best they could with the remaining 40 per cent. or less for the transmission of a load of work which was certainly as heavy as that of the piping times of peace. Then there were bombardments of places on the telegraph routes which broke down for several days together a number of the precious links between London and Paris.

I recall the worst period, that period of foreboding which commenced in March, 1918. All the wires *via* Calais and Boulogne were under the fire of the enemy and were mostly out of action; the cable to Dieppe was interrupted, and of Anglo-French Government lines there remained only the four conductors of a single cable to Havre and two of these were being used by the military. But, in the exceeding greatness of the struggle and effort of the nations, there still existed for us all something of the grace enjoyed by a warrior of other days in another sphere. "We were pressed on every side, but not straitened; perplexed, yet not unto despair; pursued, yet not forsaken; smitten down, yet not destroyed."

At that critical juncture in our cable history I remember a particular evening when a proposal was drafted to the French Administration, and it was to the effect that in the emergency that had arisen the two wires should each be worked on the duplex triple Baudot system, and so yield a total of twelve channels, six for sending and six for receiving. In order that this might be done it would be necessary to instal repeaters at Havre. The Postmaster-General would be glad to send over the necessary apparatus and also British staff to attend to it. The proposal was turned into French and that was converted into cypher; but our French friends with considerable sagacity penetrated the double veil of the cypher and the language that it concealed, and in a few hours they gratefully accepted the proposal in its entirety. *Within about 24 hours the whole of the apparatus and the staff* were on the way to Havre, and so was commenced the intensive utilisation of those cable lines. On these two duplex Baudot wires during the next few weeks, with our own staff looking after the repeaters, record output on a wire basis was achieved, and the totals have not since been exceeded. Within a few weeks the cable to Dieppe was repaired, and, after three months of instructive experience, the British staff returned to London. I have recounted these details of the prevailing war situation as it affected our civil telegraphs, because they illuminate the background against which our work in Paris was done, and they were frequently referred to in our conversations with French officials. Moreover, it is from the extremity of that situation that London-Paris telegraphs have been recovering during the past 18 months.

Paris telegraphs reach out in Baudot circuits to all the large cities of France and to Algiers; in Baudot circuits to four centres in Switzerland, to three centres in Italy, to Brussels and Barcelona and Madrid. Paris telegraphs are joined up to the world system by a Baudot to Marseilles worked in connexion with the Eastern Telegraph Company's Mediterranean cables; by a Baudot to Brest in connexion with cables to West Africa and North America; by lines worked on the Undulator to Fredericia in Denmark; and by wires to Havre where they link up with the cables of the Western Union and the Commercial Cable Companies. For us the centre of official interest was in the working of four Baudot circuits to our own office in London, and of our communications to the south of France, Switzerland and Italy which are relayed at Paris.

The Paris C.T.O. is on what would be the Surrey side of the Seine, and in relation to the Stock Exchange or Bourse, which is the commercial focus of the city, it occupies a position that would be somewhere in the Lambeth Road. The office is not an imposing building. It is entered through a gateway and forecourt, and a single flight of stone steps leads spirally to the various floors. The instrument rooms are situated on the second and fourth floors. During the past ten years or so the interior has been reconstructed, and the principal galleries are lofty, large and well lighted with large windows. There are altogether five rooms or divisions known as Salles A, B, C, E and F, and their total superficial area is about one half that of the instrument galleries of the C.T.O. To be pedantically exact it is 3,506 square metres, or something approaching 40,000 square feet. There are two large galleries which, at first sight, seem almost as large as the Centre Gallery of the C.T.O.; there are two other galleries of good proportions. The fifth or Salle F is a smaller room, which has been opened recently, and contains the Baudot circuits to towns in Alsace-Lorraine. There is also another small room in which is worked one of the Cable Companies' circuits to London. There were other small rooms in preparation for post-war development; but this multiplicity of galleries, scattered about in a large building, separated by stairways and corridors, is of course from all points of view an abomination in a Central Telegraph Office, where the circulation of traffic, supervision and co operation between the sections are all part and parcel of the regular business. So far as circulation of messages is concerned, the difficulties *are largely overcome if there is an up-to-date and extensive system* of pneumatic house tubes. In Paris Central, however, the centre of the house tube system is in Salle A, the Foreign Section, and it is not one of the largest galleries. Carriers from one division to another have to be sent to this room to be passed on to the terminal division. Besides this, the tube system is such that it admits of only one carrier being in the tube at one time; and there are small losses of time which are by no means insignificant when millions of telegrams are affected. Furthermore, the tube and circulation centre is a very congested area, and messages are heaped up in trays and await primary sortation to the various divisions with inevitable increments of delay. While we were there Censorship was in full swing, and you will readily understand that it is practically impossible to get an estimate of circulation values or any other values when the regular professional military are in control.

The average daily number of actual telegrams dealt with in the Paris C.T.O. is about 95,500; but a large number of these are re-transmitted to other towns, and the number of telegraph transactions totals altogether 125,000 per day. At the commencement of the war, record totals of 336,000 transactions per day were dealt with. Making comparisons with the London C.T.O. we have, under the heading of actual telegrams,

150,000 to 165,000	per day	in	London.
against 95,000	„	„	Paris.

and under the heading of transactions we have

260,000	per day	in	London.
against 125,000	„	„	Paris.

In a short time at the Paris Office one is struck with the relative simplicity and uniformity of the working arrangements. This is of course a very important thing. In the first place the French inland and foreign telegraph services are conducted under the same regulations as laid down by International Convention. There is only one set of telegraph rules, and only one general telegraph instruction book instead of two as with us. This is all to the advantage of *administration, organisation and efficiency*. In France the foreign wires have from the earliest days been exploited by the State, and the working to places abroad is indistinguishable in essential features from the working with their own offices. It was in the year 1837 that, under the influence of Napoleonism, every form of telegraphing became a Government monopoly. Private ownership was forbidden, the means of rapid communication being regarded first and foremost as of military and political importance. I have read an International Telegraph Convention drawn up under Napoleon III in 1865, and it is curious to note the evolution and revolutions of the telegraphs, and yet to see how many of the regulations of to-day are the lineal descendants of that piece of legislation. In this country, on the other hand, the wires to the Continent were not taken over by the State until 1889, and the foreign service has since remained something like a separate business with its own regulations, its own history and traditions, its own staff and, arising out of these particularities, its own group consciousness. But I must leave you to weigh up this matter, with special reference to the *perplexed counter clerk and telegraphist*. There is a temptation to linger over this question, as over others, and to see what it really means.

Then again there is language: the Parisian operator speaks French to all the countries round about, with a remarkable flow of colloquialism, and without the obligation of labouring away heavily in a foreign tongue on a foreign circuit. Here again there is almost *a caressing invitation to tarry* and examine the significance of this factor in its bearings on organisation and efficiency, as well as in its larger and more alluring aspects. I understand

* Paper read before the London Telephone and Telegraph Society, Nov. 25, 1919.

that in Paris an allowance of 20 francs per month is paid to operators who acquire a certificated knowledge of a foreign language, but very few have gone in for the study, and besides, the standard is a high one, both literary and *viva voce*. Before passing on I must mention the official library, which is only a few hundred yards away, in the Rue de Grenelle. For those students and readers who are always smuggling home a new literary treasure, the library of the French Administration is a perfect treasure trove. There are over 40,000 volumes, and it is constantly growing. There are books in several languages, and our own is well represented. Two volumes may be borrowed at a time. They are mostly of a pretty solid, scholarly or technical character; but it is all the same to your true litterateur; and your fusty, musty book-worm who would pass a delightful existence on the embankment of the Seine, where there are long ranges of book stalls, even he would find endless and recondite joy in those upper rooms which seem so far away from the noise and clatter of the streets.

But let us return to the instrument galleries and pursue our observations. Here again there is the same note of relative uniformity—or perhaps it would be more accurately expressed by calling it lack of variety. Only three types of apparatus are in use for the general traffic: Morse sounders, of which there are about 200; Hughes, of which there are about 170; and Baudot, of which there are now about 135 installations with some 450 channels. The Baudot is of course well-known as a French invention and is preeminently the French national system of working. It is utilised on all their longer lines where there is any appreciable volume of traffic, and gradually the Hughes is disappearing. For those who were acquainted with the old installations used in London with high tables and weight driven receivers there are no striking Baudot novelties in Paris. There are the various types of installations, fundamentally the same, some with two channels, others with three, a large number with four, and a few with six, in each case only one line being employed. Receivers of the type known as "Le Rapide" are utilised on the duplexes to London, and the shortened segments of the distributor are accordingly reduced in size. So much so is the Baudot the backbone of their telegraph system that they have devised a light portable set with folding tables and chairs for use at special events. They pack it up and send it to naval and military reviews and other places where a sudden and large influx of work is expected. During the war the General Headquarters were provided with several quadruples of this type in motor wagons, and in these cases the power was provided by batteries of small accumulators charged by a dynamo driven by a petrol engine.

In Paris, repeaters known as the "1909 type" are employed. They embody the principle of the "Rapide" receiver. The appendixes of the five electro-magnets bring into operation five levers to which are fixed five springs which play between the battery stops. The device momentarily stores up the signals which, revived and restored to their original values, are swept on to the line by the revolving brushes of the distributor. These repeaters are used in the split or *échelonné* Baudots between London and places beyond Paris, for example Lyons, Marseilles, Rome. By the interposition at relay stations of the 1909 contrivance the French have a developed system of split Baudots. For instance Paris works on the same circuit with Toulon and Hyères. On another circuit she is in communication with both Bayonne and Biarritz, and on this same circuit Bordeaux also utilises two channels each with Bayonne and Biarritz. Paris Central and Paris Bourse share the same wire to Madrid Central and Bourse respectively, each office having in normal times two channels at its disposal. It is a justifiable claim of the French that it is possible to work on the Baudot direct with far-off Cochin-China or with Shanghai, and that no other system of telegraphs dependent on lines will do that. With modest aspirations we limit our ambitions for the time being to the establishment on the *échelonné* system of good stable working with Switzerland and Italy. On the repeaters there are local receivers to check the signals as received from London, and receivers to check the outgoing currents to the distant offices; and *vice versa*. The recording slip is kept running, and the dirigeur in charge is in a good position to observe the working conditions on both sides. It is *à propos* to remark that during the war the local control has been abolished on the purely French wires, on account of paper shortage and need of apparatus.

In the galleries of the office we did not see any examples of any of the more modern types of fast-speed apparatus. It almost seemed as if the French had made up their minds quite definitely as to the type that best suited their general purposes, and they did not intend to multiply the number of systems in use. This is a subject of endless debate, if one would have it so, as modern invention is fertile in its devices. There is no distinct advantage in having several different complex multiplex systems in simultaneous use for the same class of work, and it was natural that the French should favour their own excellent and exceedingly flexible system. It is very strange, however, that in France, where the lines run to a length of 500 miles, duplexing is not resorted to. The pressure of war conditions brought three Anglo-French duplexes into existence, but generally speaking, they seem to prefer two simplex lines to one duplex. Yet they are an exceedingly logical people, and one feels impelled to seek the reason for their failure to take advantage of such an obvious method of economising long and expensive lines. It is possible that in the change from Hughes to Baudot they have been able to cope with the growing needs of their service without adopting duplex methods; but it is also possible that they anticipate difficulties with lines that are variable in their electrical qualities. They also prefer to have a large margin of security. They do not force up the speed of working to the practicable limits. In any event they have a rooted prejudice to duplexing, and that method of working has not caught on, although with us it is the national system. I am inclined to think that the prejudice is based upon a desire to keep to a minimum the number of types of circuits; also upon a general lack of knowledge among the French staff of the *finesse* of the duplex method—the timing of condenser discharges and so on; and also upon the difficulties that have been encountered in their own experience in obtaining electrical compensations upon lines with underground or other constructional faults. These observations are confirmed in an article which appeared in the September number of the French *Annales des Postes, Télégraphes et Téléphones* in which M. Montoriol says that duplex trials were recently made for a whole month with a well known apparatus on a line from Bordeaux to Marseilles, 425 miles in length. English engineers were at each end of the line, but duplex hardly worked well more than half the time, *it being necessary to re-tune the balance two or three times an hour.*

The internal wiring arrangements of the office at Paris are pretty much on the same lines as those of London. The wires are led to test boxes of modern design in each division, and the wires and power leads run from them to the various installations. But there is, unfortunately, no test officer at these boxes, and in point of fact no examination of lines is conducted from the galleries. That important work is concentrated on the Rosace, which corresponds in situation to the Basement Test Room in London. The Rosace is a rather curious name to apply to the Test Room, but it is used in France. It dates from the earliest days of French telegraphs, when the wires were led into offices round the circumference of a large circular aperture, and the imaginative Frenchman with a touch of ecclesiastical poetry in his composition thought the arrangement bore some resemblance to the rose window of a church. It was the only suggestion of a religious order that I came across in the office. However, up-to-date test panels are now used, and the old name is still applied to them. There are three panels in the test frame with accommodation for about 900 wires. Usually one officer pegs away at each panel. He is the lord and despot of the wire situation so far as his panel is concerned. If the galleries cannot get on with a wire they hand it over to him, and he makes it good if he can. He and his two colleagues are busy men. There are several other officers in the room, men of the north and men of the south, Flamands and Marseillais, and they have a genius for shouting. Of course we had a good many talks with these estimable gentlemen, and it is evident that they do not think much of the underground wires in France. The subterranean sections are about 40 years old. We did not hear anybody say a good word for them. It was correct form, almost a refined etiquette, to disparage them. It was quite the general opinion that they were, *ipso facto*, bad and beyond redemption. Test officers would suggest sympathetically and with a sense of kinship engendered by a common adverse experience that we, too, had our underground system. The Dover lines, for example, are a bit shaky and a source of trouble, eh? Rather variable and unreliable? They were like the incredulous people of another world when we assured them that they were as steady as rocks. It ran contrary to their experience. Then again when the mornings are damp or wet, and the Galvo needles go over to the bridge with a sharp and decided click, you look at those good people interrogatively, and they in turn look apologetically through the windows at the trees dripping with moisture and at the ragged masses of clouds up above. They shrug their shoulders in a delightfully expressive way, and their gestures are more eloquent than a volume of words.

Before turning to another order of ideas, it may interest some of you to know that French Baudot operators do not practice "glissage," the apparently easy and gliding method of manipulating the keys which we so assiduously cultivate. The teachers and dirigeurs-chefs discourage it; and they insist that the wrists should rest on the table, that the pads of the fingers should be towards the ends of the keys, and that the fingers should be raised after every signal. The signalling in many cases looks rather laborious, and we therefore made careful enquiries in the galleries as to the prevalence of Baudot cramp, but to our surprise no cases were known. And this is all the more astonishing when it is realised how long the Baudot system has been installed in Paris, and still more so when it is taken into account that the operators remain at sending points *regularly* for as many as four successive hours. This is a very important matter both from the point of view of the avoidance of occupational disease, or at least of fatigue and discomfort, and also from the point of view of administration. The question is a difficult one; but if our French friends are in fact enjoying advantages over us in these respects, the subject of Baudot cramp and fatigue is worthy of a closer investigation.

During the war a large number of unestablished Baudotists have been trained, and the course has lasted for from 6 to 8 weeks, with 2 or 3 hours' practice daily. The training has been carried on in the school under the tuition and guidance of M. Mercy, the Chef of Technical duties. The first stage consisted of practice for a week or so on keyboards without the locking arrangement or control, and the cadence was given to the class by the time beats of a sounder joined up to a Baudot. In the second stage there was cadence and locking, and in the third stage there was cadence, locking and local control. Pupils were set to gumming up the control slip, check the numbers of words, ask for repetitions, and generally speaking, under the critical eye of a precise and exacting teacher, they did all that was required on a live circuit. The Chefs of the office attach great value to this thorough and detailed school training. Their academic thoroughness proceeds, I suppose, from their reputed inveterate habit of starting from the beginning of things and working their way in logical stages and succession to the end. From these propensities of the French it follows that they would have excellent books, full of details and side-lights, on the Baudot telegraph system, and we have a long way to go if we desire to surpass the French in publications on technical subjects.

There is one direction in which the reflective and imaginative ability of these Baudot people finds complete expression in decisive action, and that is in regard to the tests they apply to their apparatus on delivery from the manufacturers with a view to ensure standardisation and efficiency. In their own delicate phrase, the governor is the very soul and centre of the Baudot system. There is the suggestion of a metaphor in the words, and in point of fact they put the soul to a severe and searching test. When a consignment of new governor springs is delivered to their department, they try them critically against a desirably high practical standard. Varying weights are suspended on the springs against a measure scale, and an electric bell circuit is closed at the points of measurement. The extension of the springs is required to be directly proportional to the weight suspended, and a pair of springs must give approximately 180 revolutions per minute with 23 spirals in play. They are equally precise in other matters affecting apparatus.

The staff at the Paris C.T.O. numbers about 2,000 men and women, and the duties are arranged in what is known as brigades, of which there are two. The two brigades rotate day by day everlastingly. They are like two establishments. One day they do 7 to 11 in the morning and 6 to 9 in the evening; and the next day they do 11 a.m. to 6 p.m. The duty list of circuit appointments lasts for a month. Night duty is performed by the requisite number of the 11 to 6 staff returning at 9 p.m. and staying the night—a duty of 17 hours' duration in a period of 24 hours. Sunday duty is part of the week's work, and no doubt will be until dominical rest is recognised by the community. Evening pressure up to midnight has been met by *demi-nuits* or half-nights, some of the 6 to 9 duties being extended to midnight. Before the war, the frequency of night duty was about once in fifteen days. During the war, it came round every fourth day, and, the number of men being insufficient, women had to take their share of it. Nine months after the armistice, the night rota consisted of 41 women and 75 men. There are no meal reliefs, for no meals are obtainable. There is a canteen for light refreshments, and a rest enclosure something like a tap room in a country tavern. The staff are very dissatisfied with the duties, although I believe the frequency of night duty has now been materially reduced, and two hours' rest has been arranged for on that duty. Last August the staff proposed a modified scheme, but always a brigade system, thus moving in the well-worn groove, along the traced path of an old and settled tradition.

In another large order of facts the practice in France is different from our own. It is perhaps dictated by circumstances which do not obtain in this country. I refer to specialisation in the staffing arrangements. The basic fact is the brigade system. Each brigade is divided roughly into officers who man the circuits, and those who attend to the non-manipulative duties, such as circulation of telegrams, service correspondence, and the disposal of transmitted messages. These two main classes are not merged or interchangeable. In Salle A, which is the Foreign Section of the office, the wires are normally worked exclusively by men, and as a rule the more experienced are selected. The fact that the inland and foreign services are one and are governed by the same regulations, and also that French is the language for international purposes, gives a large field of selection for the staff of the foreign wires. A further fundamental difference in the working arrangements is to be found in the fact that the instrument staff on the duty from 7 to 11 and 6 to 9 are listed for either sending or receiving for the whole of the four-hour period in the morning, and in the evening they reverse, that is to say, those who were sending in the morning receive in the evening, and *vice versa*. In the case of the 11 to 6 duty the next day, the change over from sending to receiving is made at half-time. The French Delegation in London were quite bewildered and a little distressed at the changes which seemed to them to be so frequently in progress. I have already mentioned that there are in Paris no meal reliefs, and this fact too reduces quite appreciably the permutations of staff during the busy hours of the day. You will therefore gather that, under their relatively simple system of staffing, with longer spells at the same occupation, the amount of movement and changing of the staff is small. The supervision is rather indulgent and homely. Reading is allowed throughout the day. Members of the staff may occasionally leave the gallery without permission for a few minutes and partake of wine or coffee in the canteen or smoke a cigarette in the corridor. In one of the rooms of the office there is a large secular, prosaic text to the effect that those who abuse privileges endanger the privileges of all. The office has, so to speak, a distinct individuality of its own. As compared with the London C.T.O. there is only about half the life and activity going on. We gained the general impression that the atmosphere of the place is metaphorically less electric, less bustling, and less *affairée*, and this impression was strengthened by the absence of cord carriers, pneumatic punchers, and the latest types of high-speed apparatus.

About 50 per cent. of the staff at Paris is composed of ladies. Of course they get married, but, as a set-off to that blessed estate, they may retain their economic independence by remaining in the service. I am not sure, however, that they properly appreciate the privilege. We had opportunities of speaking to several of them, and they looked wistful as they contemplated the life of their sisters on this side of the Channel. At a staff dinner one evening, a charming lady of the office told me that she had a little boy—*tout p'tit comme ça*—and, with a fine trill of laughter, she measured off in the warm and smoky atmosphere the imaginary proportions of a small body of pink pulsating plasticine with arms and legs. He is not only the idol of his mother's heart, invincibly enthroned and adored, but he is also one of the perplexities of the Paris Central Office, for he upsets the regular service of the State. I don't mean to suggest that they have a nursery for babies at the office, but madame has to have special hours of attendance to suit the infantile needs of her son, and on those days when he drives her to desperation with his humours and agonies she does not go to the office at all.

The supervision of the office is carried on by M. Tallendeau, the Chef de Bureau, and his lieutenants.

There are the Chefs de Brigade—two in number, one for each brigade. They are somewhat equivalent to our Assistant Controllers, if it is not *lèse-majesté* to make such comparisons.

Then there are the Sous-Chefs de Section (we might call them Superintendents), who are in general charge of the Divisions, one for each, and are concerned with staff and requirements.

The Commis Principaux come next. They are something between an Assistant Superintendent and an Overseer. They are in charge of groups of circuits. There is one for the wires to Great Britain, another for Swiss and Italian wires, a third for those to Alsace Lorraine, and so on. It is their responsibility to see to the working of the lines, the diversion of traffic, and that sort of thing.

You must not estimate the value of these public servants by ordinary mercenary standards or the rates of their remuneration. Some of them are quite candid about it. Nevertheless, they contrive and adjust means to ends; and, in the idealist aspect, by judicious and penetrating criticism and praise, growling and exultation, it is they who foster the growth of skill and proficiency in our business, and who inspire the finer degrees of technical and manipulative ability which almost convert the operator into an artist.

We now come to a French creation. He bears a name familiar to us, but it is the French name, and we have no other. The Dirigeur! He is the utmost limit of specialisation. He is specially trained, and when judged fully competent he is attached to one brigade, to one division, and to his own particular circuits. Month after month, and even year after year, he performs dirigeur work at the same circuits. One of the dirigeurs at the London circuits has been at the same work for ten years. The dirigeurs receive an allowance of 12 francs per month, and the Chefs-Dirigeurs (there are about six of them) receive 15 francs monthly in addition to their salary as Commis Principaux. There are about 150 trained dirigeurs in the Paris office, including about 40 in reserve. During the war, women were admitted on equal terms with men as dirigeurs, and about 20 were trained; but only one lady responded to the last invitation for candidates. The further training of women for this work has therefore been suspended, and it is doubtful whether on other grounds it will be resumed. Sixteen women are still performing dirigeur duties at less important circuits. The training of dirigeurs is carefully taken in hand by M. Mercy, who is the author of one of the best books on the Baudot system. There is a school room set apart, with blackboard and apparatus. The large tinted diagrams are really artistic and admirable. The course of instruction lasts for from 3 to 4 months, with three lessons per week of two hours each. There is an eliminating examination of an elementary character in magnetism and electricity prior to the course, and successful candidates up to the required number are chosen. During his term of duty each dirigeur has charge on the average of two Baudot installations, totalling about eight channels. He has no supervisory control over his team of colleagues, but he is respected by them. His special function is to get to the office early, to get his apparatus in order, to get it going, and to keep it going. There are no Baudot mechanics in the galleries, and he therefore attends to all adjustments, to the replacing of broken springs and so on. There is a workshop upstairs for repair work. The pockets of the dirigeur's overall, like a schoolboy's, hold a goodly supply of screws, nuts and springs, and pieces of inky rag. He distributes the batches of messages to the operators at the keys, keeps up a small diary, but the entries are not numerous. He has no "inscribing" work to do, that is to say, he does not have to fill in the forwarded particulars of telegrams or keep up circuit abstracts. That is done by inscribers who sit at separate tables; and the dirigeur is free to look after the apparatus. He keeps no statistics. There are no tablet check returns, and no half-yearly returns. We are back in the last century! The circuit abstracts of the foreign circuits are counted daily for international accounting purposes. The numbers of telegrams and words sent and received are recorded, and this is done under various headings. This task is taken in hand preferably by the married men who are blessed with numerous children, and the counting is done at home. It is one of the thoughtful and helpful devices of the French Administration. It is specially paid for, but the reward is not great. It is of course educational, and it occurs to me as a remote possibility that little François and his promising sister Héloise spend many a happy hour round the winter fire-side doing "tots" and working out their salvation with a practical intention. As the accounts are made up from the circuit abstracts, the French have no need of counterfoiled forms. Their Comptabilité or Accountant General's Office and also the operators have, on that account, a relatively calm and unruffled existence. The forms for received messages for the home and foreign services are of the same pattern, and again there is the note of uniformity. The forms are wide, and the slip is pasted to them with greater facility, and in the end a more presentable message is produced. Our French friends were pleasantly aggressive about our delivery forms, which they considered too insignificant for a telegram, and too narrow for gummed slip. In the contest we were exposed in something of a salient, and in the fire of their chaff we had to make a diversion. Their outward messages are written by the public on the most ill-assorted scraps of paper, and the service indications are entered where there may happen to be clear spaces. Honours were even, and the battle was a draw; but I hope that if ever there is another happy engagement on the same ground we shall come off triumphantly.

This paper has now become long; but in a Central Telegraph Office there is a large assemblage of facts to take account of, and I have endeavoured to bring out contrasts of principle and practice where they really exist. A large telegraph office is a living thing, always reaching out to fresh adaptations and to a larger destiny; and this profession, this business, this métier of ours links us up with the whole world of politics and commerce, peace and strife, pleasure and industrialism. It is at once our pride and the measure of our responsibility that all the activities of our national life depend largely upon our service for the proper direction of their energies, and notwithstanding the trials of the war and the temporary shortage of facilities, our service is, I feel sure, as alive as ever to respond with a healthy reaction to the needs of the nation which are vastly greater to day than they ever were before.

TELEGRAPHIC MEMORABILIA.

IT would be an interesting symposium if a selection could be made from the experiences of British telegraphists who have served abroad during the war. One does not ask for blood-curdling adventures. Heaven knows they could be supplied *ad nauseam* but one's mind rather turns to the varied scenes, climates and conditions of life under which so many of our colleagues have spent the more or less weary months of military existence. Russia, India, Egypt, Salonica, East Africa for example, suggest sufficient variety to fill more than one reasonable volume. Here and there by means best known to the possessors some of the most interesting photographs have been procured and brought safely home by their happy possessors. I do not know whether I am betraying a secret but it is more than hoped that one or more articles following the lines indicated above will shortly appear in these pages. If pressure of space should prove to be an impediment to the appearance of these and similar interesting articles, perhaps my fellow-members of the Editing Committee would permit the disappearance of the writer from these pages for a month or two in order to give way to the publication of some of these unique experiences. The modesty of their possessors, in many cases alone stands in the way of publicity. To such we trust that the view that a wide publicity to such experiences would be a real service to the British telegraphist will induce some of the more reticent of our ex-Army men to open wide their note-books in the pages of the T. & T. JOURNAL.

Our friends of the Telephone Department, London, are keen on co-operating with the Telegraphs in forming a Choral and Orchestral Society which should prove worthy of the twin Services. Any lover of music who has a knowledge of the C.T.O. and its possibilities in this direction cannot but acknowledge the high standard of which the telegraphist staff is capable. Union with the telephonists should produce an organisation of which even Queen's Hall might well feel proud.

Quite a number of the younger men, by competitive examination, are gradually passing out of the Telegraph into the Higher Services. Others seem ear-marked for the Treasury Pool. While congratulating them upon their respective successes one has the lingering hope that some day telegraph conditions may so improve and develop that those upon whom the Department has spent considerable time, care, labour and hard cash in training may find in the Telegraph Service itself sufficient incentive to make it their life-profession.

On the other hand the new year has seen the recruitment of more than a couple of score of telegraphists from various offices throughout the United Kingdom, including the L.P.S. and the Inland Branch of the C.T.O., for permanent attachment to the Cable Room. Here their services should be more than usually welcome, and here too it is hoped they will find new interests in, as they will surely find new and un-thought of phases of their craft.

The problems of the Anglo-Continental telegraphs are still with us, and again multiplex printing telegraphy comes to the front. A four-channel Baudot duplex is now installed with Rotterdam and long before this is printed should have shaken down into steady working. The Anglo-German offices are next on the list, with some modification of the type formerly employed on these circuits and one likely to lend greater stability.

It has however to be admitted that despite all efforts the general situation is still unsatisfactory. We are far from being able to carry the peak load. At present an epidemic of posting telegraph traffic has also affected many of the ex-belligerents, including Germany who has disposed of a considerable quantity of belated traffic for this country (by aerial post apparently), to Holland who in turn has forwarded the same to these shores by the ordinary mail. This country too has been caught in the grip of the malady, thanks to dislocated cables and unstable continental lines. To admit this position is not to admit defeat but rather to bend all further efforts towards a lasting solution. Disposal of telegraph traffic by post, aerial or otherwise, is an emergency measure only. Nothing is settled until it is settled *right*!

Little by little war-time secrets creep out and one of the by no means least interesting telegraph items is that of the overland London Malta emergency circuit which by the co-operation of the British, French and Italian Governments was established between London and Malta during one of the critical periods of the war. Ocean cables had lighted upon a somewhat disastrous set of circumstances and it became absolutely and obviously necessary that Malta should not be isolated from the capital of the Empire. Wireless did not provide the desirable secrecy for Government traffic, and the submarine cable communication had been reduced to something like a single thread. The circuit was worked by the Eastern Telegraph Company from their London office and passed through T.S. Foreign, one of the shorter Channel cables to Paris, thence south to Lyons across the Italian frontier to Turin, Rome and the south of Italy. Then by means of a few hundred yards of cable *somewhere near Scylla and Charybdis* the line passed over to the island of Sicily, again dipping into the sea for the final submarine stretch to its termination in the Company's office in the great Mediterranean naval station. Observations in London registered the maximum Wheatstone speed attained at about 25 words per minute. When the emergency make-up of the line is considered this may well be accepted as highly satisfactory for a cosmopolitan circuit with repeaters in three languages *en route* and composed of conductors of probably twenty different gauges!

Mr. D. M. Ford's paper on "Some Initial Considerations of Attendance Charts" read before the T. and T. Society on Dec. 16 based, as it undoubtedly was, upon long experience of the largest telegraph office in the world, may be considered as a standard work on the cycle system of arranging staff attendances. That it had *vulnerable points the criticism which followed clearly tended to* show. At the back of the minds of some of the critics, however, there still appears to be insufficient allowance for the fact that the lecturer at no time advocated the rigid application of any system or principle *without a complete and close study of the local conditions*. The threshing out in public of these and kindred problems in which the staff is most intimately concerned is all to the good. To Mr. Ford has fallen the honour of pioneer.

In the years prior to 1914 Germany had devoted an immense amount of energy and capital and undoubtedly much careful research to the problems of high voltage currents. According to Professor Barkhausen, however, she had in a large measure neglected the study of low power currents and had depended upon American and Danish engineers for much of her knowledge of low power work. *In a most interesting lecture to the students of the Dresden* Technical High School the professor gave due credit to Pupin, and dilated upon the success of automatic telephony—"the greatest wonder of the technique of commutation"—and the immense advances made by valve amplifiers. He touched upon a host of problems which remain to be solved, as for example:—"What are the directive principles which should govern *low* power current transformers?" The crying need, continued the professor, is for engineer specialists in low power currents, and plenty of them. With this end in view a special Chair in this subject has been instituted at the High School mentioned. In addition to the general study of these questions an honorary Chair of Telegraphy has also been established with apparently yet another sub-division which specialises in railway telegraphy and signalling. Judging from the contents bills of the forty-year old *Elektrotechnische*

Zeitschrift, the fourteen-year old *Jahrbuch der drahtlosen Telegraphie und Telephonie* and the eight-year old *Telegraphen und Fernsprech-Technik* all published in Berlin, and even the *Zeitschrift fuer Feinmechanik* now in its twenty-seventh year of publication at Nikolassee, one rather concludes that the German professor who was until recently actively engaged on the wireless equipment of torpedo boats at Kiel, has somewhat under-rated the knowledge of his compatriots. But a Chair of Telegraphy! This is surely evidence of solid faith in the future of our craft, and it would be well if we Britishers looked to our laurels.

Our friend Mr. Rooney should take heart from the above admissions when he thinks back on the German workmen and their part in the equipment of the Carter Lane Trunk Exchange. Does he need further consolation in this direction? It may perhaps be found in the experience of the writer, who, when visiting the new Hamburg Telephone Exchange in 1910 with its accommodation for 80,000 subscribers, discovered that the engineer in charge had gained all his experience in the U.S.A. although employed by the Deutsche Telephonwerke of Berlin. This gentleman who spoke English with the distinct Trans-Atlantic twang had been resident in America for many years, and had superintended the entire construction of the exchange which bore many marks of Anglo-Saxon scientific management both in construction and organisation. The memory of this visit it must be admitted rather confirms Barkhausen's contention that, at least on the practical side, Germany had not devoted the same assiduous study to the infinitely small current side of electricity as she had done to the heavier type of current for power, lighting, &c. In any case it is evident that she is alive now to the needs of the future.

"Bakelite," the artificial dielectric, invented by the renowned chemist Dr. Backeland, has been experimentally used by the French Telegraph Administration for the manufacture of Baudot and Hughes type-wheels. The cost of these wheels is considerably less than that of the present steel wheels as they can be moulded instead of graven as is the case with the latter. It is stated that bakelite will stand the same mechanical strain as those of steel construction.

The authority for these statements (*Le Journal Télégraphique*) reminds us that type wheels of the Western Electric have recently been made of this material.

"Communications" are necessarily among the first steps towards the re-opening of international relationships. It may be recalled that wireless telegraphy played an active part in the very early negotiations between the Allies and Germany. The fact therefore that an understanding has been reached between the Italian and Serbian delegates at Ljubljana (formerly Laibach!) on the question of postal telegraphic and customs questions has led far-seeing and optimistic folks in Italy to hope for a speeding-up in the settlement of the Fiume question.

The Peace Treaty itself in connexion with the future work of the proposed League of Nations recognises to the full the importance of telegraphy as a factor in linking up the nations. Should the League become a real and working proposition, there is little doubt but that this portion of the International Communications section will be allotted a place well and worthy of its importance.

Too late for the January issue kindly greetings have reached me for the London staffs from Belgian and French telegraphists. In the former case many of the Belgians write of their pleasant memories of T.S. and T.S.F. during the war years. One or two would much like to return to London!

From the last number of the *P.O.E.E. Journal* it is gathered on the authority of our engineer friend, Mr. E. Lakey, that no less than 152 Baudot traffic channels have been opened in the British Isles since August 1914. All of these except 16 terminate in London. As already foreshadowed in this column further extensions introducing new features are well in hand, and "a large quantity of Baudot apparatus is now in course of manufacture."

The Imperial Communications Committee has appointed a sub-committee to assist in examining certain questions relating to wireless matters affecting the national and commercial interests of the empire. The Rt. Hon. Sir Henry Norman, M.P., is to be Chairman, Brig.-General S. H. Wilson Secretary, and Lt.-Col. C. G. Crawley Assistant-Secretary. The committeemen are: Sir John Snell, Rear-Admiral F. L. Field, Prof. J. E. Peltavel, Dr. W. H. Eccles, Mr. James Swinbourne, Mr. F. J. Brown and Mr. L. B. Turner. Of the above perhaps only two are well known to the Post Office staff, viz., Mr. F. J. Brown and Mr. L. B. Turner. The latter has a high reputation on the engineering side while the former's intimacy with Foreign and Colonial Telegraph matters is most keenly appreciated by those of the traffic departments who have had the pleasure of personal contact.

Mr. Dive's paper read before the T. & T. Society on the 20th ult., "Telephone Service through Newspaper Eyes," was a commanding success.

J. J. T.

LONDON TELEPHONE SERVICE NOTES.

How do you choose the books you read? An interesting discussion could be held on the subject of the various considerations which arise in the choice of books. What is the most popular determining factor? Is it the author, the subject, the title, the binding, or the number of illustrations? Do similar considerations determine the attendance at our Telephone and Telegraph Society and London Telephonists' Society meetings? There seems reason to think that they do. The meeting of the Telephone and Telegraph Society at which Mr. D. M. Ford, of the C.T.O., read a paper entitled "Some initial considerations of attendance charts," was not largely attended, and one looked almost in vain for representatives of the London Telephone Service. Mr. Ford is a member of the committee which has been sitting at the C.T.O. in an endeavour to produce a duty chart which will reconcile as far as is practicable the convenience of the staff and the needs of the service. Many of the difficulties which present themselves in such a consideration are common to the Telephone and Telegraph services, and it was a matter for surprise that members of the London Telephone Service were conspicuous by their absence. The result was that the major part of the discussion turned on the merits and demerits of the particular chart which the committee has drawn up and there was in effect little of interest to the telephone side.

Members of the London Telephonists' Society should note particularly Tuesday, March 16th, on which date Miss A. E. Knapman, Supervisor at Paddington Exchange, will read a paper before the London Telegraph and Telephone Society entitled "Idiosyncrasies of subscribers," and on the same occasion Miss A. Chillman, of the C.T.O., will deal with the subject as seen from the Phonogram room. The meeting place is the Lecture Hall of the Sunday School Union, Old Baily, and the time 5-30 p.m.

The London Telephonists' Society opened the New Year with a dance and social, the success of which was the more pronounced for the interval which had elapsed since the previous function of its kind was held in the first year of the war. All the tickets were soon sold and the list of artists billed for the occasion contributed very largely to the demand. The dances were a succession of merry scenes between which the artists succeeded in the difficult task of singing and performing experiments in magic under such conditions. There is many a sigh that the event is past.

Under the heading "The Post Office's Great Record," the *Daily Telegraph* has published an article on the work of the Post Office during the War. It may at least be regarded as encouraging. It quoted the War Cabinet's statement, "The whole Empire owes the Civil Service a lasting debt of gratitude," and then proceeded as follows:—

> "To no other department of the Civil Service could this tribute of the War Cabinet be paid with more truth than to the Post Office. Whether we consider the complexity, the multiplicity, the severity of the tasks which the Post Office had to face during the War, the numbers it sent into

the fighting forces of whom nearly 9,000 laid down their lives for their country the record of the department is indeed a proud one, a precious heritage for ever to every member of the staff, as well as to the central administration, which shouldered as heavy a burden as any department ever had to bear, not even excluding the War Office or the Admiralty."

The Postal, Telephone, Telegraph, Savings Bank and Stores Departments all came in for a share of the praises. Here are a few of the items quoted:—

"About 85,000 men joined the military forces."

"8,780 lost their lives."

"400,000 miles of copper, bronze and iron wire, 45,000 miles of cable, and 90,000 poles were supplied to the Army."

"Ten million insulators and 11,000 switchboards were supplied."

"Thousands of tons of aluminium and other metal were distributed."

"Some hundreds of thousands of yards of cloth for uniforms were supplied, and over 2,000,000 garments were examined and despatched."

"£24,000,000 worth of postal orders were issued to meet the shortage of currency in the early days of the war."

"25,000,000 currency notes were withdrawn monthly from circulation for destruction."

"3,500,000 accounts were opened by the Post Office Savings Bank in connection with demobilisation gratuities."

"£300,000,000 worth of War Savings Certificates have been issued."

It has been stated that the first days of the New Year are meant by nature for meditating on other people's sins. Apparently we are experiencing the exception to the rule, if a rule it be, for our praise has come in the New Year. Another daily contemporary published a letter from a special correspondent in New York, who asserts that the American telephones under private control are worse than London's, and concludes with the statement that, taking all circumstances into consideration, their private ownership of the telephones and telegraphs offers no basis for a complaisant sense of superiority over the British Post Office. The standard of efficiency to which the British Post Office aims in respect of the Telephone Service given to the public is high and as will be apparent to those who have read Mr. Maycock's articles in the recent issues of this Journal, we are steadily approaching the goal reached prior to the great upheaval. Orientals say, "The darkest hour of the twenty-four is the hour before day," and there is every indication that in the London Telephone Service we have passed the darkest hour in spite of our many difficulties. It is interesting to note that the total number of working lines exceeds the pre-war figure, and during the month of November last 6,563 orders for new stations were accepted by the Contract Branch, a figure considerably in excess of all the previous records for London, even in times when there was no lack of exchange accommodation. Likewise the volume of traffic has surpassed pre-war totals. Avenue Exchange stands out prominently in this connection with an increase in 12 months of 67 per cent. of originated calls dealt with twelve months previously. The highest weekly total recorded at that exchange was reached during the week ending Dec. 20th, 1919, when 1,015,652 valued outgoing calls were dealt with. A very strenuous time is in front of the Administration if the Telephone Service is to keep pace with the demand which is foreshadowed for the future.

"Latchmere," the first of the new Exchanges to be installed in London, was opened on Jan. 10th. It is a comparatively small Exchange and is designed solely to give relief to Battersea until a new Battersea Exchange can be built. "Broadway," giving assistance to Stratford, will probably be working by the time these notes are in circulation.

It is suggested that reference to the social events held by individual Exchanges should in future appear as "Exchange notes," instead of in a running article as hitherto. They have been arranged on this principle this month and each Exchange is invited to use the space available. No change is involved in the present procedure by which the items are forwarded by the 7th of each month to the respective District Superintendents, who will pass them on to Mr. Mead at Headquarters.

ACCOUNTS BRANCH.

We have pleasure in recording the success of Miss M. Warburton, a second class clerk, who passed her final examinations for the degree of B.A. (Lond.) in November last, taking honours in French. Miss Warburton's studies have been carried on in addition to her official work, and we offer her our congratulations on the successful result.

CONTRACT BRANCH.

An agreement has come to hand on which the witness describes herself as "attractive looking dark young lady." If subscribers cannot be more serious when executing a contract it will be necessary to ask for "occupation" of witness instead of "description."

AVENUE EXCHANGE.

The staff held a very successful dance at the Bishopsgate Institute on December 13th. Those who participated expressed their appreciation particularly in respect of two items. One was the quality of the refreshments (there was no "Je suis") and the other was that the demobbed men were present once again, anxious as ever to perform their part. The Christmas dinner was a very jolly event, and a photograph taken on the occasion appears

in this column. One of the items contributing to the fun of the event was a gentlemen's hat trimming competition in which ten gentlemen competed and wore their creations for the critical inspection of umpteen feminine eyes. Such an occasion is the only chance we get to laugh at our District Superintendent.

A big effort is being made to increase interest in the Exchange library. The membership has increased within the last six months from 30 to 100 and 80 new books have been added. A sale of work has been held and as a result £10 has been raised for the purchase of new books.

DALSTON EXCHANGE.

A Christmas party was arranged by the staff at Dalston Exchange this year in lieu of a Christmas dinner. Supper was provided, after which there was a good programme of dancing and music. A special feature of the event was the carnival waltz arranged as a surprise by the Chief Supervisor who was amply repaid for her efforts by the appreciation of all present. We were

glad to have with us on the occasion Mr. Benham and other members of the District Traffic Office.

EAST EXCHANGE.

In addition to a concert which realised £18 15*s.* 5*d.*, we held a sale of work and raised another £10 2*s.* 5*d.* The sums were combined and handed to the Shadwell Children's Hospital. A Christmas dinner and social was held on Dec. 18, and all who participated had a very jolly time.

EAST HAM EXCHANGE.

A jolly evening was spent on Jan. 9, at the Carnegie Library, Manor Park, where the staff of the East Ham Telephone Exchange and their friends, numbering about 70 in all, enjoyed a Programme of 22 dances. A special feature of the evening was a Leap Year Dance (Twilight Waltz) and it was noticed that none of the male members were embarrassed by the attentions they received at the hands of the ladies.

LONDON WALL EXCHANGE.

We combined our annual Christmas dinner and social with the occasion of a presentation to Miss Huson, one of the Divisional Supervisors who retired on Dec. 16 after 33 years' service. Miss Huson has the distinction of being the first in London to retire from the Post Office with the rank of Assistant Supervisor, Class I, after entering the National Telephone Company as a telephonist. The toast to Miss Huson was proposed by Mr. Benham and seconded by Mr. Smeardon, of the engineering staff, after which she was presented with the following presents from the operating staff and engineers:—

A Berkeley armchair and cushion, fish knives and forks, stainless dinner knives, a cruet, blankets, linen handkerchiefs, fur-lined gloves, a bottle of eau de Cologne, an umbrella.

Under the auspices of the Kia Ora Club a dance was held on Jan. 6 at the Shoreditch Town Hall. It was more than successful and an atmosphere of charm and enjoyment filled the hall the whole evening. We do not claim a monopoly of good looks, but we seem to think that the proprietors of some of the illustrated periodicals would do well to send their photographers to our next dance.

MAYFAIR EXCHANGE.

Three hundred attended a dance on Dec. 20 in aid of the Hospital Saturday Fund. The catering arrangements were carried out by the staff themselves and Mr. White and Mr. Gregory acted as M.C.s. The proceeds amounted to £40 and the sum has been forwarded to Miss Heap for transmission to the fund.

TRUNK EXCHANGE.

The staff of the Trunk Exchange are organising another Bazaar in aid of St. Dunstan's and the War Seals Foundation. It will take place on March 12, at the Memorial Hall, Farringdon Street, and the Lady Mayoress (Lady Cooper) will perform the opening ceremony at 4-45 p.m. We are very anxious to see at the Bazaar our colleagues from other Exchanges and hope that we shall have many such visitors. It will be remembered that on the occasion of the last Bazaar the Trunk Exchange raised £480, and we hope to do very much better on the coming occasion. In the interval since the last Bazaar much good work has been done for St. Dunstan's by the sale of goods made by the blinded soldiers at that Institution. Miss Cureton and Miss Ferryman are to be congratulated on the result of their efforts, for the sum of £217 16*s.* has thus been raised.

VICTORIA EXCHANGE.

Mr. Mantle, who was the District Superintendent at Victoria during the strenuous days of the war, when P.B.X.s, large and small, grew with such rapidity, is now in charge of the City Traffic District, and the Staff at Victoria have presented him with two pictures as a mark of their appreciation of his work and forethought for the staff during the dark days of war.

GERRARD EXCHANGE.

The Gerrard Swimming Club held their second dance at the Irish Club on Jan. 9. A large number were in fancy costume, for which several prizes were given. The first ladies' prize was awarded to Miss Morrissey, who was attired as an Indian Squaw. Miss Moore gained the prize for the most original costume, a casement window. The proceeds will go towards the funds of the Club.

THE BAUDOT.—V.

BY J. J. T.

(*Continued.*)

WITH a slight revision, owing to the lettering of Fig. XVIII, the final paragraph on page 49 is herewith recapitulated.

Inside the distributor cage and behind the upper portion of its front plate H^1H^1, is a pair of electro-magnets EC and armature Y (Fig. XVI). They are contained in a metal framework BF (Fig. XVIII) provided with two brass cheeks, J, J, which slide easily into metal grooves A and B, fixed on the inside of the caging. This permits of rapid replacement of the coils and attachments when a change becomes necessary or permanent removal when the distributor is arranged as a *correcting* office.

The sides of the framework provide support for two screws KK upon which is pivoted the armature Y. This armature carries a tail-piece Z and a small flat buffer spring Z^1 (Fig. XVI). At right angles to Z is a bolt-headed pin p, capable of easy movement backwards and forwards in a polished steel cylinder d. When in a position of rest Z remains slightly away from the bolt-head of p while the remote end of the pin known henceforward as the *correcting pin*, remains practically flush with the cylinder opening shown on F (Fig. XVIII).

An adjusting screw S and lock-nut S^1 determine the distance of the armature from the cores of the electro correcting coils EC.

The latter are provided with a shunt, being designed to provide a minimum of magnetic inertia and self-induction. The armature is light and easy of movement. Very short local currents are thus able to energise the former sufficiently to actuate the latter. The two loose ends of the winding of the correcting coils are led out at the top of EC and provide means for making the necessary connexions by the following arrangement.

The front and back plates of the distributor caging (Fig. XIX) H^1H^1 and HH are bridged across by a pair of metal strips, one only of which, C is shown. Each strip is provided with two screws S and S^1. S serves as a binding screw for one of the loose coil ends with C, while both S and S^1 serve as metallic and electrical unions with C and the metal angle supports F^1 and F respectively.

F^1 and F are fixed to H^1H^1 and HH by means of screws W, W^1 and are insulated from the caging by means of ebonite plates E, E^1.

When a synchronising current arrives at the Movable Contact (see M. Figs. VIII and IX, p. 17) the circuit is made (Fig. XIX)

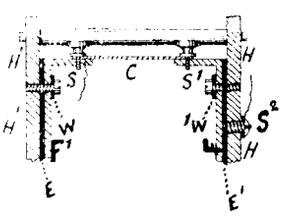


FIG. 19.

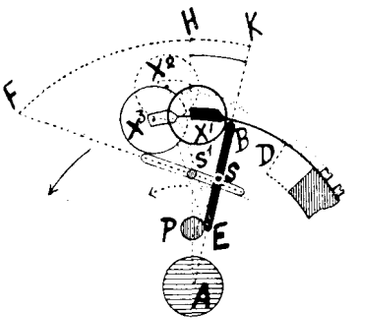


FIG. 20.

via the screw connexion S^2 on to the angle support F the strip C, and S, through the correcting coils out to the second strip through a similar series of connexions to earth. When the correcting coils EC (Figs. XVI and XVIII) are energised the armature Y is drawn towards the cores (Figs. XVI and XVIII), thus tilting the tail-piece forward and throwing the pin p (Fig. XVI) forward into the path of the star-wheel, until that moment rotating with the complete planetary mechanism already described. The insertion of the pin in between two of the teeth of V is sufficient obstruction aided by the kinetic force of the rotating system to overcome the pressure of the spring and roller-cam W which is lifted up over the top of one of the teeth of the star-wheel and *dropped* by the pressure of the spring into the next tooth-gap. By this time, the rotation proceeding, a replacing cam in the form of a double inclined plane C (Fig. XVII) replaces the *correcting pin*, pushing the latter gently back into its cylinder and also assisting the armature towards its normal position. In this the latter is aided by the fact that the coils having ceased to be excited the armature drops back by its own weight out of the way of the pin. The effect of these movements has therefore been that for a *period represented by a movement of one-ninth of the circumference of the star wheel*, this wheel has been freed from the control of the roller cam while the various pinions and axles centred round the disc DD have thus been free to move. Consequently for that brief period of time also the axle AA has been freed from rigidity with the wheels 8 and 9 which have, however, *not ceased to rotate at their normal speed*, maintained by the governor. The axle AA which is the brush carrying axle has, however, been "step-backed" by a minute fraction and thus maintained phase with the *correcting* office.

As no less an authority than Mr. H. H. Harrison has borrowed an analogy from Mr. Murray I may perhaps be permitted to quote the same, "We do not alter the going rate of our watches to correct for small deviations from standard time: we set the hands back."

This in effect is what is done in the Baudot system, the correcting current only acting when the brushes of the *corrected* distributor are *beginning* to run past the "in phase" point.

In order that the functioning of the electro-corrector system may be readily observed a steel pin L (Fig. XVIII also sectionally shown in Fig. XVI) is fitted to the rear of the armature Y. The upper part of this pin rests easily between the two prongs of a metal fork, which is extended so as to protrude above the top of the distributor caging, when the electro-correcting coils EC (Figs. XVI and XVIII) are placed in position. This extension is slotted in order to carry a paper indicator FL (Fig. XVI), the upward and downward action of the armature Y giving a semi-rotatory movement to FL at each beat of the latter. A closer study of what actually takes place when a synchronising current takes effect in the Baudot correcting system should prove both interesting and useful. The theoretical sketch arranged by M. Faivre of Paris will form the basis of the concluding observations of this special Baudot feature, but where reference is made to other diagrams it will be found profitable to study the same carefully in conjunction with the Fig. XX.

A represents the brush-carrying axle of the distributor as shown in Figs. XVI and XVII. EB represent two teeth of the star-wheel of which S is the axle. X^1 the roller cam and P the correcting pin occupy their relative mechanical positions, when the latter is in action, *i.e.*, on opposite sides of the star-wheel. The arrows mark the direction of rotation of the disc D (see also Fig. XVII). With the latter rotating and P thrown forward into the path of the star wheel which till this moment practically forms a solid part of the entire rotating system, one of the star-wheel teeth, let it be E, strikes the obstructing pin raising the roller-cam. This *tends* to turn the star-wheel upon its axle S: position X^1. The impetus of the moving mass being very much superior to the pressure which the roller-cam and spring are able to oppose, the star-wheel tooth B forces the cam on to the top of B: position X^2. Quite independantly of the general rotating movement of the disc D this permits the star wheel to rotate *on its own axle* through a certain angle. Obviously the cam cannot remain on the crest of B but drops behind, taking up position X^3 and once more holding the star-wheel rigidly. The replacing cam C (Fig. XVII) now replaces the correcting pin in its cylinder. The cycle of movement is complete. We have seen that the movement from X^1 to X^3 brought about the momentary freedom of the star-wheel from the grip of the roller cam X (Fig. XVII). This means that not only has the star-wheel been freed but that the pinion O, the pinion Q and the satellite pinion N are also momentarily freed in relation to wheel 8 and its fellow 9 (Fig. XVI). By the intermediary of this combination N has been able to "step-back" on wheel 8. Thus, while wheels 8 and 9 [controlled as they are by the *governor* axle FP (Fig. XVI)] have passed through an angle FK (Fig. XX) the disc D and the *brush-carrying* axle A have only moved through the angle FK *minus* the angle HK. It will be noted we have not modified the actual speed, only "step-backed" our brushes.

What, however, is the actual value of the "step-back" expressed *in figures!*

The momentary dis-engagement of the disc DD and C (Fig. XVI) from the wheels 8 and 9, by the intermediary of the star-wheel and special train-work, is equal to the space between two teeth of the star-wheel multiplied by the mechanical relationship of the pinions, Q, N and O.

The pinions Q and N having respectively 12 and 24 teeth the star wheel *pinion* O, 12 teeth and the free wheel No. 9, ninety-six teeth the relationship of this gearing will be:

$$\frac{12 \times 12}{24 \times 96} = \frac{1}{16}$$

Consequently with a 9-toothed star wheel the value of the "step-back" on the brush-carrying axle will be.

$$\frac{1}{9 \times 16} = \frac{1}{144}$$

of the circumference of the brush-carrying axle and thus also of the distributor plate over which the brushes rotate.

With a 12-toothed star wheel the figures work out at $\frac{1}{192}$ of the circumference.

Erratum:—Page 49, third paragraph *read*:—"$\frac{1}{2}$ to 1 per cent. higher, about 181 r.p.m.

THE "CRYSTAL" TELEPHONE.

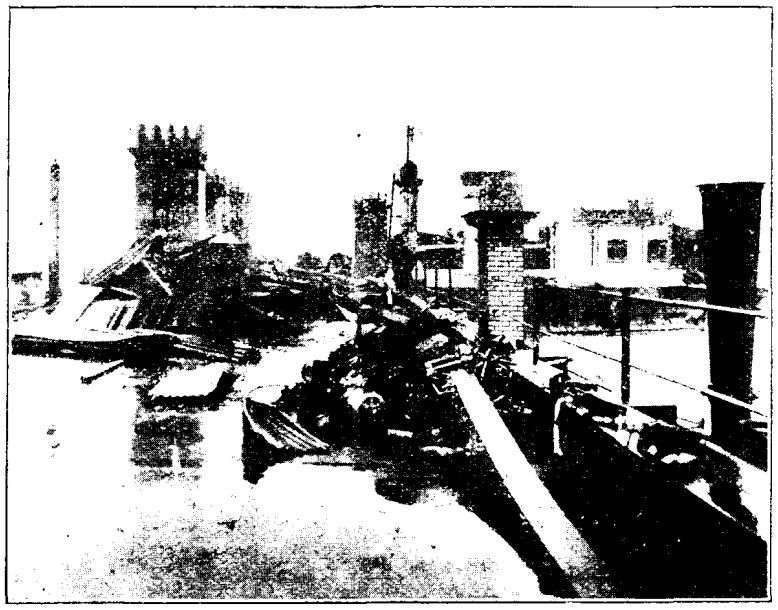
THE December issue of *Telephony* contains an abstract by A. McL. Nicolson of a paper presented at a joint meeting of the American Inst. of Electrical Engineers and the American Physical Society, Philadelphia, on Oct. 9 last, describing the effects of "piezo"-electricity in the conversion of mechanical into electrical energy and also the converse effect. "The expression piezo" says the paper, "is derived *from the Greek "piezein" to press.* It relates to a variety of solids in the crystalline state, which, when subjected to change of stress, become electrically polarised. Piezo-electricity includes, also, the reciprocal phenomenon, whereby the same crystals dilate or produce stresses when electrical charges are applied to certain regions.

"The same mechanism in asymmetric crystals which operates on polarized light to rotate the plane of polarization also causes a liberation of electricity when the crystal is elastically deformed, or a dilation when electric potentials *are applied. This mechanism is found only in the hemihedral* or hemimorphous crystal possessing either the asymmetric arrangement of the atoms in the organic molecule such as the tartrates, sugar, camphor, &c., or the asymmetric arrangement of the mineral molecules such as quartz, tourmaline, boracite, &c.

"H. and P. Curie discovered the effect and proved that it was due directly to stresses, or changes in the applied stresses, rather than to changes in temperature which, under the name of "pyro-electricity," had been known previously as a thermal-electric property of these asymmetric crystals, and the name "piezo-electrique" was applied.

"If tourmaline, boracite and quartz crystals are pressed between sharp and blunt poles, definite electrification of these poles results. If the pressure *be released a reversal of the electric charge takes place.*

"A blade of quartz cut from the crystal and coated on its sides with tinfoil, or silvered, liberates electricity, the quantity of which depends directly *on the weight which is suspended from it.* An electrification, with the object, for example, of balancing a charge on an electroscope, may thus be accurately "weighted out." This method is used in the measurement of ionization currents.



Effect of the bomb dropped on G.P.O. West in the Air Raid of July 7, 1917.

Internal Wreckage, July 7, 1917.

"Amongst many mineral and organic crystals investigated by the Curies and others, the crystal of Rochelle salt was found to have the largest piezo-electric constant. Apparently no other crystal has yet been found to approach the piezo activity of Rochelle salt, particularly if the crystal is carefully chosen and specially prepared.

"In 1917 the Research Laboratories of the American Telephone and Telegraph and the Western Electric Companies commenced an inquiry into application of the piezo electric effect. As an outcome of some of the experimental work performed, it was found that Rochelle salt was susceptible of greatly increased piezo-electric activity. An absolute electric charge has been obtained resulting in potentials as high as 500 volts and alternating currents measurable through a thermocouple. Acoustic tones from a crystal may be heard at a distance of several hundred feet."

After describing the manner in which the crystals are treated in order to obtain the greatest efficiency from them, and describing the "spring compressor" employed to compress the crystals to the necessary degree and the method of connexion with the polar electrodes, the paper goes on to describe:

"*Sound Transmitter and Receiver.* Since with these composite crystals, a given force produces the greater piezo effect when it is applied in such a way as to twist the crystal about its principal axis, and conversely, an applied electrical force produces the maximum mechanical response in the form of twisting motion, it is apparent that whether we are interested in producing electrical or mechanical results from the crystal, the diaphragms should be so attached as to make maximum use of the torsional effect.

"One way is to apply a cylindrical diaphragm so as to surround the crystal, and to attach the cylinder by means of rings to the compressor plates which hold the crystal. By screwing one of the rings over one of the compressor plates the cylindrical diaphragm itself becomes twisted into diagonal corrugations stretched tightly across the crystal poles. The "diaphragm" should be made of a strong light material, like gold beaters' skin or bond paper. When aerial tones strike the diaphragm and actuate the crystal as a transmitter, the resulting vibrations reach the crystal body through the poles and corresponding electrical oscillations are generated. Singing against the diaphragm, near resonance (the fundamental may lie between 200 and 600 cycles), will generate about 20 microamperes of current or produce 15 volts on open circuit. A clap of the hands near the transmitter will excite trains of oscillations.

"If the crystal receiver, as described, is used with a microphone transmitter and the potential is stepped up to the crystal with a transformer, very strong acoustic effects may be obtained as a "loud speaking" crystal receiver.

"*Crystal Transmitter and Receiver in a Line.* With the aid of the vacuum tube amplifier, good transmission of speech and music may be obtained by using the piezo crystal at both ends of a line as sole transmitting and receiving apparatus.

"*Some Electrical Constants.* The crystal may be considered as a leaky condenser having a shunt resistance in excess of 100 megohms. The ohmic resistance is several times greater from the analogous to the antilogous pole than it is in the reverse sense. There is, however, no evidence of current rectification. The capacity varies with size and may be as great as 10^{-8}F. in a good crystal. It is usually 10^{-9}F. Its impedance at acoustic frequencies varies from 100,000 ohms to 300,000 ohms. From these curves the so-called "motional impedance" of the crystal may be found in the same manner as the motional impedance of an ordinary telephone receiver which, as is well known, gives the resonance characteristics of the diaphragm. In the case of the crystal the dilations reach certain maxima where the applied frequency of the alternating potentials (of constant amplitude) coincides with an elastic natural frequency of the crystal. At this frequency, the apparent capacity passes through the greatest change in value from maximum to zero or negative values, depending on whether the crystal response, as a generator, is in phase or out of phase with the applied potentials. The impedance decreases to a minimum at resonance as indicated by the conductance curves."

The author says that Curie's law that the electric charge generated by a crystal is for a given force, independent of the absolute dimensions, seems to be well borne out in a variety of crystals. Very small crystals are generally less effectively rendered "composite" on account of the relative absence of the stresses during shorter growing periods. Hence they are generally less efficient. On the other hand, properly articulated crystals may be grown far larger than is necessary for effective operation. He has noticed that the crystals improve with time, particularly when they are first made, and that, when they are paralysed by being baked at too high a temperature they slowly recover. He considers that drying out is probably one cause of this improvement and also realignment or recrystallisation of disturbed portions of the crystal molecules.

It is claimed by the writer that the crystals, after several months' use, or non-use, reach a very steady operating condition in which their activity seems to be permanent, especially for alternating effects where weather conditions have negligible action on sensitive apparatus associated with the crystal. As regards general efficiency and comparison with known apparatus like the carbon transmitter and the electro-magnetic receiver, it should be said that the microphone is more sensitive than the crystal transmitter. The microphone with its associated local battery gives out more energy than it receives and hence constitutes an amplifier; while the crystal at present translates only that portion of the energy applied to it which affects its mechanically sensitive regions. The efficiency of the crystal receiver, he says, compares favourably with the electro-magnetic receiver for equivalent resonance conditions. It is not improbable that other crystals of organic constitution, *i.e.*, of molecular asymmetry, may be found whose piezo electric activity may exceed that of Rochelle salt. So far very little is known about the electrical and mechanical orientations set up in other crystals capable of developing the composite structure described in the paper.

PERSONALIA.

LONDON TELEPHONE SERVICE.

Mr. B. L. BEAUMONT and Mr. W. F. DOBSON have been appointed Assistant Superintendents of Traffic, Class I.

The following resignations have taken placed on account of marriage:—

Miss G. MOORE, Assistant Supervisor, Class II, Mayfair Exchange.
Miss E. M. GRATY, Assistant Supervisor, Class II, New Cross Exchange.
Miss C. SMITH, Telephonist, Royal Arsenal Exchange.
Miss S. L. SETTLE, Telephonist, Putney Exchange.
Miss E. BRAYBON, Telephonist, City Exchange.
Miss M. S. SQUIER, Telephonist, Wanstead Exchange.
Miss A. M. TOVEY, Telephonist, Paddington Exchange.
Miss L. FIELD, Telephonist, Victoria Exchange.
Miss M. P. HODDER, Telephonist, Victoria Exchange.
Miss H. E. WELSH, Telephonist, Victoria Exchange.
Miss L. A. JONES, Temporary Telephonist, Victoria Exchange.
Miss GIDLEY, Temporary Telephonist, Victoria Exchange.
Miss J. ALLEN, Telephonist, East Exchange.
Miss SUCKLING, Telephonist, Trunk Exchange.
Miss E. VON KÖRMÖEZY, Telephonist, Avenue Exchange.
Miss K. D. L. TAYLOR, Telephonist, Avenue Exchange.

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PADDINGTON EXCHANGE AND THE AUTOMATIC DISTRIBUTOR.

BY CYRIL D. ILIFF.

THE present Paddington Exchange was brought into service in March, 1907, thirteen years ago. Despite its age, however, it will bear comparison with many of its younger sisters, for owing to the skill and foresight with which it was laid out there are few Exchanges to beat it in the matters of suitability for traffic requirements and comfort for the staff. The building, which was specially constructed for the purpose, stands on the site of "Old Pad," and consists of five floors. The basement is devoted to the stores and linemen's room, the ground floor to offices, traffic and engineering, the first floor to telephonists' quarters, the second to apparatus and the third to switchroom. The use of the roof by Special Constables is happily a thing of the past. The switchroom runs the whole length of the building, with the 61 A positions in the form of the letter J whose shorter limb ends adjacent to the "staff" staircase leading to the telephonists' quarters. On the other side of the staircase the B positions run in a parallel line to the longer limb of the J and terminate close to the head of the "main" staircase communicating with the western end of each floor.

At the bottom of each staircase are swing doors with "panic bolts" so that egress in the case of an emergency is well provided for. The Chief Supervisor's desk is placed close to the main staircase, while that of the Assistant Supervisor, Class I, is at the other end of the room. The latter desk also accommodates the Observation circuits. The Information desk occupies the middle of the room and forms, in addition to the local complaint and enquiry centre, the Directory Enquiry bureau for the 17 Exchanges which constitute the North West District.

The B positions are entirely devoted to groups of incoming order wire junctions, and the circuits are of the latest keyless pattern except, of course, on the trunk and toll positions, the ringers being operated as jack-ended junctions on the first two A positions with facilities for team work on the third. The next 37 A positions are devoted to the handling of calls from subscribers under the ordinary conditions of "A" operating with a full multiple. Eight positions are devoted to the "School," and the last twelve form the "Automatic Distributor," the suit finishing with service, testing and electrophone positions.

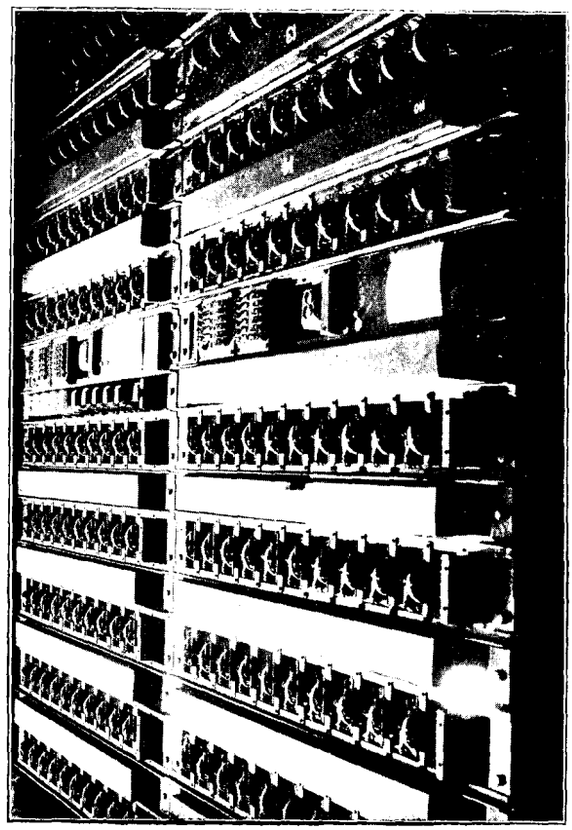
The outstanding feature of the Exchange is the Automatic Distributor. The apparatus itself is perhaps a little complicated to the non-technical, but is none the less a triumph of ingenuity and electrical skill. Its function is to connect any calling subscriber with an equipment served by a telephonist who has no call in hand at the time, thus entirely eliminating the troubles due to imperfect distribution and the harrassing of telephonists through having waiting calls blinking at them while they are struggling with difficult connections. As it is possible to close or open any of the 12 positions as required, it will be seen that during slack times at night or on Sundays one telephonist can deal with all calls that may be originated by any of the thousand subscribers without leaving her seat. The miracle is performed in the main by two pieces of apparatus called respectively the first and second preselector. They are similar in build and appearance and look something like a mill wheel with three spokes or arms. In the case of the first selector there are five rows, and in that of the second only four. These arms rotate in a circle one-third of which bristles with contacts called a "bank," so that one of the arms is always touching them. When No. 1 arm comes to the end No. 2 is at the beginning, and so on. The arms are driven round in a series of jerks, thirty of which occur every second, and as there are ten sets of contacts in the circular wall it will be seen that each of the three arms touches all the contacts once every second.

Every subscriber has one of these first pre-selectors permanently allotted to his circuit, and it is so connected that when he removes his receiver and actuates the line relay, instead of directly causing one particular lamp to glow, the arms of the selector are driven round at the rate of thirty steps per second, thus momentarily connecting with each contact in the "bank" three times. In other words the apparatus "tests" with a view to selection, each of ten "choices." The only condition to prevent a selection is that the choice has already been taken by someone else, for ten subscribers share the same set of "bank" contacts.

As soon as the arm comes into contact with a disengaged choice, the driving impulses are stopped and the circuit is then extended to the arm of a second pre-selector, which in its turn rotates or "hunts" until it finds a disengaged choice of the ten to which it has access. The contacts on the bank of the second selector are wired up to the jack and lamp of one of the 200 calling equipments spread over the 12 A positions referred to. At this stage the actual speaking circuit of the subscriber is completed by means of a relay, the line is then directly through to a disengaged

telephonist and all the other choices which lead to her position "test engaged" until the work necessary for establishing the connection to the desired subscriber has been completed.

It will thus be seen that each subscriber can have access to no less than 100 of the 200 calling equipments, provided that all 12 positions are "open"—the closing of a position causes all the choices on that position to test "engaged"—but it may happen that owing to the number of closed positions or a temporary rush of traffic all the choices on a selector test engaged. In this case the call appears on any positions available that happens to be open, and an alarm is actuated which calls the attention of the supervisor to the need for more positions to be opened. If her resources fail to remedy the trouble, the fact is indicated to the engineering officer in charge of the apparatus by a duplicate alarm fitted in the apparatus room.



FIRST PRE-SELECTOR RACK.

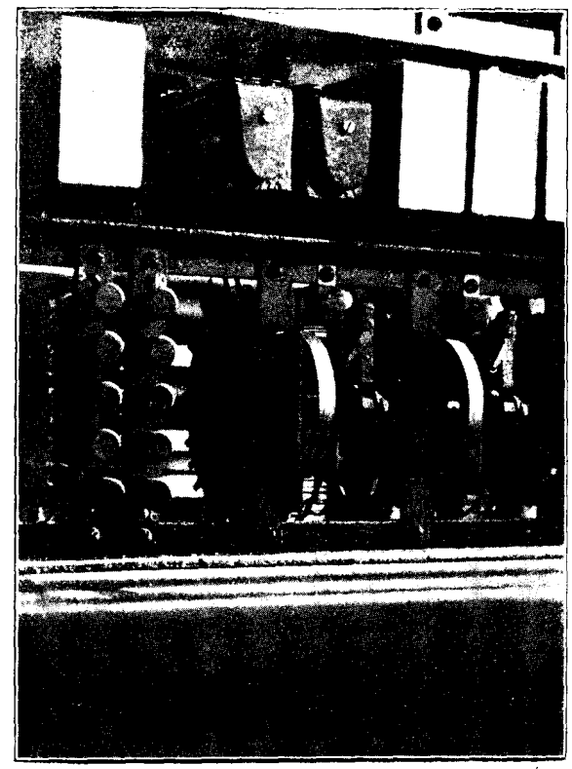
There are certain limitations in connection with a Distributor of this nature which have not yet been overcome. In the first place, as each subscriber has a range of choice over 100 calling equipments (each one of the ten choices on the first pre-selector having ten choices on the second pre-selector) and, as there are 1,000 subscribers and only 200 calling equipments, it follows that the telephonist has no clue to the Exchange number of the calling subscriber, nor yet to the class of service to which he is entitled.

It is also a somewhat complicated matter to trace a faulty circuit. But limitations of this nature generally can be overcome, and should the system of Automatic Distribution "prove itself in" there is little doubt that the various requirements will be met and fulfilled.

It is interesting to note the special problems that arise with the introduction of such a piece of apparatus as an Automatic Distributor. Situations arise which are quite unknown in ordinary operating, and the pioneer work in this direction called for—and received—a great deal of tact and perseverence.

One of the first tasks was to get the subscribers to be ready and prompt to give their own telephone number when asked to do so, and it really seemed that a large proportion of callers had no idea of what their own number was. As stated above, the telephonist has no clue to the calling subscriber's number, and can only find it out by putting the circuit under test (the exact method of doing this will be described later) or by getting the information from the caller.

Now as a certain proportion of the subscribers were "message rate" and the rest "unlimited," it meant that offers to complete ineffective calls must either be made universal or abolished altogether. The former alternative being chosen, offers to "complete" are made to "unlimited" as well as to "message rate" callers, and at first it called for much alertness on the part of the telephonist to get her question as to the caller's number understood before he replaced his receiver. It was difficult in some cases to persuade the caller that the telephonist really did not know his number, but in time the subscribers became quite well-educated. Some

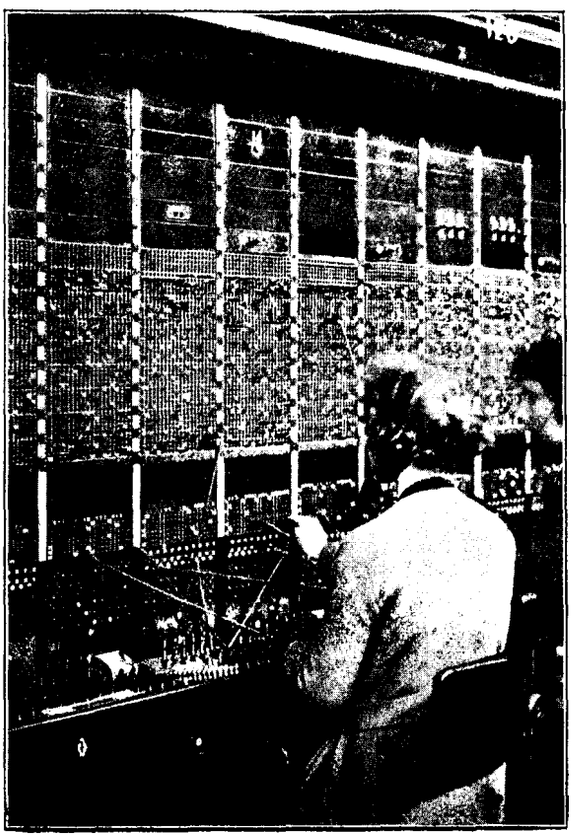


SECOND PRE SELECTOR.

indeed rather overshot the mark and translated the salutation "number please" into a query of this nature, and promptly replied with their own number. The telephonist of course tested the line in the multiple, found it "engaged" and advised the caller accordingly! The complications arising from this can only be realised by the telephonic mind, and the remedy was none too easy, for the absurdity and incapability of a telephonist who didn't even know the number of a calling subscriber could only be equalled by one who didn't know whether the number you were asking for was your own or the one you wanted! It is to be feared that some of them thought that they were being made the victims of a practical joke. However, time and patience have worked a wonderful change, and few difficulties of this nature now give much trouble.

It must be perfectly obvious that co-operation between Engineering and Traffic Staff—always essential to smooth working in an Exchange—is still more so when dealing with an equipment of this nature. Conditions arise which only exist so long as the particular connection is set up along the particular pre-selectors and the same choice on those pre-selectors, so that to get to the root of a trouble, it is essential that faults should be reported to, and taken up by, the Engineering Staff, before the connection is released.

For this purpose a circuit from the Apparatus Room is multipled so as to be within reach of every position. The insertion of a plug actuates a buzzer in place of the ordinary bell, and by this means a fault can be reported and located in a matter of seconds rather than minutes, the Telephonist reporting direct to the Inspector of the position, lamp number, and nature of the trouble experienced. Should it be necessary to put a circuit under test by means of a



ONE OF THE DISTRIBUTOR POSITIONS, PADDINGTON.

plugging-up line, the "A" Telephonist connects the faulty circuit to the Testing Telephonist's position by inserting a special "transfer" plug into a jack immediately above that associated with the particular calling equipment.

This causes a lamp to glow on the Testing position and indicates to the Testing Telephonist that a circuit requires tracing. This is effected in three stages. A strip of ten jacks is tested for the ordinary out of order "tone" and the jack on which this is found shows the "rack" on which the faulty circuit is working. There are ten racks, each accommodating ten "panels" of ten subscribers. Having found the rack, the "panel" is traced by similarly testing the ten jacks associated with that particular rack. The ten subscribers' lines working on any particular panel are then tested in the subscribers' multiple,s the numbers being ascertained from a card index kept on the Testing position. The process sounds a long one, but as a matter of fact it really only takes about 20 or 30 seconds at the outside. On an average there are 15 tests to be made, the first ten of which are on two sets of consecutive jacks, and an experienced telephonist can make very short work of the whole process. Having ascertained the number, the line is tested and dealt with in the ordinary way.

Space prevents anything like a full description of the Distributor. Its "loads," "relays," "channel indicator," "flooding counter" have not even been touched upon; it is a case where realisation to the full requires personal inspection, and even then it requires an effort. The Exchange itself has been rather eclipsed in this article—much might be written about the *esprit de corps* that exists between the Supervising and Operating Staffs—but we must cultivate modesty and not give cause for jealousy! This

GENERAL VIEW OF PADDINGTON EXCHANGE.

much must be said, however, that "Paddington" is to every member of the Staff, both Traffic and Engineering, a word to conjure with and the reputation of the Exchange and its service lies very near to their hearts.

In closing I would wish to acknowledge my thanks to Messrs. Hills and Stradling for their unwearying patience and freely-given information with regard to the technical side of the work, and to Mr. Oldham for his excellent photographs.

TELEGRAPHIC MEMORABILIA.

THE gathering of C.T.O. veterans past and present, to give a send-off to Mr. C. S. Keen, Assistant Superintendent of the C.T.O., on the occasion of his retirement from the service was an unique gathering. Never before, probably, have so many past members of the C.T.O. foregathered to welcome an old colleague to the blessed realms of the pensioned! It is hoped that the function will be specially dealt with elsewhere in these pages, meanwhile the greeting extended to Mr. A. Eames, an ex-Controller of G.P.O. West must have been gratifying to one who it is satisfactory to note, bore his considerably more than three score years and ten with happy, lovable dignity. To the more than respected Charlie Keen a tender parting word of sincerest regret at losing so good a friend from our midst.

A commencement has been made with the C.T.O.War Memorial Fund which augurs well. That it should be anything but a real success is unthinkable. The bulk of the receipts will go to the endowment of a bed in Bartholomew's Hospital, the gates of which are always open to the sick and injured. These gates, by the way, still bear the marks of bomb splinters, undoubtedly intended on more than one occasion for our own building in St. Martins-le-Grand, and which as we know from the photos in our last issue they finally reached—with some intensity!

Except on very special occasions since November, 1918, one has noted the reluctance of both staff and supervision to attend social and other office meetings. The reason is not far to seek. Men, if any specially, then those who have returned from active service, seem more than ever desirous of getting back to the real joy of home and its hobbies. The relaxation of office needs for the greater part of the staff has released thoughts from over-concentration upon "the daily round and the common task" of telegraphic duties.

This leads one to enquire, "What are the hobbies and recreations of the telegraphist?" Without rummaging one's brain for oddities in the direction of out-of-the-way relief from business

pressure, one may say at once that gardening and music loom large. The technical side of our vocation has many votaries, who, quite apart from any hope of official acknowledgment, dive deeply into the "whys" and "wherefores" with the most satisfactory results. Model-making, carpentry, joinery, and cabinet-making give relief to both mind and hand to not a few. Photography, largely limited during the war, has once more come into its own, while the extremely delicate art of *micro*-photography is not unknown. Literary, religious, and economic studies absorb the attention of others. Even geology and astronomy are not without followers. One follower of the latter science satisfactorily calculated the impossibility of the end of the world as prophesied by the American astronomer for Dec. 17 last.

He sat down and, after some abstruse calculations, declared, "Well, that planetary conjunction has happened many times before in the world's history without fatal results," so we all went away comforted and ordered our Christmas dinner, and are glad now that we had confidence in our true prophet!

It is still winter, but outdoor sports have not been forgotten. One hears of a challenge from French telegraphists from a Rugby *équipe there*!

From a "Transport" friend it was suggested that the duties of the Post Office Staff should be so re-adjusted that as far as possible the minimum number of Post Office servants should travel at the peak-load traffic periods of London's railways, tubes, trams and 'buses. Had it not been a breach of departmental regulations I would have given him a copy of an ordinary Divisional duty chart, but he smiled when 3 p.m. to 10.37 p.m. and similar odd minute duties were mentioned, and wanted to know all about it. There is however nothing more *sacrosanct* in leaving the office at 10.30 than in quitting it at 10.37, although there may be other arguments in favour of a more conventional hour. My friend had not the gift of seeing other people and their conditions as they see themselves, so I had to leave the matter.

One is glad to hear the Telephone and Telegraph Society opens wide the doors of membership to officers of the London Postal Service. It is understood that membership will be free for the remainder of the session to any of the L.P.S. who may care to assist the membership with their presence. It may also be useful to place on record that the two remaining engagements of the Session are:—March 16, "Idiosyncrasies of Subscribers," by Miss Knapman (L.T.S), and Miss A. Chillman (C.T.O.); and April 20, "Developments of Wireless," by Mr. E. H. Shaughnessy, O.B.E. (E.-in-C's office). The place of meeting is the S.S. Union Lecture Hall, 56, Old Bailey, E.C., and the hour 5-30 p.m.

The Y.M.C.A. Victory Fund is considerably the richer for the C.T.O. collection, notwithstanding the many calls upon the slender purses of the latter. The Foreign Branch alone subscribed over £14. St. Dunstan's Hostel was also the gainer by the sale of Victory souvenirs amongst the various staffs a total of £47 being realised. It is well that the latter institution should be ever in remembrance in this practical way. Unfortunately, contributions to this *unique* work of helpfulness for our blinded men have fallen off considerably of late. The sum of over £50 has in addition been subscribed by the staff and supervision of the Cable Room in aid of the widow of a telegraphist, unfortunately excluded from the benefits of the "lump sum" by the very disease to which her brave husband succumbed, after a most pathetic struggle.

The following short extract from Sir J. J. Thompson's lecture before the Royal Institution, on "The Educational Properties of Crystals," should be interesting to those readers who have perused the account of the Crystal Telephone. The learned lecturer said:—"Quartz crystals run in twins and whatever one twin does the other twin is sure to do the opposite! Tourmaline crystals are more reliable. By the application of pressure to the two ends of a tourmaline crystal it is electrified positively at one end and negatively at the other, the amount of electricity developed bearing direct relation to the pressure applied. By means of electricity generated in this way it was possible to draw the curves enabling the exact time at which an explosion, whether by gunfire or otherwise, took place, to be calculated."

Major H. J. Round read a lengthy and extremely interesting paper before the I.E.E. Wireless Section on Jan. 14, on "Direction and Position Finding." The need for checking and counter-checking calculations and readings when engaged on the delicate task of locating wireless sources is rendered imperative by the fact that both continuous waves and spark waves give extensive variations, the former giving much greater variations than the latter. When signals come over-sea from moderate distances and practically no land intervenes, results appear to be most reliable. If, however, there is land anywhere near either the transmitter or receiver or between the two, results become unsatisfactory. In England, according to the lecturer, variations from east to west are greater than those from north and south, but when in American waters or "out East" these conditions again vary.

It was noticed when Zeppelins were well at sea that night errors were not, generally speaking, serious, but aeroplanes always gave trouble. In this connexion a curious feature is that if the aeroplane reverses its direction then the error in reading becomes a negative one instead of a positive one.

With all these and other factors to bear in mind and to allow for, it may easily be realised how essential to success is a perfect system of checking results. The lecturer playfully hinted that on one occasion when only utilising two checks upon observations made, the variations led to the production of a result which located the German fleet some considerable distance in the *interior* of Germany!

In locating enemy submarines during the war the Major stated that the Germans used a very powerful spark working on 400 metres, and very much doubted whether a signal was ever made by one of these without the record being taken by British stations.

In giving the results of these location particulars, the lecturer related the story of an Austrian submarine in the Mediterranean. In these waters we were forced by circumstances to adopt a system of wireless intercommunication with the observation stations and the intelligence centre. Having lost his own bearings this particularly wily submarine commander brought his boat to the surface, sent out some signals, then waited for the British centre to give the result of the readings and calculations, which having intercepted, the courteous enemy "thanked us and then submerged."

In other localities nearer our own shores we were more favourably situated. Here the lecturer paid a welcome tribute. He said, "A system of good *rapid land-line* communication to a centre was very essential, and our Post Office in England and the Army authorities in France did magnificent work in this direction."

According to the proceedings of the American Institute of Electrical Engineers of October last, Mr. Alexanderson states that the rate of wireless telegraph transmission from existing first-class stations is about 20 words per minute, that is on the five first-class stations which operate on wave-lengths between 12,500 and 17,000 metres. "It is probable," he adds, "that the future speed of a transmitting system" (for which the author is responsible), "will average 100 words per minute: also that the selectivity with regard to wave-length will permit the wave lengths of messages to be within one per cent. of each other. Thus, whereas 12 first-class stations is about the limiting number for the world with present radio-practice, there are prospects of increasing this limit 175 times.

From *Les Annales des Postes, Télégraphes et Téléphones* we learn that the experimental department of the French Telegraphs has used alternating current to supply the telegraph apparatus, thus avoiding the use of cells. The system is described as an unqualified success, and it is proposed to adopt it for other large telegraph centres working Morse, Hughes, Baudot, etc.

The recent article in *The Post* on "A Miniature London," by C. D. H., appeals to the writer as a gem of poetic fancy. There are some of us also to whom Telegraphy has never quite lost its poetic side. To touch a key and instantly obtain an answering throb from across the Atlantic, to hear from the Italian capital that the carnival is passing, and from a Swiss office that the staff are all sick and have gone home to bed, to be able at one instant to touch intelligencies on the icy coast of Murmansk, and the next, to exchange greetings with a Mediterranean port. All these feats of wonder are possible under one roof in the centre of the City of London. Is it not a greater Wonderland than some of the fairy stories of our childhood? But C.D.H. does better with his "Miniature London," i.e., Mount Pleasant sorting office, for he covers every nook and cranny of The Mount, every duty, every office, every commonplace within it with the dainty toilette of a happy imagination, even the refreshment bar becomes his Hotel Ritz. Happy man!

A fairly recent number of *Business Organisation* directs attention to the fact that the "All Red" cable route, so much discussed prior to the war, became an actual fact owing to the war itself. It adds the information that the last link, that from London to Halifax, Nova Scotia, was actually contributed by Germany, as the cable itself is one of the late German Atlantic cables. But the details of this and other submarine cables and what is to be done with them, is it not written in the ponderous book of the Peace Treaty?

"The importance of a true education in science is that it leads to love of accuracy as to facts, loyally to scientific truth, unwearying labour in obtaining it, and care in the inferences derived from it." *American Paper.*

There is a criticism regarding the C.T.O. War Memorial which one both hears and reads and which while undoubtedly voiced in all earnestness and sincerity does not appear to allow for the *other* view. Briefly translated and condensed it resolves itself into: "Would it not be better to spend the money on something more practical than a tablet in metal or stone? Why not on something that would alleviate the sufferings of those maimed and broken by the war." Can it be truthfully said that the Post Office staffs have neglected this latter phase of helpfulness? I know of no office, no exchange, no depot, no department, large or small, which has not done its part in this direction throughout and since the war, even apart from the magnificent effort of the Post Office Relief Fund. The C.T.O. War Memorial Fund itself expects to devote five-sixths of the total amount to an extremely and lastingly practical purpose. If the remaining sixth be spent upon something which will always mutely speak to us of the sacrificial side of life one feels somehow confident that the sincerest critics will not begrudge us the sweet incense of our box of spikenard ointment. There are needs of man which even the bread that perisheth do not satisfy. Is this not one? As though to reassure these same kindly hearted critics that the hard matter of fact side is never absent from the minds of the C.T.O. staff it may be useful to place on record that the appeal for starving Austrian children is being generously met by many of these same folk who have already well responded to the War Memorial appeal.

* * *

Mr. Pendry's new and enlarged edition on the Baudot Telegraph System is now opportunely published. The additional matter, which includes phonic wheel drive, the Gulstad relay, and divided duplex, itself justifies the enhanced price.

* * *

Another sign of the gradual settling down of Europe is the opening of a telegraphic route from this country to Bulgaria *via* Paris and Vienna. Whether this will prove to be a permanent "best" route remains to be seen. It is at present the most direct and is a hopeful sign to all those of us who are watching the straws which blow towards sounder and more real peace conditions.

THE following from an appreciative telegraphist listener to Mr. Allen's paper, read before the T. and T. Society on Feb. 17 should in some small way compensate for the woefully sparse attendance.

"It was a masterly, comprehensive and illuminating lecture that Mr. W. H. Allen, O.B.E., delivered at the S.S.U., on Feb. 17, on the subject of "Materials and the present Economic Conditions." It was a rare pleasure to hear the story of the inflation of costs unfolded in logical sequence and with such lucidity in its manifold bearings and inter-relations. The Stores Department, of which Mr. Allen is the Controller, has its hand on the responsive pulse of the markets: and the speaker detailed in his paper a complexity of factors that have resulted in the world's present intensely febrile condition. The diversion of the energies of many millions of human beings and tons of machinery for five years to work of colossal devastation has been followed by a world shortage of material and transport difficulties. Heavy demands have led to soaring prices, and these in turn have given rise to claims for increased wages accompanied by demands for reduction in hours of labour. Behind all this there are the sinister operations and machinations of trusts and combines cutting out free competition so that it no longer governs the business world in the production, transport and distribution of goods.

The lecturer covered an immense ground, and dealt with all phases of industry and with figures running into millions. He showed that not only the large factors of the extractive and marketing processes, of labour and transport, but also the pilferings, bad debts, delays in docks and percentages for contingent disturbances and uncertain elements in the industrial situation enter into the purchasing price of commodities, inflating charges and costs of daily necessities by from 100 to 400 and even 600 per cent. The making of a shirt is an intricate business; there is apparently a subtle and invisible chain of connexion between clover crops and cats and maiden ladies; and insulating silk is scarce and costly because, for one thing, it is fashionable for ladies to wear silk stockings."

J. J. T.

THE TELEPHONE STAFF IN PARIS, 1919.

AFTER jogging along for what bade fair to be a life-time, suddenly something in the form of adventure came my way. This came at the end of June, 1919, in the form of an expedition to Paris, to work with the British Peace Delegation.

We set out, a party of forty-two, on June 28, and after an uneventful journey reached Boulogne, in the midst of a perfect tornado of noise: railway engines shrieking, the syrens of every boat in the harbour giving intermittent blasts, and every other instrument capable of emitting ear-splitting sound, uniting in an indescribable orgy of noise, continuing for over an hour after our boat reached the quay. This manifestation was the welcome given to Marshal Joffre who had been spending a few days in England, and returned to his native land by our boat and train. I hope he was pleased with his reception, but think he was probably as glad as we were when the hubbub ceased. Joffre had to pass along the platform on which our party was assembled after he had been received by the port authorities, and we formed up on either side to allow him passage way. We were compelled to regard him with a great degree of admiration, so gallant his bearing, so erect his walk and with such a splendid swing, in spite of his stoutness and a slight lameness.

ON BOULOGNE QUAY.

The twenty-eighth day of June of our journey is an historical date, and we reached the French capital in the midst of the excitement and rejoicing consequent on the signing of the Treaty of Peace by the Allied Nations and Germany at Versailles. The vehicles (rather uncomfortable ones, for those we were to have had were commandeered for other purposes) which took us

across Paris from the Gare du Nord to Passy had to cut their way through what appeared to be dense masses of people, all wildly excited but perfectly orderly. One can realise how difficult is the housing problem of Paris when looking upon such a marvellous crowd as this, and upon that other even greater, which thronged the streets on July 14.

The arrival of a large party of women caused some little commotion in the quiet and dignified Avenue in Paris in which our hotel was situated, and I heard two dear old ladies both carrying thin loaves of bread about a couple of yards in length, bits of which they kept breaking off and munching speculating eagerly as to whom and what we were, finally settling to their satisfaction and great content that we were Americans. There was none to undeceive them, and they smiled amiably at us and departed on their way.

The night of this great day was a noisy one but we were too tired to spend it out of doors as the rest of the inhabitants apparently did. However, by the next day a more or less normal state of affairs prevailed.

On this day, Sunday, we were introduced to our new offices and duties by the retiring Chief Signal Officer, Colonel Waley-Cohen, who first addressed the Telegraph and Telephone staffs collectively, and gave us much useful advice on many subjects; even telling us the best places to shop and where to make for if we got lost in our walks about the city. To lose your way in Paris, it may be remarked, is tremendously easy where all the streets radiate from a central point, and to take short cuts on chance is to court disaster.

We saw over our switch rooms at Astoria. These, I was sorry to find, were situated in the basement, and I wondered why a telephone staff is so often stowed away underground. I think, however, our room was about the coolest in Paris during the hot spell that we got later on going out of doors at lunch time after being on duty from the early morning, was like stepping into a red-hot oven.

In this switch room we had boards carrying connexions to the different rooms in the Astoria, trunk lines to London often out of order and one also to the G.H.Q. wherever that might happen to be at the time. Trunk calls to other places in France, in Belgium, Germany, and elsewhere, we obtained via the French inter-urban Exchange and to French local subscribers by means of junction lines to our local exchange at Passy.

The volume of traffic fluctuated very considerably, dependent largely on the sittings of the Supreme Council, but the Telephone Staff had to be in constant attendance during the day and night as well as on Sundays. Our staff also had charge of the Telegraph counter, and dealt with the receipt and circulation of telegraph messages.

The telephone switch-boards were not the complete and up-to-date ones to which the London staff have been accustomed. They had therefore to learn that every connexion set up must be carefully looked after, as, even when the speakers remembered to ring off, the signal was not always received. The most effective part of the apparatus seems to have been that for the ringing, which was very strong. A military officer came through to me one day to complain that his left ear had been put completely out of action by the strong rings he had received after he had taken up his receiver, and that he had in consequence been obliged to put himself in the doctor's hands. According to his own account, this particular person suffered many misfortunes not shared by others, but we could never find anything to explain the wherefore. I don't think he liked telephones.

An operator found herself in new and sometimes difficult positions, as for instance, when an important member of the Delegation complained to her in forcible language that he was being worried by a stream of people bothering him with invitations to whist drives and other social functions and asking why such calls were put on to a busy man. An adequate answer was not readily forthcoming.

The French National Fête Day occurred a few days after we started our work in Paris. The Triumphal Procession of this victorious nation in the first year of the Peace they had won was expected to be the most imposing on record, and little else was talked about for days preceding the event. French people who could not secure seats astounded us by coolly announcing their intention of spending the night before the march in their places on the line of route to ensure a good coign of vantage. One man up a tree in front of us caused us a good deal of amusement tempered by anxiety. He was mad with excitement, and alternately waved his arms and his legs to the time of the music, and we held our breath lest he should let go his hold with both arms and legs at the same time and fall from his precarious perch.

One side of the Astoria is on the Champs Elysées, and as the tribune of the President of the Republic was immediately in front of the hotel, the Delegation staff had a fine view of the salute of the troops—it was almost as if they were the objects of it.

The March Past started at 8 a.m. on a perfect summer's morning, the procession being led by the halting steps of Frenchmen wounded in the War. This indeed struck a distinctly sad note, but it was dissipated in the exultation of the onlookers at the proud swinging gait of the soldiers of all the allied nations marching to the rousing strains of their bands.

I will not attempt a description of this memorable scene and great military pageant, as it has already been done by more competent hands, but I shall never forget the enthusiasm which seemed to mingle with a great sight of relief called forth on this glorious Fourteenth of July.

The hundreds of war-battered guns which had disfigured the beautiful Champs Elysées, were gathered up and piled in two great heaps at the two Rond Points of the Champs Elysées, in preparation for the procession. High up on the summit of one heap was the French Coq of 1914, with drooping head and ruffled feathers and triumphant on the other the Coq of 1919 his head proudly erect. One could almost hear him crowing. I was glad to find that these ugly trophies of war were afterwards cleared away out of sight and left the clean sweep of this lovely thoroughfare unspoiled.

One of the things most distressing to a Londoner was the lack of traffic regulation in Paris. In this, as in most other directions, the Parisian has a rooted objection to control, and I have seen a taxi driver swerve out of his course and side of the road to avoid a gendarme (who was heroically doing his best to evolve order out of chaos) in a way that no English chauffeur would dare do. The sight of this poor man trying to keep the vehicles within bounds, often shouting at them at the top of his voice, was intensely funny when one had plenty of time to spare, but became a serious matter when one was hurried. They do not appear to have any speed limit, or if there be no one regards it. Almost the worst offenders in this respect were the Americans who loved to see pedestrians dart from under their wheels. Until you had sufficient courage to walk boldly into the road without looking too far in either direction, it was wisest not to frequent the busy thoroughfares, for as soon as you stepped off the kerb cars seemed to spring at you out of the earth in a most disconcerting manner, and those who stopped to speculate on the chances of getting across alive usually turned back and went home the way they came or dived down the nearest Metro station and got to their destination by train. We owe Providence a deep debt of gratitude that we were permitted to reach home unscathed.

I could write at great length about the fascination of the streets, both old and new, and of this most dramatic people, but fear to weary you, so will just say in conclusion how liberal an education I found it to live in the midst of so charming a race under conditions entirely different from those at home. One got into the way of looking at things from their point of view and found it a refreshing exercise, acquiring thereby a new outlook on life. We met with unbounded kindness from all the French people with whom we came in contact, both officially and socially, and I think all members of the telephone staff will look back with affectionate remembrance on Parisians, and will regard the six months they spent in this delightful city as a pleasant interlude in their official life.

P.H.

THE BAUDOT—VI.

By J. J. T.
(Continued.)

By this time it will have been recognised that the primary necessity for a system of the Baudot type is a reliable speed governor. Especially will this be so when it is realised that the respective speeds of the two distributors, *correcting* and corrected, are to be definitely fixed within $\frac{1}{2}$ per cent., the one of the other, not forgetting also that the general speed of rotation of the brushes, *i.e.*, 180 r.p.m., means that the actual time of contact of the brushes with each segment, in a four-channel simplex for example, is only $\frac{1}{12}$ of a second.

Now to obtain uniform motion it is necessary to: (*a*) Apply a certain force to the body it is desired to move, *and* (*b*) to prevent any exterior force from acting upon the body thus impelled. The first condition is simple and obvious. The second is practically an impossibility. The Baudot governor however, provides that although it cannot *prevent* any exterior force *acting* upon the speed of the distributor it can so arrange that the disturbing factor or factors are neutralised in their action and equilibrium is restored as quickly as possible. It determines the speed, and in addition thereto, compensates within certain limits for variations in the driving power of the distributor, varying friction in the bearings introduced either by occasional metal dust, irregularities of manufacture or by the throwing in and out of gearing of necessary working parts. We shall have noted the latter in our study of the mechanism of the correcting system just terminated.

Fig. XXI shows the Baudot governor:— A. Full lateral view. B. Bird's-eye view. C. View taken from underneath metal block M.

Fig. XXII gives: D. End-on view. E. View in reversed position to A., but profilic. In the following description, where it is not specially stated, Fig. XXI (A B & C) and Fig. XXII (D & E) are intended.

The tubular portion N has a saw-cut, shown in C and E, and, aided by the adjustable screw-grip O forms a means by which the governor is firmly fixed on to the governor-axle F of the distributor

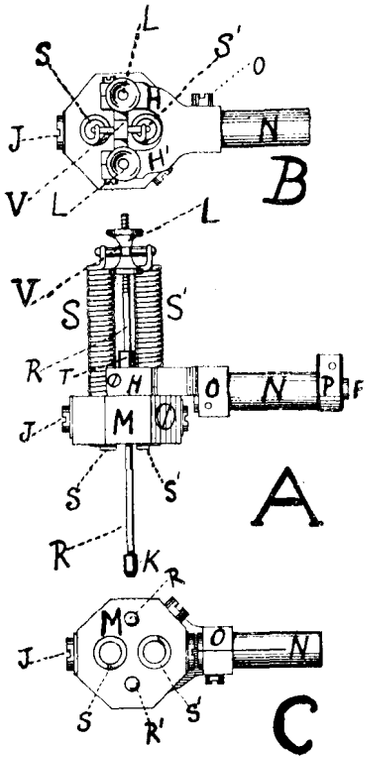


FIG. 21.

(Fig. XXI A., see also F. Fig. XVI), fitting on to the latter axle as a metal sleeve. The piece P (Fig. XXI A.) is fixed independently on the axle F, and forms a limiting stop for the position of the govenor upon it.

Mention may be made that the correct position of N upon the axle F is at that point where the saw-cut is in line with the slit of the piece P which latter thus acts as a counterpoise to O. The other extremity of N terminates in a stout two-pronged fork HH^1 (see A, B, D and E). One each of a pair of steel grinding-rods RR^1 is rigidly fixed into and passes through the respective prongs of N, being soldered to the latter by means of small nuts TT^1 (Fig. XXI A, Fig. XXII D and E.).

Each rod is fitted with a small screw stop-block KK^1 at one end and with a pair of lock-nuts LL^1 at the other.

The adjusting bar V (Fig. XXI A, B and Fig. XXII D, E) has a small cross-piece fixed at right angles on to which the springs SS^1 are hooked, the bar itself *resting evenly* upon the two lower lock-nuts. The metal block M which weighs 35 grammes is capable of free movement along the grinding rods and towards KK^1 (Fig. XXII D and E), the lower ends of the springs SS^1 being fixed in M, but so adjustable that any given number of convolutions may become *active*, *i.e.*, the springs can be effectively *shortened* by screwing them into the block and *lengthened* by screwing them *outwards*, a small angular piece of thin steel (W Fig. XXII D and E) being inserted in M across the path of the springs and held in position by the screw J for the purpose.

The active length of the springs once fixed their *tension* may be varied by lowering or raising the adjusting-bar (known sometimes by the French word *potence*) by means of the lower lock-nuts, the upper lock-nuts clamping them firmly in the determined position. Each pair of springs is very finely balanced before leaving the factory so that each spring is mechanically exactly equal in pull and any adjustment necessary should be made with corresponding equal delicacy. Each spring should always have the same number of convolutions in activity and the pull of the adjusting-bar V should be absolutely level.

At rest the block M remains against the fork-prongs HH^1 being held there by the springs SS^1. When the shaft F rotates carrying N with it the centrifugal force developed will be sufficient

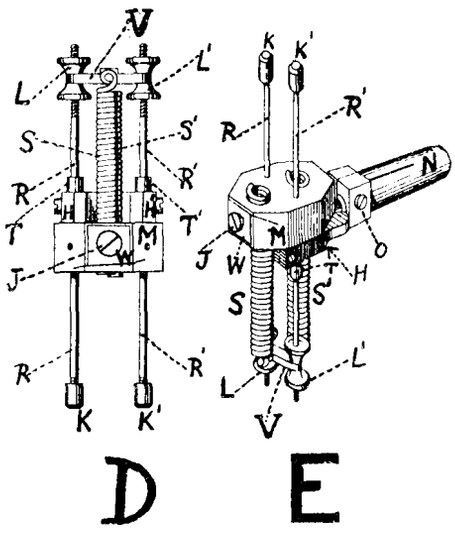


FIG. 22.

to overcome a certain tension of the springs and thus to throw out M along the guiding rods in the direction of the stops KK^1.

A study of the principles which regulate the Baudot governor and its adjustments will follow in the succeeding article.

(To be continued.)

REVIEWS.

"Telephonic Transmission" (Theoretical and Applied), by J. G. Hill, Assistant Staff Engineer, Post Office. Longmans, Green and Co., 21s. net.

This book is the most complete disquisition we have seen on the problems connected with the study of Telephonic transmission. With its eight appendices, it contains full information as regards the basis of fundamental formulae and the results of many practical experiments tabulated in a convenient form or expressed in curves. Mr. Hill deals at length with the methods of measurement by standard calls, the many disturbing influences, and the improvements in transmission efficiency effected by loading the conductors continuously or by spaced inductance coils. In the final chapters he describes in detail the effects of amplification by the telephone relay which is known as the thermionic valve. Incidentally we assume that the name valve has come to stay, although the action of the apparatus is in no sense of the word valvular. Mr. Hill obviously shares the view of other experts on transmission that the future solution of transmission difficulties rests with the thermionic valve and its developments, which bid fair to reduce the costs of construction, that have risen so considerably in consequence of post war conditions, by reducing materially the quantity of copper locked up in the underground and overhead telephone lines.

Mr. Hill's book is edited by Sir William Slingo, late Engineer-in-Chief of the Post Office, and it embodies the latest theories and practice of the British Post Office. No student of these problems can afford to be without this up-to-date and comprehensive treatise on the subject.

Elements of Vector Algebra. By L. Silberstein, Ph.D., Lecturer in Natural Philosophy at the University of Rome. Longmans, Green & Co. 5s. net.—This book is primarily intended for those engaged in geometrical optics and secondarily as an introduction to the use of Vector Algebra. For the latter purpose it would have been better if an alphabetical vacabulary of terms had been included so as to save the beginner from compiling his own. Otherwise the matter is clearly expounded and should prove useful.

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Editing and Organising Committee - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - - W. H. GUNSTON.

NOTICES.

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

VOL. VI. MARCH, 1920. No. 60

NEWSPAPERS AND THE NAIVE.

IN its attitude to the passing events of the Telephone world the Press is perenially naive—as a recent sheaf of instructive cuttings attests. First we may turn to an account of the telephone strike in Copenhagen, which bears the sub-heading: "Strike leaves Copenhagen happy." People are described as revelling in life undisturbed by the Telephone bell and it is claimed that the strike has proved that three-eighths of ordinary telephone conversations are superfluous. We would merely remark that "superfluous" requires rather nice definition, and that we cannot imagine that the would-be users of the other five-eighths of the service are happy, unless they prefer sending messengers or making hurried journeys in trams or cabs, or fiacres or droschkes (or whatever they ride in in Copenhagen), every time they require immediate communication with a client. But the legend of the nerve-destroying telephone, its intrusion on one's privacy, etc., etc., is classic, and one's joy at surcease of it is doubtless as genuine—and as short-lived—as our desire to escape from all letters and newspapers when on holiday. Then we learn of a piquant situation in Paris where the telephonists, smarting under the criticism of subscribers, join with them in condemning the service. According to the *Temps*, special missions have been sent to England and Germany to inquire into the latest improvements. But what astonishes our naive Press is that the subscribers consider their service the worst in the world, as if all complaining subscribers in all climes and countries did not consider their telephone service the worst in the world. We may whisper that this heresy—we might almost call it orthodoxy—is heard of even in America, nay, it is particularly insistent at this moment in New York itself. Lastly, we find in the *Evening News* a congratulatory reference to the improvement in the London Telephone Service. The congratulations are reserved mostly for themselves, however, for they attribute the improvement to their "campaign" of last summer, and not to the gradual return of more normal conditions, the increase in the forces of the technical staff as its members were released from the Army, the freeing of circuits monopolised for War work, the gradual transference, in short, of the full energies of the service from military to civil ends, and the gradual fruition of development schemes resumed or put in hand on the cessation of war. To none of these is the improvement due, but to the power of the Press! It is claimed that the amendment coincided precisely with the date on which the "campaign" began. It must therefore be supposed that the telephone system is so delicately responsive to criticism that despite shortage of telephonists and the fact that many of them were inexperienced, the service suddenly improved as soon as and, indeed, before the "campaign" was fully launched, for the big guns were not brought into action until well into August, and the drop in the time of answering calls, to which special attention is drawn, occurred in July. Which is the more naive in this case, the newspaper, or those who put their faith in it? For by faith, we are told, one can remove mountains: perhaps by it one can also remove the "peak" of a curve to the position most satisfactory to one's argument.

OUR IMMEDIATE FUTURE.

As the War recedes and Peace slowly—all too slowly—proceeds, and the stirring of civil industries, awaking as from a long sleep, reacts on the telegraph and telephone service, some measure of this reaction is felt by our journal. Since the signing of the Armistice the circulation has steadily increased, in some instances by small and in others by fairly large quantities, and all the while an ever-growing stream of subscribers flows in from the Continent and from the Colonies. To this gratifying result we naturally wish to respond by keeping the subject matter of the journal at a high level, and we should gladly increase its size were we not precluded by the heavy cost of printing and paper, and by the low rate of subscription which, after careful consideration, we find it in our best interests to maintain. Nevertheless we shall endeavour by the insertion of occasional extra pages, as in our February issue, to keep pace with the steady flow of contributions on all subjects, which is another gratifying feature of the revived interest in our undertaking. As we announced in a recent issue we had (and still have) many articles in hand, which we are compelled to hold over; but in saying this we do not wish to discourage contributors who have anything of interest to write upon. On the contrary we are eager to hear from our readers of all ranks and of both sexes. At the same time we would ask those who report "Welcome Home," dinners and similar reunions to be brief, for, interesting as the speeches on such occasions are, it is impossible to find room for them *in extenso* in our limited space.

In our forthcoming issue we hope to publish articles on the Anglo-Russian Telegraph during the War, and other experiences

of our colleagues in the great adventure. In an early number the lively and instructive paper recently read by Mr. Dive before the London Telephone Society and the important one by the Controller of Stores on "Materials and the present Economic Conditions." will appear. We shall announce other features of importance from time to time.

HIC ET UBIQUE.

THE Telephone Service, says the New York correspondent of *The Times*, writing on Feb. 13, once the admiration of the whole world, and particularly of visitors from London, has fallen greviously from its former state of miraculous efficiency. For more than a year past, in fact ever since the Armistice, it has been steadily and rapidly deteriorating, until to-day there is no more despised and abused institution in the world.

Cartoonists daily make the telephone the target of their sneers. One of the most striking of their recent pictures depicts an exasperated New York citizen viciously hurling the telephone receiver through the window.

The Vice-President of the Company, Mr. J. S. McCulloch, in view of this catastrophe, has issued a plea for mercy to the public. He admits that the service is bad, and cannot promise any real improvement for many months. According to him, the daily average of calls in New York before the war was 2,000,000. This number had increased to 4,000,000 on the first of the present year. Yet all through the war the telephone industry was classified as non-essential, with the result that the company was unable to make new extensions to meet the amazing growth of traffic. To add to its difficulties, its staff of operators is short by 3,000. The Vice-President announces that the Company intends to spend during the next 12 months £7,200,000 in establishing new exchanges and to add £400,000 to the amount of its pay-roll.

Meanwhile, he makes an urgent appeal, especially to the women of New York, to cease their habit of gossiping endlessly over the telephone, and of monopolising the wires with "riffraff" conversation. His proposed plan of eliminating useless calls by instructing each operator to inquire of every customer, "Is your call essential?" has, however, only brought a fresh storm of maledictions upon the Company. Leader-writers point out that the suggested inquiries would merely add to the existing confusion and lose time. Whereas before the war about five seconds was the average time consumed in establishing connexion over the telephone it now frequently takes 10 minutes, and sometimes much longer, to attract the attention of the operator.

New York has been observing with grim interest the complaints of London, and has come to the conclusion that the conditions in England cannot be one-quarter as exasperating as they are here, where subscribers, though unable to obtain the connexions they call, are daily, times without number, rung up by people who angrily shout, "Wrong number; get off the 'phone."

THE telephone companies of America, says *The Times Trade Supplement*, after having resisted for years the introduction of machine methods, have suddenly embarked on a huge programme and placed large orders for automatic telephone equipment. They have been forced to this by the conditions outlined above (*i.e.*, the difficulty of obtaining operating staff). The British Post Office now have exchanges working at Accrington, Blackburn, Chepstow, Epsom, Leeds, London (G.P.O.), Newport, Paisley, Portsmouth, Grimsby, Darlington and Stockport, and more are to follow. India is following suit. Australia has several such exchanges. France, Germany, Austria and Italy have all adopted the automatic or machine switching telephone, and it is rapidly becoming the telephone system of the present, whereas only a few years ago it was considered as an interesting possibility of the future.

The information with regard to America is interesting. We do not know precisely what is meant by "adopted" in reference to France, Germany, Austria, and Italy. We should think introduced would be the more correct expression.

BULGARIA is falling into line with the rest of Europe and introduced on Nov. 1, 1919, a new schedule of rates for telegraph and telephone service.

The new rate for telegrams is 20 stotinki (2*d.*) per word, with a minimum of 2 leva (1*s.* 7*d.*).

Telephone subscribers are divided into three classes. In the first class are included government offices and private houses: in the second class, mercantile establishments and the offices of physicians, lawyers, editors, printers, etc.: the third class comprises hotels, restaurants, cafés, clubs, theatres, banks, factories, etc. Subscribers of the first class pay 250 leva (£10) per year: of the second class, 450 leva (£18): and of the third class, 800 leva (£32). The cost of installation is additional, and varies from 100 to 500 leva (£4 to £20).

WE quote *Technical Pamphlet for Workmen*, No. P W — A.1., as follows:—

"$H_2S O_4$ is the chemical expression for sulphuric acid, indicating that it is composed of two parts of hydrogen (*by weight*), one of sulphur and four of oxygen."

This is evidently the new chemistry of a proof reader whose war acid must resemble war whiskey, by having a great superfluity of water.

WE welcome the first number of the *Indian Post and Telegraph Magazine*, dated January 1920. It is well set up and well illustrated and includes articles on postal, telegraphic and cognate subjects, reminiscences, humorous paragraphs and sketches, as well as a good portrait of the Director-General of Posts and Telegraphs and a view of the G.P.O., Bombay. We wish the venture every success.

ENGINEERING STAFF RE UNION.

ON Saturday, Jan. 17, a Bohemian Concert, organised by the Engineering Staff (Internal and External) of the South West London Area, was held at Stanley Hall, Clapham Junction. The primary object was a social re-union and welcome home to those members of the staff who have been serving with H. M. Forces. Among the visitors were Mr. Alex. Moir, O.B.E., Mr. A. Wright, Mr. J. E. Gibbons, Mr. F. W. Heath (late First Class Clerk, Engineering Department), and Messrs. E. W. Bennett and C. H. Smith, of the P. O. Engineering Union.

On behalf of the Committee, Mr. Moir extended a warm welcome home to those members of the staff who had served in the forces. He stated that when the war broke out there were employed in the London District 4,622 workmen. Of that number, 2,346, or more than 50 per cent. went on active service. He regretted to say that 165 had been killed, and he felt sure that their memories would ever be kept green amongst them. 349 had been wounded; 88 men had received decorations; 11 had been mentioned in despatches; and 25 had been promoted to commissioned rank; a record which reflected the greatest possible credit upon the men and upon the District. (Cheers). They could never fully estimate or appreciate the debt of gratitude which we owe to all those who had taken part in the Great War. They had now returned to Peace time conditions and were striving—not unsuccessfully—to overcome the arrears of work which the war had left in their hands.

He mentioned the opening of the new Latchmere Exchange on Jan. 10, an event which was quite fresh in the minds of many of those present. He expressed his appreciation not only of the excellent results achieved at the opening (there were no faults of any kind), but of the expeditious manner in which the work had been done. He congratulated the organisers of the concert on the persence of Messrs. Bennett and Smith and the staff on having such capable officials to guide and control their interests.

During the evening a presentation was made to Mr. C. H. Smith by the late "Overseas Branch of the P. O. Engineering Union."

In returning thanks, Mr. Smith expressed great pleasure at seeing so many Post Office people gathered together in such a friendly and helpful manner. It augured well, he said, for the future of "Whitleyism" in the Post Office that such gatherings were taking place, and he was sure a mutual desire existed to raise the industry to a premier position.

The organisers wish to express their thanks for the valuable assistance given by those ladies of the Traffic Department who took part in the programme. Miss Lawless (Brixton), Miss Ansell (Brixton), and the Misses I. and B. Hatherley were highly appreciated, as were Mdlle. Des Moulins and Mr. Hubert Hill in their rendering of a scene from "Il Trovatore." Messrs. G. Tilley, W. Webb, J. Coeshott, and those old favourites, Messrs H. Dapp and H. Davis, with their concertinas met with an excellent reception all contributing to make the evening a most enjoyable one.

SOME INITIAL CONSIDERATIONS OF ATTENDANCE CHARTS.*

BY D. M. FORD.

Of the many problems connected with the administration of the Telegraph Service the regulation of the attendances of the staff is one of the most complex and also one of the most interesting, and is one of such vital importance both from the point of view of the department and of the staff that it calls for close study with the view to arriving at conclusions which shall be as mutually satisfactory as possible. There are few if any administrations outside the Telegraph Service which are faced with so many difficulties as are inherent to telegraph traffic, which is subject to such marked fluctuations from hour to hour, which varies so widely in its incidence at different periods of the year and for which immediate treatment is of paramount importance. The objects to be aimed at in framing attendance charts are the closest possible correlation between personnel, traffic and delay in order to meet the varied requirements on a sound economic basis and at the same time the arrangement of the attendances to the best advantage of the staff. This matter has been the subject of serious consideration for many years but there is still ample scope for detailed examination of this highly important question. As will be gathered from the title of this paper I do not propose to enter into the working details of the construction of attendance charts but intend to confine myself to a review of some of the main principles which govern the regulation of attendances and duties in the service.

The practice which was fairly generally adopted for a good many years was the preparation of weekly lists showing the attendances and appointments of the staff for the week following. This system was not without its advantages, as it enabled individuals to be readily allocated to the most suitable duties according to the requirements of the moment, but it led to many inequalities of treatment in the distribution of attendances and duties, entailed much clerical labour and was more or less "hand to mouth" in its methods. Although the requirements of a telegraph office vary to a considerable degree at different periods of the year yet there is a large proportion of the duties to be arranged for which are standard throughout the year and, in these circumstances, it was natural that the authorities should have been led to consider the question of the formulation of some scheme to provide for those duties on a systematic basis of regular rotation. The outcome of these considerations has been the introduction of the permanent chart system which is now in general operation in all the more important offices in one form or another. The chief points in favour of the permanent chart as compared with weekly lists are the regulation of the attendances and duties on a more scientific basis, uniformity of treatment in regard to their allocation, and the reduction in the clerical labour required. It has also the decided advantage of enabling the staff to know their duties in advance for the whole period of the life of the chart.

The broad principle on which charts are usually prepared is the division of the staff of an office into sections, or rotas, of suitable size, the allocation to each rota of a series of representative attendances which are performed in turn by each member of the rota. To every attendance is given a serial number and the duty proper to the attendance is shown on a second chart under a corresponding number. A sufficient number of reserve appointments to cover sick and annual leave and various other contingencies are distributed throughout the rotas, each with its appropriate attendance in proper rotation. The duties which the reserves are required to cover do not of course fall regularly and a weekly arrangement for the reserves is therefore necessary on these cases the attendances may not be in accordance with those shown In the chart but they can usually be arranged to approximate to the scheduled attendance.

A number of expedients have been adopted to meet the irregular incidence of the traffic in the most effective manner, the chief of which are split duties and long and short duties. The former duties are peculiarly adapted to meet the requirements of the work, but are only applicable to towns where the homes of the staff are within easy reach of the office and are not suitable for application at the Central Telegraph Office nor at the large provincial offices where the residential districts are at a considerable distance from the business centre. There is little doubt that in the past an undue number of daily attendances on split duties were required at some offices but it has since been recognised that there is a reasonable limit to the system of the adjustment of attendances to traffic, and split duties are now restricted to three attendances daily and, in practice, are frequently limited to two. These duties, I believe, are not unpopular with the staff where they are in force.

I gathered from the paper which Mr. Booker read at the last meeting of this Society some very interesting information regarding the duties in the Paris Central Office and a brief reference to the duties performed by the telegraph staff in the Paris head office may not be out of place here. The split duty arrangement is still in operation there although I understand that a re-organisation of the attendances is contemplated which will eliminate the double attendance. Apart from the inclusion of the split duty the arrangements differ essentially from those in force in this country and so far as can be judged by the scheme of attendances there does not appear to have been the same effort in France to bring traffic and staff into close adjustment at each hour as there has been in this country, if the Parisian method can be regarded as typical, and if the incidence of their telegraph traffic follows in any degree the same lines as ours. Their duties between 8 a.m. and 8 p.m. are practically covered by two sets of attendances only, a split duty of 7 to 11 in the morning and 6 to 9 in the evening, and a middle duty 11 a.m. to 6 p.m.; these two attendances, with fixed duties, being performed indefinitely in daily alternation by two brigades. Their night duties are framed with equal simplicity. A certain number of men on the 11 to 6 duty return at 9 p.m. and stay till 7 a.m. a matter of 17 hours work in 24 hours — and some of the 6 to 9 duties are extended to midnight. There are no meal reliefs on either the day or night duties. Could anything be more delightfully simple! I can imagine our harassed chart constructor, labouring to fit in 20 duties or so to the best advantage, envying his fortunate Parisian *confrère* his easy task, and it is not surprising that the recent French official visitors were bewildered by our elaborate staffing arrangements. In spite of the recognised desirability for simplicity in the compilation of charts it would need a bold official to recommend the adoption of such a system to his Controller, and a more than bold Controller to put such a scheme into operation. In another important respect the French methods differ from our own, that is in regard to specialisaton on instrument and non-manipulative duties, those duties being performed by distinct sets of officers who are not interchangeable. In this connexion it is perhaps permissible to touch upon a very controversial matter the performance of circulation duties in the Central Telegraph Office. There have, for many years, been two schools of thought on this subject, one favouring specialisation on circulation duties, the other advocating their performance in turn with manipulative duties. The subject is a very complex one and the arguments on both sides are so weighty that opinion regarding the relative merits of the two systems is very divided. The policy for a number of years past has been against direct specialisation on circulation duties but it is an ever recurrent subject of discussion and the question remains one of the most difficult problems in the Central Telegraph Office. It is however somewhat outside the scope of this paper, and I will revert to the main subject.

The question of the rotation of duties is one which is worthy of consideration. Generally speaking, the duties in a telegraph office are about equally divided between "early" and "late," any duty terminating after 6 p.m. or may be 5 p.m., being regarded as a late duty. There is, however, sometimes a tendency towards a slight preponderance of late duties. In framing a chart it is a matter for decision whether the duties shall follow in regular rotation from the earliest to the latest, by weekly, fortnightly or monthly alternation of early and late duties or in the case of the long and short duties by daily alternation. This is a point which can usually be arranged to meet the wishes of the staff concerned. The performance of certain duties by a voluntary staff for a fixed period is in operation to a limited extent and this is an arrangement which is probably capable of extension with advantage. The scheduling of attendances carrying relief from duty on one day, or even two days, every week provides an inducement to undertake, voluntarily, night and late duties, and thus limits the number of such duties to be performed by the rest of the staff and provides more favourable duties as a whole. A good example of this is the "Special Staff" in the Central Telegraph Office which performs a duty from 5 p.m. to 1.45 a.m. on five days of the week with freedom from work between 1.45 a.m. on Saturdays until 5 p.m. on Mondays. This arrangement makes provision to a large extent for the heavy press work during the evening and early night hours which would otherwise only be possible by an extension of the number of late duties performed in rotation by the general staff. It has the further advantage of providing a staff more efficient to deal with press traffic than could be expected in the case of one composed of officers performing those duties at rather widely divided intervals. A special duty from 3 p.m. to midnight for 5 days weekly which was instituted on a voluntary basis in the Central Telegraph Office to meet restricted railway facilities at night has also had the effect of improving the general run of duties. In earlier years the 7 a.m. to 3 p.m. and 3 p.m. to 11 p.m. duties in that office were covered by a voluntary staff which performed those duties alternatively week by week, but that arrangement ceased some 30 years ago.

Night duty is usually performed by monthly or weekly rotation amongst the staff available for that duty, and the hours and arrangement of the duty vary considerably at different offices according to local requirements. At the Central Telegraph Office the system in force in the Inland Galleries is the performance of long and short duties of 11 and 3 hours respectively, in nightly alternation for monthly periods, by all the male staff available. In the Cable Room the night duty is from 11 p.m. to 7 a.m. with an adjusting duty of 8 a.m. to 3 p.m. performed in weekly rotation.

It is vitally important to the smooth working of an attendance chart that the permanent establishment of an office be adequate to deal with the traffic on the basis of a highly efficient service without recourse to extra duty or temporary force during at least six months of the year and in order to arrive at the staff requirements on that basis a critical examination of the traffic at an appropriate period of the year— usually April or October —is necessary. It is not sufficient to ascertain the number of messages actually signalled from hour to hour. What is very desirable is a return showing the traffic which should be disposed of each hour within a certain specified maximum delay in order that the staff provision may be adequate to deal with that traffic without carrying forward delayed work to the following hour. The delay basis will vary with local conditions and will be relatively high at offices where the greatest circulation difficulties exist. A fairly liberal staff provision during the morning hours is desirable to obviate congestion and delay at the "peak" period of the day, as a result of work being carried forward from the earlier hours. The basis of individual output will of course

* Paper read before the London Telephone and Telegraph Society on Dec. 16, 1919.

be governed by the nature of the traffic, and the types of apparatus in use, and in this connexion due allowance should be made for the numerous instances where traffic is too heavy for one and too light for two operators, but for which it is necessary to provide two operators in order to keep delay within reasonable limits, and also for those circuits which carry a poor load, but still too heavy to be coupled with another circuit.

There are circumstances which have a very appreciable effect on average output. On Concentrator and Intercommunication Switch systems the output is necessarily somewhat less than on ordinary Morse circuits, and on the other hand that on keyboard apparatus such as the Baudot and Western Electric Multiplex is higher than on Morse. Taking all the circumstances into consideration and having in view the need for a fully efficient service, a fair daily cumulative average for an office or division carrying a proportion of these types of apparatus may be placed at from 24 to 26 messages an hour. Having arrived at the number of officers required to deal with the instrument traffic, provision must be made for the non-manipulative and book duties, for circulation duties where these are not arranged separately and for the meal and casual reliefs, in fact, the whole requirements of the office or division from hour to hour in every direction must be provided for. The number of officers required to cover all the duties having been decided upon it will then be necessary to make an appropriate addition to the permanent establishment to cover the replacement of officers on sick, annual and compensation leave, and for various contingencies incidental to the working of a telegraph office such as night and devolution duties, temporary transfers, withdrawals for special events, preparation of returns, &c. The required addition for annual leave reliefs is ascertainable with exactitude, and in order to avoid waste of force in this connexion the annual leave should be distributed evenly throughout the year. The provision for sick leave cannot be fixed with the same precision, but an approximately correct estimate can be framed on the statistics of sick absence for the preceding three or four years though the abnormal conditions which existed during the war may, at the moment, render necessary a reference to the pre-war figures. The required provision for the miscellaneous replacements referred to will vary considerably at different offices.

The full staff required for working the office being fixed and the appointments to be covered at each hour being scheduled, it is now the task of the chart constructor to arrange a series of attendances to provide for the performance of those duties in the most efficient manner with the minimum waste of force at any part of the day. A certain amount of overlapping is almost inevitable but this should be kept within the narrowest limit practical, and effort should be made to so adjust the attendances as to spread any spare staff as equally as possible throughout the day. There is no clearly defined system laid down for the preparation of duty charts and indeed it would not be possible to formulate any definite scheme which would be generally applicable in detail, but there is, I think, room for co-ordination on broad lines with variation in the methods of the application of governing principles to practice to meet the local conditions at various towns.

Certain general regulations have been laid down regarding attendances which must be observed in compiling a chart, the most important of which are :—

That all officers be listed for 48 hours attendance weekly (42 hours if between 8 p.m. and 6 a.m.).

That each officer be allowed a clear interval of 9 hours for rest at home.

That the evening attendances of women should be restricted to 8 or 8.15 p.m. where possible, but in no case shall they be liable to give an attendance after 9. 15 p.m. (This instruction was waived during the war, but the present conditions generally permit of the regulation now being observed.)

That no indoor officer be required to give more than three attendances daily.

That each officer perform a fair share of night work.

That duties shall not in ordinary circumstances exceed 12 hours on any one day—including overtime.

That all officers who have passed the efficiency bar shall be employed for at least a part of the day on above bar duties.

That the seniors shall take the more responsible duties and shall perform the more important non-manipulative duties in order that they may be afforded relief from taking charge of the heavier and more important circuits.

That the attendances of learners under 16 years of age be between 8 a.m. and 8 p.m.

The increase in the number of telegraphists who have been certified to be suffering from telegraphists' or writers' cramp, and who are permanently exempt from the performance of manipulative duties and the large number of other officers who are also either permanently or temporarily exempt on medical grounds from such duties has led to many, or even all, non-manipulative duties, apart from writing duties, being absorbed by those officers, and has thus rendered abortive the regulation that non-manipulative duties are to be performed by the senior telegraphists. This is a most regrettable circumstance, especially when it is considered that many men of 50 and over are engaged on instrument duties and that it is often an unfortunate necessity to schedule them for full manipulative duties owing to the allocation of the non-manipulative duties to officers exempt from instrument work. In this connexion I may perhaps be permitted to suggest that, in view of the altered circumstances, the regulation referred to might with advantage be modified to permit of senior telegraphists taking a share of the less important duties.

I have endeavoured to touch upon the main initial considerations connected with the preparation of attendance and duty charts, and though I do not propose to enter into the working details, a brief reference to the methods which are being adopted in the Central Telegraph Office in connexion with the reconstruction of the attendance and duties arrangements in the Inland Galleries may be of interest. The chart system was first introduced into the office in 1903 and though based on lines which were theoretically sound it contained a number of unsatisfactory features which it is hardly necessary to enlarge upon here. One of its chief weaknesses may however be mentioned. This was the constant interchange of staff throughout the office which, among other objections, robbed divisions to a considerable extent of the individuality which formerly attached to them, led to a lessening of divisional *esprit de corps* and a falling off of the friendly rivalry between divisions, both in work and play, which had hitherto existed and which was all to the good of the office.

The abnormal conditions which were brought about by the war caused the weekly lists to be reverted to but the arrangements for the interchange of staff were maintained, necessarily so in the circumstances then existing.

Under the scheme which is now being instituted the office will be divided into practically self contained divisions with a staff of as near 250 as can be arranged, but various circumstances will probably necessitate larger divisions in some instances. All sections except the News Division and the Stock Exchange will comprise men and women. The former will be restricted to males with not more than 5 years' service. Each division will be split up into rotas of eight officers, with a series of representative duties which will be performed by every member of the rota in turn and fixed duties will be allotted to each attendance on the rota. A suitable number of the higher rotas will be reserved for officers on the devolution list and the last two rotas will be filled by juniors for whom the easiest circuit appointments will be provided. Special rotas will be formed for cramp subjects and others who have been granted preferential duties on medical grounds. Vacancies will normally be filled from the next following rota and they will therefore, in effect, fall on the lowest rota and thus a sytematic flow upwards will be provided. These changes will obviate the retention of officers on a limited round of duties for unduly lengthy periods. Reserves will be distributed as equally as possible throughout the rotas. An attendance in proper rotation will be scheduled and the reserve appointment will fall in regular sequence to each member of the rota, but the actual attendance of the reserves may not be strictly in accordance with the chart for the reasons which have already been referred to.

Every division will bear its proper proportion of duties between 8 p.m. and 8 a.m., although these will often be in another part of the office. Telegraphists under 21 years of age will not be called upon to perform night duty.

The attendances and duties of the unqualified learners, who perform four hours collecting and distributing duties in two-hourly periods and are under training for the remaining 4 hours, will be arranged apart from the chart, and girl probationers will be dealt with similarly.

The appointments will be arranged to provide as much variety of employment as is practicable and the extended use of the Baudot and other keyboard systems will be a valuable means of providing relief from Morse manipulation, though at present the extent of the relief is limited owing to the lack of knowledge of Morse working on the part of temporary Baudotists and will in any case be restricted to those officers qualified in both Baudot and Morse working. On duplex circuits the senders and receivers will change over every two hours and there will be a change of appointment during the day in the case of all attendances beyond six hours.

Dinner and casual reliefs will be provided for on the rotas.

Each division will be allotted a proper proportion of reliefs for annual leave, but as annual leave is arranged for the office as a whole—males and females separately—and as it is not practicable to staff divisions in equal proportions in regard to seniority a certain amount of pooling of those reliefs will be necessary.

Under this sytem divisions will not rely upon outside assistance at any time but spare staff will of course be available for distribution at the discretion of the floor superintendents.

The Cable Room presents many features which do not exist in the Inland Galleries. The work carries a large proportion of non-manipulative duties of a special character, and the staffing arrangements are to a considerable extent governed by international regulations. It will, therefore, be necessary to introduce modifications in dealing with the duties in that branch but as matters there are likely to be abnormal for a considerable time longer the question of introducing the permanent chart system is not ripe for consideration.

A readjustment of the duties in the Cable Room as a tentative measure is at the present time under consideration with the primary object of reducing the frequency of late and early duties to be performed by the staff generally. These duties have for a very considerable period formed a high proportion of the attendances in that branch but the amount of traffic which has to be dealt with between 8 p.m. and 8 a.m. is still very large, and while these conditions last the number of late and night duties must necessarily be high. With the object of furnishing an inducement for the voluntary performance of the night duties the Controller has suggested the introduction of a scheme under which attendances on four nights a week only, will be required with freedom from duty on two consecutive nights each week. The duty will be

from 9.30 to 8 a.m. and will be performed by three batches of male telegraphists on a rotary basis which provides for the attendances and free nights being spread over the week in proper sequence in each individual case. This duty is now being offered by the Controller as a voluntary duty to the Cable Room men. If brought into operation the bulk of the staff will be relieved from the performance of duty between 11 p.m. and 8 a.m. and the extent of the late evening duties will be appreciably curtailed. The experiment will be watched with much interest and the principle which it carries may be found capable of extension in other directions.

The construction of charts to meet the varied requirements of an office of the magnitude of the Central Telegraph Office bristles with difficulties, but it is confidently anticipated that the final result will lead to increased efficiency and a general improvement in the working arrangements of the office.

I am hopeful that the discussion which will now follow will be fruitful of criticisms and suggestions which will be helpful in future considerations of the question of attendances and duties of the Telegraph Service.

LONDON TELEPHONE SERVICE NOTES.

Mr. DIVE'S paper entitled "Telephone Service through Newspaper eyes," which he read before the January meeting of the Post Office Telephone and Telegraph Society attracted a good and representative audience. Mr. Dive treated his subject with a dignified tolerance which detracted nothing from his argument nor blunted the shafts which he directed against our newspaper critics. The numerous enquiries which have been received both from within and without the service concerning the printing of the paper indicate the measure of interest which Mr. Dive has aroused. It will appear in due course in this JOURNAL and we await with keen anticipation the publication of rejoinder equally dignified and reasonably courteous under the heading "The newspaper through telephone eyes."

At the fourth meeting of the London Telephonists' Society prize competition papers were read by Miss H. M. Honey of the Trunk Exchange and Miss I. Stephenson of Mayfair Exchange. The subject of Miss Honey's paper was "At school again" and dealt with her reminiscences at a Trunk training class at the Carter Lane School. It is always interesting to hear of the impressions which individuals receive when first making the acquaintance of telephony and the telephonists' craft, and it might well form the subject of correspondence in this JOURNAL. The subject could include reference to the system of training followed in the schools, and in this connexion it is interesting to read of the Binet-Simon tests, elaborated by American psychologists, which aim at grading people by their capacity for learning rather than by the amount of knowledge they have acquired. Such tests are employed in America to obtain evidence of functional fitness. The test for the selection of telephonists is to require candidates to mark on a paper one dot for each time that a given figure or letter appears on a revolving cylinder, and those who accomplish the task rapidly and accurately are considered to be capable of accurate telephone work without undue mental strain. Others equally intelligent who fail in this task make, we are told, but indifferent telephonists. Those who have had experience in the training of telephonists, and of telephonists who have been trained, will no doubt have views as to the necessity or otherwise of imposing a preliminary test of this kind.

Miss Stephenson gave a very refreshing description of her experience in France and aroused the envy of many of her colleagues who remained at home.

To commemorate the appointment of Mr. Edmonds to the post of Assistant Controller a complimentary dinner was arranged by the members of the Traffic Branch. The Controller occupied the chair and between 60 and 70 sat down to the dinner. The principal toast of the evening ("Mr. Edmonds") was proposed by the Controller who called attention to the magnitude of the work and responsibilities which lay on the shoulders of Mr. Edmonds as senior traffic officer of the London Telephone Service, which administers the telephonic facilities in an area of 640 square miles, and in which are situated more than one-third of the telephone subscribers in this country. He paid tribute to the energy and high ideals which Mr. Edmonds brought to bear on all his work and which contributed so largely to the success of the telephone system in London. In his reply Mr. Edmonds expressed his great appreciation of the spirit which had promoted the function and stated how he looked forward to the development of London's telephone system and the consequent growth of the traffic establishment. He advanced the opinion that an annual increase of 10 per cent. in the number of exchange lines was possible if the Administration was able to provide the necessary equipment, and the pulse of many of his hearers quickened perceptibly at the thought of a proportionate increase in the number of Controllers. Songs were contributed by Messrs. Beck, Collins, Jacob and West with Mr. Brodie at the piano and all voted the evening a most enjoyable one.

The staff collection for the Hospital Saturday Fund during 1919 has established a record, the total amount reaching £1,222 odd. The previous best result in any year was between £800 and £900 so that Miss Heap's appeal to the staff to celebrate Peace by an increase in contribution for Hospital work has met with a worthy response. At the annual meeting of subscribers and collectors on Feb. 4 the note of congratulation was naturally uppermost. There was a large attendance evincing the interest which the staff take in the Fund's work. An excellent speech was made by Miss Heap, the retiring Chairman, in moving the adoption of the Report. Mr. Preston, the Controller, had agreed to be nominated as Chairman for 1920, and in acknowledging his election, which was carried by acclamation, he made a pithy little speech in which he set the £1,500 goal as the next one to be attained. Mr. P. A. Inman, the General Secretary of the Fund, told the meeting of what was being done to help Hospital work in London and paid his tribute to the workers for the efforts they had made and the splendid result. At the close of the business part of the meeting the Controller performed the pleasing ceremony of making a presentation on behalf of the staff to Miss A. Reekie and Miss H. Wormald as a token of appreciation for their untiring and unselfish work on behalf of the Fund. To the former the gift was a ring and to the latter a crystal rose-bowl and pair of flower-vases. In connexion with the Fund during 1919, 717 letters entitling to dental treatment, surgical appliances, admission to Convalescent Homes, &c., were distributed amongst members of the staff requiring treatment: in this way the Fund has proved a great boon.

Feb. 5 was the fiftieth anniversary of the passing of the telegraph system of this country from private to state ownership. Congratulations! Those 50 years have been a period of wide expansion throughout the United Kingdom and of enormous progress on the technical side. Prior to the transfer the Telegraph Companies had restricted their operations mainly to the principal towns and had avoided the smaller towns and villages and remote country districts, but the Postmaster-General immediately inaugurated a policy of extending the system with the result that whereas in 1870 the number of telegraph offices in the United Kingdom was approximately 3,000, to-day the number is in the neighbourhood of 14,000. In the early fifties the Company's charges were very high, and as much as 7*s*. 6*d*. being required for a 20 word telegram to Liverpool and about 14*s*. to Aberdeen, but the Postmaster-General fixed his charge on a uniform rate of 1*s*. for 20 words covering delivery within one mile from the terminal office. We are told that the service provided by the Companies was regarded as unsatisfactory by the public. Grumbling (on the part of the public of course) would seem to be a hereditary complaint. Who will forecast the development of the Telephone Service in this country at its fiftieth anniversary under State control? Perhaps the Special Commissioner who has told us that there *would* have been ten times as many telephones in this country had the system been under private control, but that there *should* have been five times as many will be able to enlighten us on the point.

The Controller's Office.

A very successful dance was held at Australia House by the staff of the Controller's Office on Feb. 10. The staff do not all take themselves so seriously as some may imagine.

The Langham Choral and Orchestral Society.

The recent inaugurated Choral Society which has now also become an Orchestral Society is making excellent progress, and it is hoped before very long to issue invitations to the first performance.

The enthusiasm and skill of the Honorary Conductor is rapidly bearing fruit and there is every reason to expect that the first performance will be the most excellent of its kind.

Vacancies still exist for instrumentalists and bass and tenor vocalists.

North-West Traffic District.

The staff of the exchanges of the L.T.S. show a decided gift for organising dances, whist drives and other social events which all serve a most useful purpose in securing *esprit de corps* throughout the service. Some of these events are on a fairly large scale, and the annual dance organised by the North-West Traffic District and held at the Wharncliffe Rooms on Jan. 31 last was certainly one of the best.

With an attendance of 550 the capacity of the large ballroom, for which the hotel is famous, was tested to the full. The Controller was unfortunately prevented from attending, but Mr. Valentine, Mr. Edmonds, and Miss Heap were present, together with several representative parties from headquarters and exchanges in other Districts.

The chief event of the evening was the Fancy Dress Parade. Under the guidance of the indefatigable Secretary, Mr. J. Edghill Collins, the competitors marched and counter-marched with a step and bearing that formed a significent reminder of the occupation of many during the past few years. The judges, Mrs. W. J. White, Miss Heap and Mr. Edmonds had a difficult task in selecting the winners from the hundred or so costumes paraded. Miss Chetwood (Park Exchange) secured the first prize as an "Early Victorian."

The prizes were distributed by Miss Heap and afterwards Mr. Edmonds in a happily phrased speech presented Mr. W. J. White with a handsome silver plated tea service and tray, a parting gift from the staff of the North-West Traffic District on his transfer to Headquarters.

In addition to some two dozen dances, the musical portion of the programme included songs by some of the best vocalists in the Department. Mr. John Robart (baritone) and Mr. McGregor (tenor) were as usual splendid in their rendering of the songs selected, and Miss Finch's beautiful voice was heard to special advantage. There was a balance of £4 10s. which has been handed to the Hospital Saturday Fund.

Central Exchange.

The Central Exchange staff is organising another concert in aid of the War Seals Foundation, on Friday, April 9, at the Y.M.C.A., Tottenham Court Road.

We hope to have the support of our friends from other exchanges, so please come and help fill the hall—it seats 650.

Mr. A. H. Dyer, who has been the Assistant Superintendent of Traffic in charge of the Central Exchange for several years has been transferred to the North-East Traffic District. The Assistant Traffic Superintendents and Supervisors of Central entertained Mr. and Mrs. Dyer and Miss Dyer at a farewell tea, and Mr. Dyer was presented by the Central and Bank Exchange staffs with a barometer and one dozen stainless dessert knives as a mark of their appreciation.

East Exchange.

As the result of a dance and social organised by the staff a sum of £13 has been raised for the fund for the relief of the widows and orphans of the British and Foreign Sailors' Society.

Gerrard Exchange.

The Gerrard staff held a whist party at the Rangers Hall on Jan. 21, Mr. Buckeridge acting as M.C. The evening was a success in every way and the refreshments were excellent. The proceeds were devoted to the Queen's Hospital, Sidcup.

The staff have contributed £42 to the "War Seals Foundations" during the past year. The series of whist drives instituted by Mr. Arrowsmith for this deserving object are still going forward.

Hampstead Exchange.

The efforts of the Hampstead staff were fully rewarded by the success achieved on Saturday, Jan. 24, in giving the inmates of the "Northcourt Home for Sick Children," a really enjoyable afternoon.

A tea was provided, after which a play entitled "Princess Zara," was performed by members of the Dramatic Club attached to the exchange. The climax was reached at the distribution of gifts from a Christmas Tree which had been artistically dressed.

Appreciation was evident in the smiling faces of the children, in whose lives it was undoubtedly "a red letter day."

Kingston Exchange.

Whose fault?

"Pet dog has chewed wire and broken box connected with telephone—a liquid has escaped—please send lineman!"

Paddington Exchange.

On Saturday afternoon, Feb. 7, the Paddington Exchange staff entertained 300 children to tea and an entertainment at St. Augustine's Schools, Kilburn. Sharp to time the boys and girls arrived and after grace had been said proceeded to dispose of the good things provided. After tea all adjourned to the upper schoolroom, ready to enjoy the play "Aladdin," which had been prepared by members of the exchange staff under the guidance of Miss J. Yule. Between the acts Mr. D. Huline kindly entertained the children with comic songs, the choruses of which received a very fair share of attention, being repeated again and again. It is hoped to repeat the tea and entertainment to another set of children on Saturday, March 6, at St. Michael's Schools, Market Street.

Our thanks are due to all the kind friends who assisted the Committee in giving the children such a good time. It would be invidious to mention names; all the workers having one idea in common, viz., the thorough enjoyment of the children, and all worked to that end. Thank you one and all.

Park Exchange.

Oh! what a pleasure and joy it is to give pleasure to others, and especially to those whose path in life is not so joyous and happy as one's own. Full testimony to the truth of this sentiment was apparent at a tea party and entertainment given by the Park Telephone Exchange staff to 200 poor children. The funds, amounting to £40, to provide for this, were part of the proceeds from a bazaar held by the staff on Dec. 6 last. Thus the donors had the enjoyment of not only giving their services at the tea party, but had the added pleasure of knowing that it was also the result of their individual efforts.

At 4.30 p.m. in streamed the eager and excited guests, with their childish eyes wide with curiosity and anticipation. They were conducted by their delighted hostesses to the pretty tea tables where full justice was done to the good things provided.

An entertainment followed the tea, when a delightful child fairy in the person of Miss Irene Burville danced to the huge delight of the children. This item was followed by a conjuror, who amused the children with his magical feats—the most wondrous and impressive being the production of a fluffy grey rabbit from beneath a small boy's coat. Also a lady pianist played the choruses of popular songs, in the singing of which the children heartily and lustily joined. After the entertainment "Father Christmas" arrived, and accompanied by "the Fairy" gave to each child a present, some sweets and fruit. Oh! the maternal speechless faces of the recipients of the dolls and the boundless joy of pen-knife holders must indeed have been very gratifying to the donors. The evening closed with much hearty cheering for the hostesses and the children made their adieu reluctantly. Among those helping were the Misses Coulston and Cronin, and during the evening Mr. and Mrs. C. Iliff visited the party.

Regent Exchange.

Members of the Regent staff gave a New Year tea and concert to the inmates of Gifford House, Home for Discharged Soldiers, on Saturday, Jan. 10. At the conclusion of a happy afternoon a gift was presented to each man.

The second Regent social held at the Holborn Hall on Jan. 16 was a huge success. 380 were present and Messrs. Buckeridge and E. Howe officiated as M.C.'s. Dancing was the chief feature of the evening, but several musical items were rendered by members of the staff and were much appreciated. Arrangements are proceeding for further events during the next few months.

Trunk Exchange.

Do not forget our bazaar which is being held at the Memorial Hall Farringdon Road, on Friday, March 12. It will be opened at 4.45 p.m. by the Lady Mayoress. The proceeds will be given to St. Dunstan's and the War Seals Foundation.

A "WELCOME HOME" AT NORWICH.

A SOCIAL evening was held at the Bell Hotel, Norwich, on Dec. 6, 1919, to give a hearty welcome home to those members of the District Manager's Staff, Post Office Telephones, who had served with H.M. Forces.

The programme commenced with a whist drive, in which 32 members of the staff took part, Mr. Robt. P. Lowe acting as M.C. The Staff then partook of a most enjoyable dinner, at which Mr. Chas. F. Ashby, District Manager, presided. He was accompanied by Mr. T. Lakey (Sectional Engineer), and was supported by practically every member of his staff. Mr. Ashby expressed his great pleasure at being able to welcome home all members of the staff who had joined H. M. Forces, except two: one, Lt. Parish, he regretted to say, had been killed, and the other member was still in India, having taken a commission in the Indian forces.

The main toast of the evening was drunk with enthusiasm, Mr. Styles responding. At the conclusion of the dinner Mr. Ashby presented the whist drive prizes as follows:—Ladies—1st, Miss St. Quintin; 2nd, Mrs. Leakey; 3rd, Miss Smith. Gentlemen—1st, Mr. Henshilwood; 2nd, Mr. Chiddick; and special prize to demobilised staff, Mr. Cogman.

A musical programme was then proceeded with which was thoroughly enjoyed.

COVENTRY POSTAL, TELEGRAPH AND TELEPHONE SOCIETY.

THE Annual Society Gathering was held at the Lounge Cafe, Hertford Street, and proved to be a thorough success. After an excellent repast served in the buffet, the company adjourned to another room where an enjoyable programme, consisting of songs and dances, etc., was gone through, those contributing being the Misses G. Harrison, E. Buckland and B. Benham, and Messrs. S. Buckland and P. H. Moore, whilst Mr. John Mewburn was the genial Chairman.

During an interval in the proceedings the officers for the ensuing year were elected as follows:—President, Mr. J. Mewburn (District Manager); Vice-Presidents, Mr. H. H. Mears (Postmaster), Mr. H. Kemp (Executive Engineer); Hon. Sec. and Treasurer, Mr. W. H. Oliver; Committee, Misses A. M. Day and E. D. Tilley, Messrs. F. Alcock, A. T. Bell and S. Buckland, H. Rees, H. D. Smith and G. S. Weston.

The proceedings closed with all present participating in "Sir Roger de Coverley," followed by the singing of "Auld Lang Syne."

C.T.O. LADY SUPERVISORS' REUNION.

UNDER the auspices of the Lady Supervisors' Club, a very enjoyable evening was spent at the Sunday School Union, on Friday, Jan. 2. The guests included supervisors past and present, and were welcomed by Miss Moore (President), assisted by Misses Barnfield, Russell, Mayersbach, Wallis, and Wright. An interesting and varied programme was provided for our entertainment. Misses Wyatt, Sault and Tynan afforded much enjoyment in the skilful and charming rendering of their various songs. Special thanks are due to Miss Tynan for her singing of "The Old Plaid Shawl." Miss Gibberd excelled in her recital of "The Butterfly," and unexpected elocutionary talent was displayed by Miss Ashdown in her presentation of "A Ghost Story." Excellent refreshments were supplied under the experienced management of Misses Jolly and Clarke, and were dispensed by the respected "heads" above mentioned, familiarly and affectionately termed "The Brass Hats" by their junior colleagues, who enjoyed the novel experience of being waited on by their superior officers. The interval furnished a good opportunity for social intercourse, and pleasing reminiscences were exchanged between friends and acquaintances. The *pièce de résistance* of the programme however, was, like the good wine, reserved to the last. Speculation had been running high as to the nature of the sketch to be performed, and the personnel of the caste. The sketch resolved itself into a farce entitled "A Mere Man," the *mise-en-scène* being "The Emancipated Ladies' Club." Congratulations are offered to all the performers for the natural and finished acting of their various parts, and special mention must be made of Miss Barnfield and Miss Shacklock. Miss Barnfield, as president of the Club, sustained her rôle with dignity and naturalness, and Miss Shacklock gave an excellent character sketch of a "Frumpish Fright," one of the recalcitrant members who failed in loyalty to the rules of the Club and its president.

The programme was hereby brought to a triumphant conclusion, and the success of this, the first dramatic venture of the Supervisors' Club, augurs well for future performances. The hours passed all too quickly, and the evening closed with "Auld Lang Syne."

A MEMBER.

A "STRIKE" NOTE.

THE following interesting note from our Bristol correspondent, relating to the Railway Strike of last October, has been held back until now by the great pressure on our space:

Owing to the disproportion in the number of kicks and halfpence distributed by a grateful public to the long suffering "telephones," the occasion of the bestowal of a little capital in the shape of a few of the aforementioned small coins may perhaps be recorded. The locale is Bristol, the occasion the Railway Strike. The first scene opens with the Road Transport Office, which controls the South-West of England, in hopeless congestion, telephonically speaking. The organisation of the telephone arrangements was taken in hand, which in addition to the immediate provision of additional circuits and instruments, necessitated the supply of a competent telephonist, who I may say, in no small way contributed not only to the satisfactory working of the telephone communications, but indirectly to the urgent and important transport work which passed through her hands. The former included the displacement in one night of a switchboard for one of larger size, which was only rendered possible by the Ministry of Transport conveying the necessary apparatus by special road service between Bristol and London. The enormous trunk and local service, including a soaring telephone-telegram traffic—the latter 1,000 per day above the average—could only have been dealt with, as it was, by the devotion and ready willingness of the staff concerned—which in my experience I have not seen equalled. The result of the combined effort in which I particularly wish to include the Engineering staff, as their work contributed an equal share in the work done, was acknowledged by the Ministry in the following letter dated Oct. 6:—

"Dear Mr. .....

I feel that I must take this opportunity of expressing my thanks for the magnificent work performed by your Department. Every demand has been immediately met, and the services, both here and at the White City (Road Transport Park) fulfil all requirements."

The particularly gratifying aspect of the whole matter is to think that the Telephone Service even under State control—will other papers please copy—can still rise to an occasion.

AN ALPHABET FOR SUBSCRIBERS.

A is for Answer, a prompt one is best;
B is for Brevity—excellent test.
C is for Courtesy, swear words are banned.
D for Directory, close to your hand,
E for Elision, a dangerous word,
F for Faint speaking, which cannot be heard.
G is for Glow, the receiver off rest;
H for "Hallo," that expression unblessed.
I for Instructions, mistakes to allay;
J for the Journeys you're saved every day.
K is the Keenness expected by you.
L—Lengthy calls it were wise to eschew.
M—Modulation will clearness obtain.
N—"No reply;" later on try again.
O is for "O"—it is *never* for "nought;"
P—the Politeness that all should be taught.
Q—in a Quandary call the Exchange.
R—to Restrict useless calls please arrange.
S is for Speech, clear, distinctive and bold;
T is for Thr-rr-ee, where the "r" should be rolled.
U is the Usage you make of your line.
V is the Vowel—prolong it in nine.
W—Wait till your calls are put through;
X-tra X-tensions will bring business new.
Y for our Yearning to give You our best,
Z for our Zealous endeavours and Zest.

J. MCMILLAN.

ABOUT ADVERTISING.

BY H. MORGAN (*Contract Office, London Telephone Service*).

IT is thought to be an axiom of commercial enterprise that the relationship of supply and demand is governed by the efficient representation made as to the real, but unappreciated existence, of the demand, and the advantages which accrue from a generous use of the supply available. This applied to telephony can be expressed by the following formula:—

The rate of extension of the Telephone Service, and the increase of the income accruing to the State in connexion therewith, are in direct proportion to the educational facilities employed to prove the demand. In other words, the telephone is first proved to be a necessity to the prospective user by the skilful and intelligent presentation of its merits by the Department's Contract Representative.

The elimination of this function, although only proposed as a financial economy during the period of National Crisis, will, it is thought, vitally affect the interests of the State in the direction of reduced revenue after the difficulties incidental to, and resulting directly from, the War, have passed, and this appears to be a consideration of paramount importance.

Demand is evolved by the vendor through publicity, and the reluctance of the State to recognise this very essential element in the past, has reacted derogatorily upon its commercial undertakings, and stultified its efforts.

Tradition dies hard, it takes an event as stupendous as a European conflagration to eradicate it in some instances.

The village physician goes his round practicing his healing art and administering his potions, pills, and powders from a small shelf in a petty surgery. He does no advertising, and is correspondingly stultified in his professional environment. Another aims at procuring the opportunity of increasing the healthfulness of the million, and we find from our daily paper that his pills are "worth a guinea a box," and innumerable other facts concerning them. We also discover, inadvertently, that he has built a factory covering acres of ground, made a fortune, and turned to philanthropy.

We know which is the best soap because we have envisaged the lady of the bath who uses it, and the boy who "will not be happy till he gets it," in a thousand different walks of life.

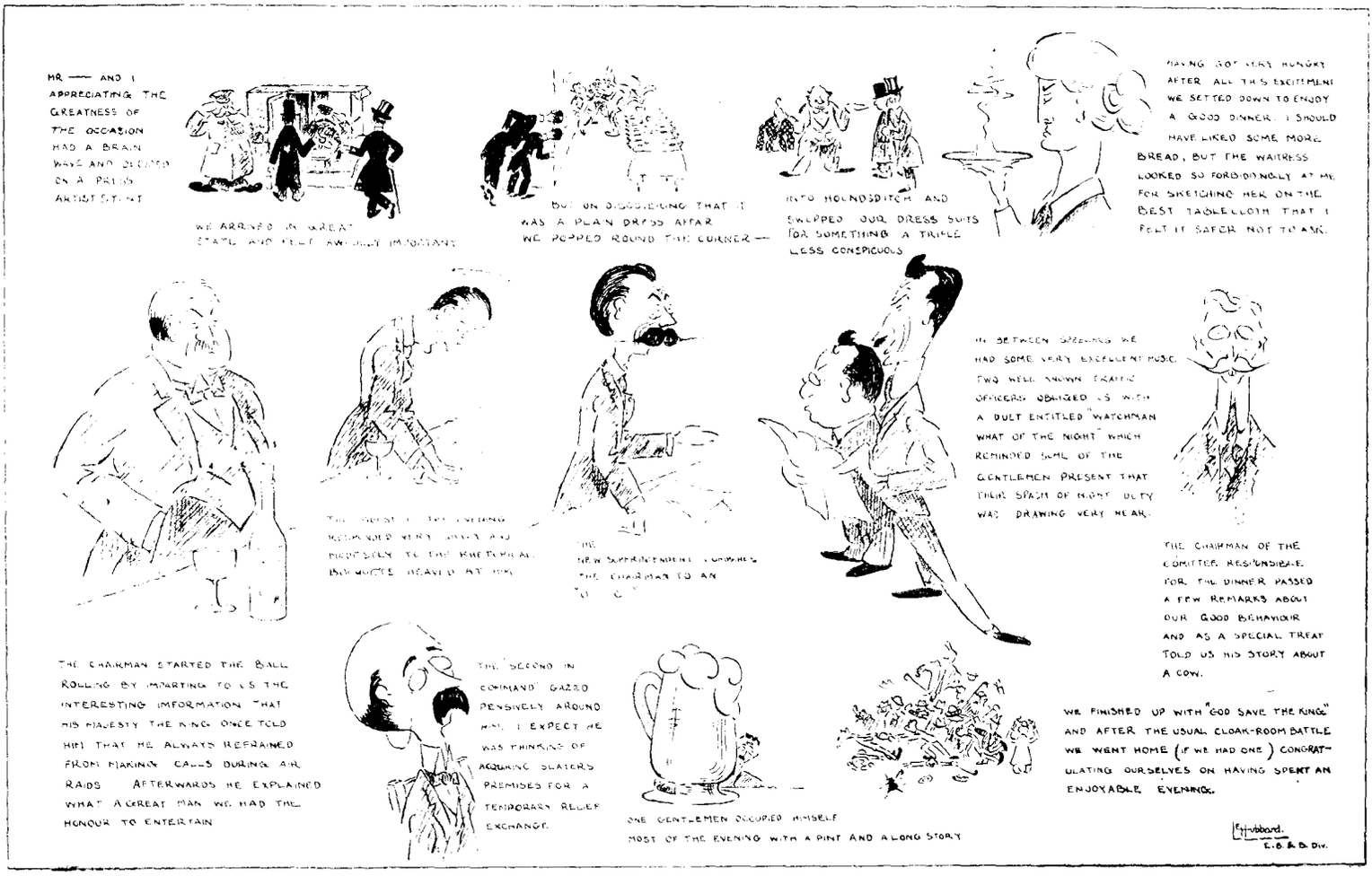
A pseudonym from the classics, with a living advertising personality behind it, will crowd an emporium with a wealthy clientele.

If the whole world had Pelmanised, and proved in practice the astonishing advantages which we are assured by all the periodicals that stand for anything at all, accrue to the diligent Pelmanist student, it would but confirm the axiom above stated, *i.e.*, that demand is governed by efficient representation as to the supply.

Who would have known of Bourneville and its beauties if it had not been associated with cocoa and chocolates in our newspapers?

The confusing problem as to the premature appearance of age propounded by the question, "Why does a women look old sooner than a man?" was satisfactorily answered for us years since by the wrapper of a product emanating from a place of delight named Port Sunlight.

Publicity paves the path to profit. The route the crowd takes is the way to fortune if the goal for which the populace is making, is the entrance to your store. "Knowledge is power" is not a proverb we are in danger of forgetting, but knowledge of the fact that electricity is too, is only inculcated, and demand associated with it by attractively advertising its general utility as a time, money, and labour saving commodity. Æsop taught us that "a mountain laboured and out came a mouse," but it was by the medium of the daily press and billposter's hoardings that we discovered it to be scientifically possible to concentrate an "ox in a teacup."



SKETCHES AT THE COMPLIMENTARY DINNER TO MR. J. F. EDMONDS.

LONDON ENGINEERING DEPARTMENT.

A dinner to celebrate the re-union of the staff of the City Internal Section of the London Engineering District, was held at G.P.O. South, on Feb. 7, when about 350 members of all grades of the staff and their friends (including 70 ladies) sat down to a substantial repast provided by the Refreshment Club. Mr. P. J. Ridd, Sectional Engineer, was in the chair, and was supported by Mr. T. H. Edgerton and Mr. A. Warner, Assistant Engineers. The following gentlemen were present as guests :—Mr. A. Moir, O.B.E., *Superintending Engineer, London Engineering District*, Mr. H. P. Brown, M.B.E., Mr. G. F. Greenham, M.B.E., and Mr. J. H. Stanhope. Before commencing dinner *an impressive silent tribute was paid to the memory of those of the* staff who had fallen in the war— followed by the sounding of the "Last Post."

Mr. Moir proposed the toast of "Our Returned Colleagues." He stated that the reputation of the District had been worthily upheld by their colleagues at the Front ; they had helped to protect our lives and our homes, and to crumble up the German dream of world dominion. As all classes of the staff, including Engineers and Clerks, were represented at the gathering, he gave the following figures, showing the united war effort of the District :—

Total employed July 1914, 5,471 ; total who joined up, 2,721 ; total killed, 198 ; total wounded, 373 ; total Commissions, 79.

Decorations.—Distinguished Service Medal, 5 ; Distinguished Conduct Medal, 20 ; Military Medal, 56 ; Meritorious Service Medal, 18 ; Military Cross, 6 ; Croix de Guerre, 4 ; Medal of St. George (Fourth Class), 1 ; Silver Medal (Serbian), 1 ; Medaille Militaire, 1 ; Mentioned in Despatches, 29 ; brought to notice of Secretary of War for valuable services rendered, &c., 1. Total, 142.

Mr. Moir went on to say that they had now returned to the conditions of peace, and all the figures which he had at his command showed that the whole staff were unitedly endeavouring to achieve the maximum output of work which was so necessary at present. During the war they had been able, under much difficulty, to maintain the working condition of the telephone plant at a satisfactory standard, but this had been possible only by allowing all postponable maintenance, repairs and renewals to accumulate. These arrears were rapidly being overtaken, and for the year 1919, although the calling rate and tear and wear of the plant was at a maximum, he was pleased to be able to tell them that the Engineering Fault Records showed considerably better figures than they had ever reached in pre-war days. On construction too there was great increase of work ; notwithstanding slow production on the part of their manufacturers, and slower transport than they had ever known. The pre-war rate of joining up new exchange lines, apart from additional stations, removals, &c., averaged 150 per week ; the present average was 400 per week, the actual figure for the past week having been 495. In conclusion, Mr. Moir described an amusing episode in his own experience as a Volunteer in uniform on the Home Front. He felt some jealousy of their returned colleagues he stated, because they had had a hand in the real thing ; they had taken part in the greatest war of all time, the history of which would for ever echo down the ages.

A chess match was played on Feb. 2 between teams representing the London Engineering District and the London Telephone Service.

The result was a win for the former of 7 games to 6.

PERSONALIA.

LONDON TELEPHONE SERVICE.

PROMOTIONS.

Misses W. A. HORWOOD, M. E. JACKSON, D. J. WRIGHT, E. C. MADIN, D. I. MARSHALL, have been promoted Woman Clerk, Class I, in the Controller's Office.

Miss E. A. EPPS, Assistant Supervisor, Class I, New Cross Exchange, has been promoted Chief Supervisor, Park Exchange.

Miss L. L. GILSON, Assistant Supervisor, Class II, Trunk Exchange, has been promoted Assistant Supervisor, Class I, at Trunks.

Miss G. M. M. JOHNS, Assistant Supervisor, Class II, Trunk Exchange, has been promoted Assistant Supervisor, Class I, at Victoria Exchange.

Miss E. C. MEADOWS, Assistant Supervisor, Class II, New Cross Exchange, has been promoted Assistant Supervisor, Class I, at Woolwich Exchange.

Miss E. H. WIDDINSON, Assistant Supervisor, Class II, Dalston Exchange, has been promoted Assistant Supervisor, Class I, at City Exchange.

The following officers have resigned on account of marriage :—

Miss A. E. GIBBONS, Assistant Supervisor, Class II, Gerrard.
Miss G. MOORE, Assistant Supervisor, Class II, Mayfair.
Miss I. ALLEN, Telephonist, Mayfair.
Miss F. M. MOFFATT, Telephonist, Gerrard.
Miss V. M. BARBER, Telephonist, Trunks.
Miss M. RUSH, Telephonist, Hammersmith.
Miss R. E. STOKES, Telephonist, Paddington.
Miss E. A. STEVENSON, Telephonist, Holborn.

PROVINCIAL.

Upon the resignation of Miss K. BACK, Clerical Assistant, District Manager's Office, Exeter, on the occasion of her approaching marriage to Mr. J. F. MURRAY Assistant Traffic Superintendent. A joint present of a dinner service was given by the staff.

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MATERIALS AND THE PRESENT ECONOMIC CONDITIONS.*

BY W. H. ALLEN, O.B.E.

THE present economic conditions are very largely those arising out of the War, and whatever we may think about them, we in this country have great cause to be thankful that we are suffering less from the effects of the War than any nation in Europe.

The most widespread and destructive War in history, in which, for the first time, nearly the whole populations of the principal belligerent nations were enlisted in intense personal and collective effort, resulted in unprecedented loss of life—more than 7 millions being killed—and in enormous loss of capital and destruction of property. It has brought in its train social and economic confusion on a vast scale, and created a serious world-wide shortage of materials.

The Allies mobilised 25½ million men and the enemy countries over 22½ million—producers withdrawn from production. To these 48 millions must be added, so far as the production of commodities for the public good is concerned, many millions more, whose energies were devoted to the manufacture of munitions of war. It is difficult even to imagine what nearly five years of war has meant in the loss of production of goods of all kinds; to gain any real conception of the enormous wastage of good material during the course of the war, or to gauge the magnitude and the economic effects of the wholesale devastation and destruction of property that occurred in the various theatres of war. Losses at sea also were enormous, the total sinkings of merchant ships amounting to something like 13 million tons.

So far as expenditure of money is concerned, the total cost of the War has been estimated at £40,000,000,000, and to this sum there is still to be added the cost of reparation and reconstruction, which will take many years to effect.

A large part of Europe is now plunged into economic and industrial chaos; over a large area, fighting is still going on; manufacture is almost at a standstill, in part from want of raw material and in part through the extreme disorganisation of mining, transport, and industry; and commerce is still further hampered by currency and exchange difficulties. In Austria and Hungary, in the new States formed out of the Austro-Hungarian Empire, in Poland and the Baltic States, there is great misery and unrest accompanied by want and suffering on a large scale. Germany and the Balkan peoples are almost in as bad a plight. Food and fuel, and essential raw materials, must be arranged for if these nations are to get to work to re-establish their industries, and begin the re-building of their economic life.

Relief supplies to the value of hundreds of millions have already been sent into these countries by the Allied and Associated Governments, but the main problem still remains.

In this country alone has heavy taxation been imposed during the war, and we may have to brace ourselves to carry still larger burdens, seeing that Great Britain has to face, for the coming year, debt charges amounting to £360,000,000 and war pensions and allowances totalling £120,000,000. The Chancellor of the Exchequer not long ago estimated that the *normal* yearly expenditure of the country will be £808,000,000. Pre-war Budgets provided for an expenditure of about £200,000,000.

The word materials has an extremely wide range of meanings, and it is almost idle to attempt a definition of it. It covers the most primitive raw materials and ranges through a gradually ascending series until quite complex products may be the materials to be further dealt with by manufacturers or engineers. For instance, iron ore and coal are raw materials from the point of view of makers of pig iron; pig iron is the raw material of the steel manufacturer; steel is the raw material of makers of forgings, castings, sheets, bars, &c., and these again are materials for engineering establishments of all kinds.

From the point of view of the Post Office Engineer, his materials consist of the finished products of many industries—wire and cable, telegraph and telephone instruments, *line stores, underground stores, and the thousands* of items included in the Rate Book and Vocabulary of Engineering Stores. The prices at which these can be supplied, and the regularity of supplies, affect the cost of his works, and he is naturally interested in such questions as why they now cost so much, when prices are going down, and when stores will be supplied more freely.

On enquiring closely into the question of how the present economic conditions affect supplies and prices of materials we find that every appearance of simplicity vanishes, and that complex trains of causes and effects are everywhere in operation.

Those who have studied such questions as are indicated by the phrases "The Balance of Nature" and "The Web of Life," have realised that in the world of living things there is a vast sytem of linkages spreading all over the world, extending to all conditions of climate and temperature, and operating everywhere, whether on the earth, in the air, or in the shallows and depths of the oceans. Nothing can happen without its effects spreading in widening circles and producing unlooked for results—often in distant and unexpected places. Let me illustrate by two examples:—

Ships discharging and loading at Jamaica carried old-world rats to the Island. These multiplied to such an extent that they became a serious plague, which had to be dealt with. Someone conceived the happy thought that, as the mongoose is the inveterate enemy of the rat, it would be a good plan to bring some from India. This was accordingly done and in an incredibly short time the mongooses had exterminated not only the old-world rats and their descendants, but also the Jamaican cane rats. But their appetites remained, and they set to work on the poultry and the ground birds. Being still hungry they turned attention to insect-eating lizards. In the result injurious insects and ticks multiplied exceedingly, a plague of insects ensued and plants and animals were affected in ever-widening circles. Jamaica got rid of one problem and found itself confronted with another, whose seriousness may be gauged when I remind you that it has been estimated that in the absence of birds the earth would be uninhabitable in six years.

Darwin showed that there is a relation between clover-crops and cats. In this case the "linkage" is as follows: Clover will not set its seed unless

* Paper read before the Post Office Telephone and Telegraph Society of London on Tuesday, Feb. 17, 1920.

fertilized by bumble-bees; field mice are the enemies of bumble-bees: field mice are eagerly devoured by cats. Professor J. Arthur Thomson adds another link to this chain, and points out that the yield of clover crops is affected by the number of maiden ladies in the district.

When we come to the study of materials, whether food stuffs, raw materials, minerals, plant and machinery or manufactured articles, and discuss supplies and prices we find that there are similar wide-spread linkages of causes and effects, of action and re-action, and we discover inter relations that are often complex and world-wide.

In the introductory chapter of a book entitled "Economics: an introduction for the General Reader," Mr. Henry Clay sketches the long trains of human activities leading up to the sale and purchase of a *woollen shirt*, and shows how very many industries and organisations in many parts of the world have made contribution. He says:—

> "It would hardly be too much to say that the apparently simple transaction of purchasing a shirt was the completion of a process in which the modern economic system as a whole was involved."

And that:—

> "Our attempt to get behind the superficial simplicity of our business transactions has entangled us in a labyrinth, the paths of which lead into every social class, and has involved us in a study of a large part of the activities of the human race."

* * * *

All this suggests that my subject should be treated with much diffidence and modesty, and that anything like dogmatism would be quite out of place. My aim will be to bring together as many relative facts as I can within the limits of space allowed to me; to arrange and present them in the most illuminating way that I can; to allow them to make their own due impression upon your minds, and to theorise as little as possible.

Shortage of Materials.

It is in the midst of conditions such as I describe in this paper that the Post Office is endeavouring to overtake the arrears of five years' suspension of telephone development, when every attempt to obtain materials proves to be an obstacle race, and transport difficulties limit the rate at which materials can be used. Works for which nearly all the materials are available are often stopped for want of one or two items that cannot be obtained by reason of a moulders' or some other strike. Supplies of materials, and, in some cases productive capacity, in this country are not yet sufficient to enable manufacturers to overtake, and then to keep pace with, the rapidly-growing demands of the public for telephone services, at home and in the Dominions beyond the seas.

I never remember a time when such long periods were quoted for commencing delivery under contracts especially contracts for apparatus; when contractors encountered so many difficulties in obtaining materials from their sub-contractors, or when failures to keep promises of delivery made in perfect good faith were so frequent.

Before the war considerable stocks of materials, half wrought stores, and finished goods, were carried by manufacturers, wholesale houses, and retailers, and these stocks not only had a stabilising influence upon prices, but were available for new production. The close of hostilities found the world extremely short of goods, but very plentifully supplied with paper money. The shelves of the world are still comparatively bare and the rate of demand is much greater than the rate of supply. Manufacturers everywhere are finding great difficulty in obtaining early delivery of the materials they require. It used to be possible to obtain on demand from wholesale stocks, bar, rod, sheet and tube in a full range of sizes in iron, steel, copper, brass and aluminium, and to obtain readily ebonite, vulcanised fibre, porcelain, seasoned timber, and other materials in the desired form. Manufacturers of telephone apparatus in particular are greatly hampered by the very long time they have to wait for their materials. These cannot be supplied from existing stocks, and makers are reluctant to put in hand specially comparatively small quantities of specific sizes. The building up of stocks again must of necessity be retarded by the general reduction in working hours.

During the war, supplies of all important metals and materials were controlled by the Ministry of Munitions or the War Office, and allotments for Government work could generally be arranged for. Control over manufacture was also exercised by the Priority Branches of the Ministry of Munitions or War Office and here again high priority certificates could usually be obtained for urgent Government work, the priority regulations compelling contractors to execute high priority work before they dealt with work of a lower priority. Since control of supplies of material and of priority of manufacture have been discontinued, competition for materials, as they became available, has been very keen, and Government contracts do not now occupy a privileged position.

Before the war deliveries under contracts could be allowed to mature automatically. Now the placing of a contract is the beginning of trouble, and much time and effort have to be expended in assisting contractors to obtain material and components, in finding suitable substitutes, and in following up deliveries.

During the last twelve months the rate of progress of Post Office underground works has had to be adjusted to the rate at which earthenware ducts could be obtained. Very large orders were placed and due arrangements were made for adequate supplies, but deliveries were limited, first by the shortage of railway trucks, and later by the coal shortage, which resulted in fully charged kilns being left waiting month after month until fuel became available for the "charge" to be fired. There is plenty of local coal in South Derbyshire where the works are situated, but the Coal Controller had to divert this coal for household purposes, and the firms were obliged to obtain coal unsuitable for domestic consumption from a distance in such quantities as they could get it. In spite of some assistance from the Coal Controller, Post Office works suffered severely, and are still suffering, from the shortage of supplies.

Much difficulty is also being experienced in procuring insulated wire of small sizes in sufficient quantity and this is a serious hindrance to the rapid increase of supplies of telephone apparatus. During the war an enormous quantity of fine wire, mostly 2 1,000th inch in diameter (requiring nearly 20 miles to weigh a pound), was drawn for the manufacturers of magnetos for air-craft and motor engines, and it was expected that upon the cessation of this demand the increased manufacturing capacity that would be available would help telephone supplies, but there is still difficulty owing to heavy demands for other purposes and this difficulty is accentuated by shortages of insulating material, enamel, silk and wool. The shortage of wool hampers supplies of flame-proof cable. The most serious problem however is the shortage of silk, which affects both switchboard cables and coil wire for telephone instruments. The shortage of silk supplies appears to be due to heavy American buyings. During 1919 Japan exported 140,000 bales to America against only 4,000 to Europe, and America received from Shanghai and Canton, during the last six months of 1919, twice as much silk as we have in Europe. The European crop is only half the pre-war crop. Japanese raw silk, which in pre-war days was 15*s.* a lb. now costs 105*s.*, and Chinese silk is three or four times pre-war rates. Silk for wire and cables that used to cost 10*s.* a lb. is now 40*s.* These rises in price are some measure of the difficulty in obtaining supplies.

Prices of Materials.

I realise, when I speak of comparisons between *prices* of materials at different dates, that there is some ambiguity about the word prices, and that there is an underlying assumption that £1 is the same thing throughout. In common with my audience I am only too well aware that £100 in present day Treasury Notes, translated into terms of commodities, is a very different thing from £100 in golden sovereigns in 1914. But all prices are recorded in terms of legal tender (whether the pound sterling is represented by gold or by currency notes), and it is necessary to take one standard of reference throughout if confusion is to be avoided; and it is certainly desirable to evade the constantly shifting problem of *what exactly is offered at any given time* when Treasury Notes are offered in exchange for goods or services.

All the comparisons that follow are, as nearly as possible, between the prices ruling in January 1914 and in January 1920.

First, I take the metals that most interest Post Office Engineers. The percentage increases in the average prices for the month of January, 1920, as compared with January, 1914, are:—

Copper, electrolytic	85 per cent.
Lead, English	140 „ „
Spelter	170 „ „
Tin	120 „ „
Iron (Cleveland)	245 „ „
„ (Scotch Pig)	270 „ „

Next, I select a few typical items of Engineering Stores:

Poles (creosoted)	190 to 230 per cent. (according to size)
Insulators	180 „ „
Spindles	200 „ „
Copper line wire	75 „ „
G.I. stay wire	160 „ „
Earthenware ducts	190 „ „
Joint boxes	175 „ „
Bricks	250 „ „
Lead Covered { Main	110 „ „
P.C. Cables { Distribution ...	100 „ „
Telephones No. 2	125 „ „
Bell receivers...	150 „ „
Bell sets	160 „ „
Protectors H.C. and F. 2 2 ...	110 „ „
Branch Exchange switchboards ...	100 „ „
Cords	250 „ „
Plugs	110 „ „

The following comparisons of "Postal" items are of interest:—

Cloth for Post Office uniforms has risen...	300 per cent.
Flax tow canvas, as used for mail bags ...	350 „ „
Thick middle thread, as used for tying bundles of letters and mail bags ...	230 „ „
Pillar letter boxes	130 „ „
Parcel scales	155 „ „
White paper of the kind used for the Post Office Telephone Directory has risen...	200 „ „
The coloured paper for the covers... ...	260 „ „

A good general view of the rise in the prices of commodities is afforded by the Board of Trade Index Numbers of "wholesale prices," based upon

the price movements (due weight being given to quantities) of 47 principal articles, which include coal and metals, raw materials for textiles, foodstuffs, drink and tobacco, and ten miscellaneous items (linseed, cottonseed, petroleum, paraffin wax, palm oil, olive oil, hides, hewn fir, rubber, and bricks).

The Index No. for the whole group of 47 items for the first six months of 1914 was 113.6, for the year 1919 it was 296.3, an increase of 160 per cent.

The rises in wages that have accompanied rises in prices are indicated in the following table. I have selected trades that are concerned in the supply of Post Office stores and the execution of Post Office works.

Rises in Wages (including War Bonus).

	Trade Rates in London.		% Increase.
	January, 1914. per week.	January, 1920. per week.	
Engineering trade :—			
Fitters	43s. 10½d.	43s. 10½d. + 33s. 6d. ; 12½%	128%*
Turners	43s. 10½d.	do.	128%*
Toolmakers ...	43s. 10½d.	do.	128%*
Smiths	43s. 10½d.	do.	128%*
	per hour.	per hour. per week.	
Instrument makers	9⅞d.	9⅞d. + 33s. 6d. + 12½%	125.5%*
		per hour.	
Cabinet Makers ...	11½d.	2s. 0d.	108.7%
Carpenters	11½d.	1s. 11½d.	104.3%
French Polishers ...	9½d.	2s. 0d.	152.6%
Painters	10d.	1s. 10½d.	125%
Plumbers	1s.	2s. 0d.	100%
Bricklayers	11½d.	1s. 11½d.	104.3%
Builders' Labourers...	8d.	1s. 8d.	150%
	per week.	per week.	
Printing Trade Compositors	39s. 0d.	88s. 6d.	126%
Tailoring Trade :—			
	per hour.	per hour.	
Males	6d.	1s. 1d.	116%
Females ...	3¾d.	8½d.	161%

* In these cases, the percentage increase includes an allowance for the reduction of the working week to 47 hours

Analysis of Prices.

As I have indicated, the study of materials and prices reveals much underlying complexity, and clear views can only be obtained by making a systematic analysis and seeing how prices are built up. I therefore propose to endeavour to construct a list of the various constituents, and comment on each separately. In practice, of course, they all operate together, though in various proportions and degrees.

In the following table the important components entering into the price of manufactured articles are put down in an order that will suit my purpose :—

How prices of manufactured articles are built up.

Cost of production and distribution :—

Labour	Increased wages, shortened hours, stoppages through disputes, restriction of output.
Materials used.	
Factory charges	Supervision, rent and rates, lighting, heating and power, depreciation, repairs of plant and buildings, technical training and welfare work.
Expenses of management ...	General administration, clerical staff, rent and other costs of Head Office.
Cost of marketing goods ...	Advertising, travellers, showrooms, bad debts.
Manufacturing waste, breakages, unsaleable remainders.	
Storage and packing.	
Transport.	
Interest on capital employed.	
Rates of exchange.	

Other factors influencing prices :—

Margins for contingencies.
Profits.
Price agreements, combinations, royalties.
Corners.

Demand and supply.

Labour.

The way in which human labour enters at every turn into the price of material is found upon consideration to be somewhat remarkable. For the purpose of keeping our hearth fires burning, underground coal in its native coal measures is useless ; we want it in our own cellars. Most of us are pretty well acquainted with the present price of coal delivered there, but we perhaps hardly realise that that price is very largely made up of labour charges of all kinds incurred in transferring it from the bowels of the earth to the domestic cellar.

In recent years much newspaper space has been occupied by accounts of movements having for their object the adjustment of wages to the rising cost of living and the remedying of unduly low rates of wages. In the result wages have risen rapidly during the last few years ; the upward movement is still in progress, and there is no sign yet that we have reached the crest of the rising wave.

The Ministry of Labour keep records of changes in rates of wages (including added war wages or war bonuses), but this record does not include seamen, railway servants, agricultural labourers, police, Government employees and certain other classes. The recorded additions year by year to the wages bill of the country were :—

During 1917	... ...	£3,000,000 per week.
„ 1918	... ...	£3,000,000 „ „
„ 1919	... ...	£2,100,000 „ „

5,650,000 workpeople received advances during 1919.

The increases in the rates of wages coming into operation during the last two months of the year were :

November	£480,000 per week	...	1,900,000 workpeople affected.
December	£140,000 „ „	...	500,000 „ „

During 1919 changes in wages were accompanied by reduction in the hours of labour in the principal industries. This reduction began in the Engineering and Shipbuilding trades when the hours were reduced from 53 or 54 per week to 47 on Jan. 1, 1919. During the year the Ministry of Labour recorded decreases in hours affecting between 6 and 7 million workpeople, the average reduction being 6¼ hours per week. (Railway servants and workpeople employed by Government Departments are included in these figures, but seamen, agricultural labourers, police and certain others are not included). In almost every case the reduction of hours was arranged, subject to the condition that weekly full time wages should not be reduced, and the reduction in hours was therefore accompanied by a general increase in the hourly rates of time workers. In busy times, these changes increase the number of hours ranking as overtime, and, together with the advance in wages, greatly swell overtime payments.

Increases in hourly rates to compensate for reduction in hours are not included in the figures already given for rises in wages as they do not affect the weekly total. It is often claimed that no loss of daily output follows upon the reduction of hours, but this is on the other hand often challenged, and any lessening of output must of course tend to raise prices.

An important element in the present day cost of labour (and also of transport) is the frequency of trade disputes of which no less than 1,413 cases involving stoppages of work were reported to the Ministry of Labour during 1919, the number of workpeople affected, including those not actually parties to the dispute thrown out of work at establishments where disputes occurred, was about 2,600,000, a number nearly equal to the combined totals for the four previous years, and the highest total recorded for 30 years. The number of working days lost was over 34,000,000.

Overhead charges cannot be altogether suspended during stoppages, and in the periodical calculations of percentages to be added to direct labour for overhead charges, allowance must be made for all unproductive expenses.

Another cause of increased Labour costs is deliberate restriction of output which Sir Lynden Macassey three or four months ago stated was "encountered everywhere : an outstanding factor of modern British industry ; an ingrained orthodox trade custom now so accepted in practice as to be a purely routine process." Large numbers of workmen mistakenly think that this leads to more employment and also increases the market value of their labour.

There is also indirect restriction from "demarcation" which Sir Lynden Macassey defined as "the rigid allocation of certain operations to certain trades whether or not there is sufficient labour of the trade available ; the hostility of the craft or skilled Unions to the semi or unskilled men ; the limitation on the number of machines a man may tend ; the appropriation by skilled men of unskilled work ; the objection of all workers to time and labour-saving appliances."

Sir Alfred Booth, giving evidence before the Industrial Court a few days ago said that in the Liverpool Docks output has fallen by 25 per cent., of which 11 per cent. could be accounted for by the reduction of the working day from nine hours to eight. He stated that at the present time the world tonnage in shipping was two millions in excess of pre-war days, and that "if ships were getting the turn-round in ports which they were getting before the war, the demand for cargo space would not be equal to the supply and that would result in a fall in freights." Sir Alfred added that the worse "turn round" was due (to a considerable extent) to less output on the part of Labour and that for Labour to do its part all over the country was the quickest way to reducing prices.

The fundamental elements in the cost of manufactured articles are labour and the materials operated upon. Wages, as I have shown, have more than doubled, and practically all materials and components used by manufacturers have advanced considerably in price.

Factory Charges.

To ascertain the works cost it is necessary to add some percentage (recalculated from time to time) to the booked costs of labour and material, that shall cover :—

Supervision.
General shop labour.
Rent and rates.
Lighting, heating, and power.
Interest on stocks of materials.
Insurances.
Repairs to and depreciation of plant.
Technical education and training of staffs.
Welfare work, &c.

All these costs have risen, notably rates, lighting, heating and power (the rise in the price of coal being an important factor) and repairs to machinery.

It does not follow that a higher percentage is necessary to cover these increased overhead charges, indeed the rise in wages may be such that a *lower* percentage will suffice to cover outgoings. But the fact remains that these items (which are embedded in the cost of production) being higher than in pre-war times, increase prices.

EXPENSES OF MANAGEMENT.

Account has to be taken of costs of management, which include directors' fees, general administrative and clerical staff, whether at Head Office or works and rent and other costs of Head Office.

Management expenses have increased and must rise still further. The decreased purchasing power of money bears upon the salaried classes as well as upon the wage earning classes, and the adjustment of salaries is following that of wages at a respectful distance.

MARKETING GOODS.

The costs of marketing goods are often considerable. Advertising is a large item in some businesses and so is the cost of travellers. Showrooms, for high class motor cars for instance, are often almost palatial.

Bad debts also have to be allowed for, and also manufacturing waste, breakages, unsaleable remainders, &c.

STORAGE AND PACKING.

Space has to be provided for storing components and partly finished goods at various stages of manufacture, for any necessary examination, and for holding finished products that await delivery instructions, and the rise in the cost of handling increases the charges for these services.

Prices of drums, crates, casks, and packing cases have increased six or sevenfold, and prices of straw, wood-wool, paper and other packing materials have much increased. Here again the labour costs of handling and packing stores for transport have risen.

The non-return of empties owing to transport difficulties accentuates the shortage and the cost.

Formerly stores could be distributed from contractors' works at a comparatively small advance in price to include this service. But, even before the war, contractors discovered that the costs of storing, handling, packing, and the clerical and accounting work involved, were more than they had realised, and they so increased their charges that it was found economical in regard to many items of stores formerly distributed by contractors to distribute from Post Office main depots. The increased costs brought about by the War may result in more items being delivered to main depots in bulk and distributed thence in detail with other goods.

TRANSPORT.

The cost of transport and distribution has always been a factor of great importance in the cost to the consumer of materials and commodities, and it is well known that the improvement of methods and facilities of transport during the last century has played a great part in the development of modern industry.

The wastage and disorganisation of the war have greatly affected transport, and every trade is suffering from the difficulties and increased costs of moving goods from place to place. Many factories are living from hand to mouth in regard to supplies of all kinds of material, and there is much tying-up of Industry. The inefficiency and inadequacy of transport is a factor that enters over and over again into present day increased costs.

Railway rolling stock was overworked during the war, repairs were necessarily neglected, the yearly quota of new engines and wagons was not provided, and there is now a very serious shortage, quite apart from the British railway stock still retained in France and Belgium. Road transport also is not equal to the demand made upon it and at the ports there is great congestion and delay in dealing with shipments, largely owing to inadequate inland facilities for carriage.

Not only is transport generally much less efficient than before the war, but it is also much more costly, whether by rail, road, canal or sea.

Railway goods rates have recently been advanced. So far as Post Office stores are concerned, the increase may be taken at 60 per cent.

Rates for road transport have been increased since 1914 by from 250 to 350 per cent. and it has been stated (though never proved) that costs have risen in like proportion.

The cost of running motor vehicles owned by the Stores Dept. has increased about 115 per cent., but the vehicles have always been employed to the fullest advantage.

The heavy demands for horse and motor vehicles have afforded opportunity for combinations amongst road transport contractors, especially in the large towns and at the large ports. Many district associations concert scales of charges, and the members of the associations all observe them. The Midland Section of the Motor Traders' Association arranged a scale of hiring charges in December last. You could then hire a 3-ton motor lorry in Birmingham for £24 15*s.* a week. To-day the recent advance of 8*d.* a gallon in petrol will have to be allowed for. The Liverpool Cart-Owners' Association have advanced their charges since the beginning of the war from 1*s.* per ton to 4*s.* 6*d.* per ton for the lighter work and 5*s.* 3*d.* for the heavy carrying. The charge for carting rubbish in London used to be 1*s.* 9*d.* a load; on April 1 next it will be 8*s.* 6*d.*

A Sub-Committee of the Committee on Trusts recently pointed out that "Many of the commodities we purchase are carted by road five or six times before they reach our hands; raw materials, fuel, components and stores to the factory, finished products from factory to railway station and from railway station to wholesale warehouse, from wholesale warehouse to railway station, and from railway station to retail shop, and finally from shop to domestic consumer."

Recent changes in labour conditions also re act heavily on transport. The reduction from 72 to 48 hours per week lately made in the normal hours for carmen and motor drivers, together with the shortening of the hours during which business premises are open, operate in the direction of increasing the cost of road transport by lessening the number of hours during which horse and motor vehicles are at work each day.

The cost of sea carriage, which of course affects all imported raw materials, has risen very heavily. Freights for poles from Norway have increased 600 per cent.; for hard-wood scantlings from Australia 430 per cent.; and general cargoes, including provisions, between New York and Liverpool 400 per cent. Nor is it likely that this year will see any reduction of shipping charges. The great demand for tonnage will probably absorb all the extra shipping which will be launched this year and ship owners will still be masters of the situation.

Sir Frederick Lewis presiding at the Annual Meeting of the Prince Line at the end of last year, said that an entirely new set of conditions existed to-day. Working costs are at least two or three times as high as they were before the war: ships are kept twice as long in port loading and discharging their cargoes, delays being almost universal. These delays affect also bunkering, dry docking, repairing, and every other operation with which shipping managers are concerned. Sir Frederick estimated that the steamers of the Line were doing 30 per cent. less work than they were capable of under conditions similar to those which existed in 1914.

The costs of handling goods for transport not borne by the carriers, such as packing, loading, and unloading, are much increased, and pilfering and other losses during transport are also much greater. All these greater costs must find their way into the price to be charged to the consumer.

Another point is that advances in the cost of transport have a double effect on prices, which are increased thereby directly and indirectly. An old example will illustrate the indirect effect. A good crop of mangel and turnips in one place does not made up for a bad one in another, because the goods are relatively difficult and costly to transport far, and high cost of carriage always tends to reduce the quantity brought to market, and thus raise the price of those which are brought.

INTEREST ON CAPITAL EMPLOYED.

This item has increased under present day conditions much more than would appear at first sight. Considerably more working capital is now required for making payments for salaries and wages, materials, transport, &c., and temporary loans are often required for carrying excessive accumulations of stocks because of strikes, and for covering the longer period that elapses between the completion of the manufacture of goods and the receipt of payment for them, owing to disorganisation of railway traffic and congestion at ports. Manufacturers, brokers, warehousemen and retailers all now require much more capital to carry on business.

The rate of interest has also advanced 2 per cent. at least since 1914.

RATES OF EXCHANGE.

The rate of exchange between two Countries may be shortly described as the measure or index of relative indebtedness.

Any loss on exchanges necessarily enters into the prices of all imported materials used by manufacturers.

During the war Exchanges were more or less stabilised by various devices but these were abandoned in the spring of 1919. It is now a matter of common knowledge that the rates of exchange with countries having goods to sell that we require are adverse, owing to the facts that British funds abroad are much depleted, that there is an embargo on the export of gold, and that we are purchasing more than we are selling. Before the war, variations in rates of exchange were not of very great consequence, but they are now a most important element in the price of many materials.

Mr. G. H. Roberts, the Food Controller, speaking at the end of October last estimated that over 3*d.* on each lb. of bacon we got from America is due to the adverse exchange between that country and Britain, and at a Conference in London on Jan. 17 he said that the adverse exchange then accounted for 5*d.* a lb. To-day it represents over 6*d.* a pound.

The present rate of exchange with America affects supplies of electrolytic copper and it is increasing considerably the cost of wires and cables for Post Office Engineering Works.

It may be some little consolation to reflect that the high rate of exchange is very largely due to the fact that our vast indebtedness to America was

incurred in order that we might lend large sums to our Allies and render assistance to the famine stricken countries of Europe. Mr. Goodenough, speaking at the Annual General Meeting of Barclay's Bank, stated that the dollar exchange is really a New York—Europe, and not a New York—London exchange.

Dr. Lankester, the Lay Secretary of the Church Missionary Society, speaking on the 13th of last month, said that the rise in the rates of exchange is one of the most serious problems with which the Society have to contend in their work in the East. The Hong Kong dollar now costs as much as 5*s*. 1*d*. as against the old price of 1*s*. 10*d*. This means that to remit a sum equivalent to £330 a year to a married missionary now costs over £900. In India the leap in value of the Rupee has been from 1*s*. 4*d*. to 2*s*. 8*d*., and double the former amount in sterling has to be remitted.

Coming to total disbursements, Dr. Lankester says:

> In China we have to pay £98,400 instead of £39,300, and in Japan £19,000 instead of £16,000. In India £191,000 instead of £109,000. In Persia just over double. If the loss on exchange continues during this year at the present rate, it will cost the Church Missionary Society £167,000 on that item alone.

You will readily see how this state of affairs affects commodities purchased in the East and imported into this country.

COSTINGS.

I have, in the preceding paragraphs, simply indicated the principal charges that have to be provided for in making up the cost of production but various methods prevail and there is a great diversity of cost-accounting systems in different trades and even in the same trade.

Costings investigations by Government Departments during the war revealed the fact that in many industries the real cost of production of a given article, or even a cognate group of articles, was not known, although the average cost of all articles made was known pretty accurately. A firm might therefore without knowing it be making good profits on some items and losses on others. Many firms who had no costings system have introduced one since the war, having discovered, through Government investigations into costs, the value of knowing the true cost of each of their products.

I now pass to "other factors influencing prices."

MARGINS FOR CONTINGENCIES.

Before the war, there were no added margins for contingencies or they were quite small, but provision now has to be made for uncertainties in regard to rises in wages, uncertainties as to stoppages owing to strikes and transport delays that may seriously interfere with manufacture, and uncertainties as to future prices of materials. When firm prices have to be quoted, contractors doubtless make ample allowances for these contingencies.

In important contracts, extending over many months, contractors usually stipulate for a cost variation clause to cover rises in wages—and, sometimes, to cover rises in materials also. In such cases, of course, no margin for these contingencies is added.

PROFITS.

Many firms calculate profits on a percentage basis, which at pre-war prices yielded a moderate rate of profit. The same percentage applied to costs that have doubled or trebled yields an excessive profit, but it is probable that in many quarters the question of re-calculating this percentage is not regarded as an urgent matter.

In view of the high rate of Income Tax and the Excess Profits Duty—prices are calculated in many cases so as to yield at least as much profit—after paying all taxes—as before the war. Manufacturers thus virtually pass on to the consumer the share of the country's burden that they ought to bear.

Any portion of the margin for contingencies not actually expended of course increases the profit under a contract.

COMBINATIONS, &C.

Apart from the legitimate cost of production, prices are affected by royalties, monopolies and rings. So far as patented articles and goods sold under various brands, trade marks and registered titles are concerned, the situation is probably unchanged except that prices have been more or less adjusted to provide a profit corresponding with the reduced purchasing power of money. When we come to the question of price agreements, associations of manufacturers, traders, carriers and retailers; combinations of various kinds; and consolidations and amalgamations of similar interests; we find that the situation is changing rapidly. The Committee on Trusts, reporting last April, said: "We find that there is at the present time in every important branch of industry in the United Kingdom an increasing tendency to the formation of trade associations and combinations having for their purpose the restriction of competition and the control of prices. Many of the organisations which have been brought to our notice have been created in the last few years and by far the greater number of them appear to have come into existence since the end of the nineteenth century. For reasons which we shall presently discuss there has been a great increase in the creation of trade associations during the period of the war"; and, amongst their conclusions and recommendations, the Committee stated that: "We are satisfied that trade associations and combines are rapidly increasing in this country and may within no distant period exercise a paramount control over all important branches of British trade." In an addendum to the report, signed by four members of the Committee, the following very significant paragraph occurs:—

> "The fact is that Free Competition no longer governs the business world. The common assumption that the rivalry of traders affords a guarantee that the price of commodities will oscillate closely about the necessary cost of production—whatever may have been its degree of truth in the past—is now, in this country, nowhere to be implicitly relied on. It is nowadays open to doubt whether we ever buy anything at the cost of production. We find that capitalist combination, in one or other form, and at one or other stage of production, transportation and distribution, now loads in varying degrees the price of practically everything that we purchase."

These combinations originally sprang from the desire to find some relief from the pressure of competition—cut-throat competition as it was called—and also aimed at effecting savings in buying materials plant and stores, standardising manufacture, interchanging technical knowledge, and reducing the cost of distributing and selling organisations; but human nature being what it is, there is little doubt that the more such combinations grow in power and complete control—including the control of the total output of a trade—the greater will be the temptation to put up prices against the consumer, or, at any rate, to prevent the consumer reaping the benefit of improved methods of production, and measures for adequately safe-guarding the public interests against any illegitimate or nefarious action of trusts and combinations will have to be devised and enforced by the State.

The establishment of Joint Industrial Councils as an outcome of the Whitley Report, brings together the whole of the employers and the whole of the employees in a trade, and this may facilitate the raising of wages and profits, and the increasing of prices against the consumer. The danger of anti-social action of this kind was foreseen by the Whitley Committee (paragraph 20 of the Report) and the safeguard suggested is the "inherent over-riding power" of the State.

This aspect of the present economic conditions is a highly important one, more especially in its potentialities, and I would refer my hearers to the very interesting report of the Committee on Trusts (Cd. 9236).

The Post Office, in making contracts for materials, encounters associations and combinations, the more noteworthy being those involving:—

> Telephone and electric light cables.
> Copper and bronze line wire.
> Metal filament lamps.
> Wrought iron tubes.
> Stoneware ducts.
> Portland cement.
> Cloth and tailoring.

The same price is now quoted by all firms tendering for brass tube and bends for pneumatic tubes.

CORNERS.

This term of American origin is applied to a speculative operation in which a dealer or combination of dealers will buy up the whole available supply of any stock or commodity, such as wheat, with a view to compelling speculative sellers of the stock or commodity to buy of those engineering the corner at their own price. Delivery of the commodity is not meant or intended. Such transactions are really gambling speculations and are quite distinct from *bona fide* mercantile agreements (having a speculative element in them) for actual future delivery at a specified time, agreements which may quite well help to steady prices. I doubt if there is much cornering of commodities in this country, but times of scarcity afford opportunity and temptation to financiers, more especially in cases where all available supplies can be bought without very large resources in money. Those who undertake such operations usually turn their attention from one article to another as circumstances may suggest, causing a more or less temporary disturbance in true prices.

DEMAND AND SUPPLY.

It is well known that, apart from actual cost of production and the other factors I have mentioned, "Demand and Supply"—or perhaps more correctly "Demand and offers to sell"—has wide-reaching effects on prices. Although this factor comes last in my table, this must not be taken to imply a low order of importance. The order should rather be regarded as that of a State procession, where interest grows as the procession draws to a close. The relation between demand and supply has in fact a dominating influence and is never absent from consideration in arriving at the selling price of an article.

An excellent example of the influence of demand is afforded by the recent course of wool prices. In June, 1917, the Government stopped the rapid rise by fixing prices, and control was maintained until June 1919. Upon the cessation of control the Government endeavoured to reduce prices by pouring upon the market an unprecedented quantity of wool; for the lower qualities the public auction prices were about equal to the former control price (30*d*. per lb.), but for the finer qualities insatiable demands arose and prices advanced rapidly from 72*d*. per lb. to 130*d*. per lb. (December, 1919), there being a very large world-demand for cloth, the public everywhere insistently demanding the finer goods. The effect of demand is thus well illustrated, inasmuch as the coarser wools have not advanced in price since the removal of control whereas the finer wools, owing to the part the public itself plays in forcing up prices, are nearing double the control price.

Silver affords another good example. The average price in 1914 was $25\frac{5}{16}d$. per ounce. At the close of 1919 the price had reached 76*d*. and it has since touched $88\frac{3}{4}d$. During the war production decreased, especially in

Mexico which produces one-third of the world's output, and concurrently with this gold disappeared from circulation in the belligerent countries and prices of goods rose generally. The demands from China and India for *silver currency increased enormously during the war, and they are still very* great. It is said that 64 million ounces of silver were shipped from San Francisco to China during 1919.

A large percentage of the world's supply of platinum comes from the Urals. During the war there was a very sharp rise in prices and, Russian supplies being still cut off, this rise has continued until the price of the metal is now no less than £35 per oz. troy, a price that severely discourages its use for electrical contacts when anything else will serve. I well remember that when I entered the Stores Department in the early eighties the Post Office bought Platimum for many years at 30*s.* and 31*s.* per oz. Owing in part to the use of platinum for jewellery the price had advanced before the war to £9 10*s.* per oz.

Let me go back to clover for my last example. Before the war, red clover seed could be bought in this country for 9*d.* a lb. or less, and white clover seed for 1*s.* 6*d.* a lb. Owing to the course of events during the war a situation of scarcity of supplies and increase of demand has arisen and prices have jumped to 10*s.* a lb. for red and 35*s.* a lb. for white clover seed. The scarcity of supplies is possibly due, in part, to the great mortality amongst bees from bee disease, and great demands for seed have arisen for sowing land that was ploughed up during the war for corn and potatoes. I may add that there are not wanting unkind people who say that these high prices are due to Government control of agriculture.

Excess of supplies has, of course, an opposite effect and goods often have been sold, for a time, below the cost of production.

Demand measured by the purchasing power of the public, has increased greatly during the war. This increased spending power and there is evidence on every hand that it is being freely exercised brings about large demands for goods, and as demands grow in relation to supplies prices rise. Competition to sell tends to send prices down, but competition to buy keeps prices up.

It is estimated that in 1914 the total amount of currency in circulation — gold, silver and copper coin, and bank notes — was £128,000,000. This was the total amount held by the public, and does not include currency held by the banks. The corresponding figure in January 1920 is estimated at £393,000,000, an increase of £265,000,000 or 207 per cent. The increase in the amount held by the banks is £116,000,000, 154 per cent. more. It is interesting to observe in this connexion that the Currency Note Return for the week ended Jan. 28 last gives the total of £1 and 10*s.* Treasury Notes outstanding as over £300,000,000.

The spending power of the public is measured by the total amount of currency in circulation added to the total Bank Deposits. Mr. McKenna recently said that the public spending power,thus gauged, is now £2,693,000,000 as compared with £1,198,000,000 in 1914, an increase of 125 per cent.; and drew attention to the striking fact that the rise in the cost of living — also as *compared with 1914—is represented by the same percentage. This per*centage increase of 125 (as all the Staff Associations well know), is that worked out by the Ministry of Labour (formerly by the Board of Trade), and is based upon pre-war and present day prices of commodities of every day use in such quantities as were consumed in 1914, and upon rent, fuel and light.

But, you may ask, what of the future? My aim has been to put before you considerations from which you may draw your own conclusions and to furnish data upon which you may exercise any prophetic gift that is in you. At present high prices are a world symptom and have their origin in the universal disturbance and shortage resulting from the war. Mr. McKenna recently said: "The rise that has taken place is not local, it is not even European or American, it covers the whole world. The cost of living in Japan has risen quite as much as in this country. In India and China, where human wants are much less than with us and where custom plays a far stronger part in fixing prices, the cost of living is much above the pre war standard."

In this country much progress has been made in getting back towards normal conditions. The use of transport for demobilisation is practically over. The process of settling demobilised soldiers in industry and commerce is nearly complete. War contracts and war commitments running into many millions sterling have been wound up. The turning over of industrial establishments from the production of munitions to civil work has been largely carried out. Stocks of raw materials and other goods necessary for production have already been imported and more shipping is becoming available for further imports. Progress has been made in repairing worn machinery, in converting machinery from war uses to peace uses, and in installing new machinery. In short, the work of years has been crowded into the months since the Armistice.

There has recently been very marked recovery in the export of manufactured goods, and Board of Trade unofficial estimates indicate that, taking the balance of trade and "invisible exports" (freight, insurance, commission, &c.), together, we shall this year turn the corner and show a balance of from 200/300 millions to the good, thus more than paying our way.

We are now assured that "Government borrowing" will shortly cease, and limits have recently been placed upon the issue of currency notes.

All these considerations raise hopes that we may before very long enter a period when prices will steady, and after a time begin to fall. On the other hand little limit can be seen to the world's demands for commodities, and prices and profits are likely to remain high while demands are greater than the means of meeting them. In the early part of my paper I described briefly the economic and industrial collapse of the Central European States. For some years there will be heavy demands for clothing of all kinds; for cotton, wool, jute, leather, rubber, vegetable oils, chemicals, and fertilisers; for metals and coal; for agricultural machinery; and for rolling stock and repair *material. Urgent demands will come for these from all parts of* Europe, and appeals for help will be made to those countries that are still stable, though more or less crippled by their own problems and their load of debt.

When we remember that a comparatively small excess of supplies will send prices down, and that it does not require a large shortage to make prices advance, it is not difficult to forecast the probable effect of these demands.

Long date credit facilities also will have to be given for materials and manufactured goods supplied for reconstruction, and this will hinder the return to satisfactory rates of exchange.

It would appear therefore that the return to new normal prices, whatever they may prove to be, must of necessity be very gradual, and there may be no marked fall for a long time.

The literal meaning of "economics" is simply "housekeeping"; and individuals, municipalities, and Governments must, like good housewives, keep their daily, weekly or annual expenditure well within their income, avoid wasteful expenditure, eschew luxuries —especially imported luxuries— and save and invest all possible balances.

THE BAUDOT VII.

By J. J. T.

Erratum: In last month's article, for "*grinding* rods" read "*guiding rods*" in each case.

CENTRIFUGAL force as we know is that force developed by a circular moving mass in the shape of a reaction in the mass, or weight itself which latter *tends* to get farther and farther away from the centre round which it is rotating.

If we swing a stone round at the end of a piece of string we notice a distinct pull which pull increases appreciably with the velocity of rotation. This is the force developed by the mass (in this case a stone) in its effort to fly away from the centre of rotation. It is the pull of the centrifugal force developed, and if we were to release the free end suddenly we should have further evidence of this power from the fact that the stone would shoot off at a tangent *into space.*

Let A (Fig. XXIII) be the centre of rotation and B a weight travelling in the direction of the arrow.

If now at a certain moment B could get away from A it would fly off at a tangent along, let us say, the line BD. In our present case it is unable to do so: nevertheless the force which *would* have taken it along the path indicated is still there, and as B is still rigid with A it can only follow the direction of the arrow and in a certain time, T will reach B^1. Speaking on broad principles and considering the arc BB^1 to be equal to BC, and remembering that B is rigid with A, it is evident that the radius AB has sustained a certain strain which is measurable by the force which in the time T would have been able to have moved the weight B through the space B^1C.

This force is known as Centrifugal force and its mathematical expression is:—

$$m\ w^2\ R.$$

where m = weight, w^2 = the angular velocity squared and R = radius.

We have here then a force which, varying to the sensitive value of the square of the speed, is capable of readily responding to very small variations. If we can make one of these factors the variant we shall be able to build up a very accurate speed governor. In the Baudot governor this variable factor is the radius of rotation or the amplitude.

In the Baudot governor the construction of which we have just studied, we should note that, whatever may be the amplitude, as soon as the governor has equalised the driving power, &c., the tension of the springs is exactly equal to the centrifugal force developed by the mass or weight (M Figs. XXI and XXII). If not M would either be still travelling farther from the axis of rotation or nearer to the axle.

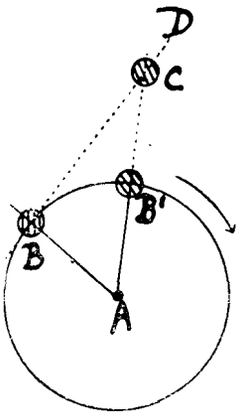

Fig. 23.

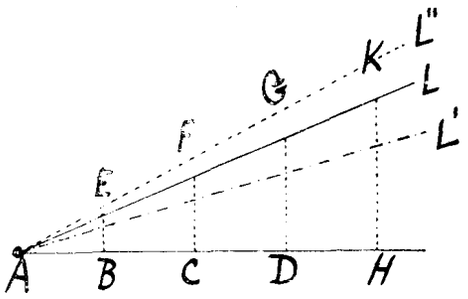

Fig. 24.

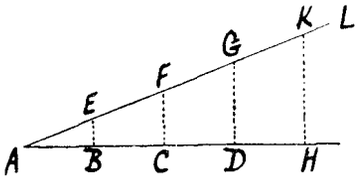

Fig. 25.

What, however, are the mechanical conditions which should be fulfilled by the governor so that a change of amplitude shall not produce a variation of speed? The weight M is subject to the action of two opposing forces. (*a*) The centrifugal force which tends to position M farther away from the centre of rotation, and (*b*) the tension of the springs which tends to draw M towards the centre. The question now is, "What tension shall be given to the springs when the centre of gravity of the moving weight M coincides with the axis of rotation so that the angular speed remains the same no matter what may be the amplitude?"

For any given angular speed the centrifugal force increases as the radius of rotation, or the amplitude, thus if we mark off from A as our zero point of amplitudes on the line AH (Fig. XXIV) several radii of rotation AB, AC, AD, &c., and if at these points B, C, D, we erect ordinates BE, CF, DG, representing the values of the centrifugal force corresponding to the radii of giration AB, AC, AD, these ordinates should be proportional to these same radii. Geometrically, by joining A to the tops of the ordinates we shall have a straight line AL which will thus represent the *law of the increase of centrifugal force* for any determined speed.

Now let us take a slightly lower speed. The ordinates will naturally be shorter and the law of the increase, geometrically expressed, will give us a lower straight line than AL, viz., AL^1. If on the contrary we take a slightly higher speed than our original one then the law will express itself by the straight line AL^{11}.

We have thus a practical method by means of which we may easily study the laws governing the increase of centrifugal force for various speeds.

Now experience has shown that for springs correctly manufactured and when their elongation does not exceed double their length, such elongations are practically proportional to the pull applied to them. We can therefore plan another diagram (Fig. XXV) by marking off from A on the line AH various *elongations* of the springs instead of as in Fig. XXIV radii of rotation by means of AB, AC, AD. The ordinates of B, C and D upon this line shall represent the values of the *tensions* corresponding to these elongations and by joining the crests of these perpendiculars we shall obtain the line AL which will now represent the *law of the increase of spring tensions*. Let it be noted that for the same governor the line AL of Fig. XXV is permanent but the line AL of Fig. XXIV is not so, but depends upon the speed adjusted to that particular apparatus.

(*To be continued.*)

"IS COURTESY DYING? IS IT WORTH REVIVING?"

By ADA M. WEBB.

WHAT is courtesy? It is a virtue which prompts us to have a regard for the feelings of others. Chivalry—kindliness—consideration—politeness—are all embodied in courtesy.

Do we find these qualities in the people whom we meet in everyday life? On all sides one hears comments on the deplorable lack of politeness and the bad manners of the Man-in-the-street. Stand for a few moments and watch a crowd of people emerging from any railway terminus. "Each for himself" seems to be the predominating rule of a large proportion of the crowd. Where that selfish feeling exists there is but little room for courtesy. A person who possesses this good quality to a high degree stands out prominently from amongst the mass, and that individual commands respect.

It must, I think, be admitted by all who have considered the question that there has been a decline of courtesy, particularly during the past few years. There are some people who seem to think that courtesy is a sign of weakness. They expect politeness from others but do not exercise it themselves. Telephone subscribers are among the offenders. The public, too, are often curt and inconsiderate to shop assistants, yet many are astonished if the latter adopt a haughty, superior air as a result of the incivility to which they have been subjected. Incidents occur day by day in which difficulty, delay and irritation could be averted by the soothing influence of courtesy. Not only in the telephone world but in all spheres of public life.

To what influences can the decline of courtesy be attributed?

The opinion has been expressed that the recent war has had a coarsening effect on the minds of men. The war no doubt has affected some individuals, but I do not think the root of the matter lies there.

The system of education is perhaps more directly responsible. Education must be of the heart as well as of the intellect! The present and the rising generation do not appear to realise or have not yet learned that "Manners maketh Man." The younger members of the community have very little respect or consideration for those older than themselves. Schoolboys and girls travelling Citywards daily are frequently wanting in courtesy. One wonders sometimes whether any attempt is made in schools to check uncouthness of speech and manners. It may be argued that the home influence and personal example should be sufficient to train the youthful mind in the principles of life! What if these are lacking? I have heard of parents who submit to be called by slang terms, *e.g.* "Old Bean," "Priceless Old Thing," &c., expressions neither respectful nor dignified. It is not to be wondered that such parents fail to exercise authority over their children and that later these boys and girls find it difficult to adapt themselves to the standard of courtesy expected in the business world. What effect has courtesy on our own great public service, viz., the London Telephone Service?

In a service where so many misunderstandings occur every day, it is invaluable and its effects are far-reaching. It is a virtue which every member of the staff should possess; it must be exercised every moment of the day and expressed principally by the intonation of the voice. We do not waste words in the L.T.S., but we can be generous with the quality of tone. If every member of the staff had a regard for the feelings of the subscribers and *vice versa*, that sympathetic understanding with the public which we all desire to promote would soon be an accomplished fact. A never-failing example of courtesy and tact on our part will meet with appreciation from the public and re-act on the whole Service. The telephone, even to an experienced user, at times has an irritating effect. At such moments a courteous apology will often suppress a volcano of wrath.

Is courtesy worth reviving? Emphatically the answer must be in the affirmative. Is it not a pleasure to meet anyone whose speech and manner convey an innate sense of courtesy. The exaggerated speech and extravagant manners of the early eighteenth century would however be out of proportion to-day. One of our leading cartoonist's recently delineated the amusing yet serious contretemps which would occur if we attempted to return to that courtly period. I fear that excessive late attendance would follow as a result of such a revival.

However great the hustle and bustle of business life there is always time for a polite expression of apology when the occasion demands it. There is also time for a courteous word of thanks for any service received. Many of the annoyances which one experiences almost daily, especially in travelling, would be lessened if one's fellow travellers realised this.

Hilaire Belloc in the following lines expresses a beautiful thought, and if courtesy therefore may be regarded as a Christian virtue, it must be revived and practised in daily life:—

"Of Courtesy it is much less
Than Courage of Heart or Holiness.
Yet in my walks it seems to me,
That the Grace of God is in Courtesy."

INTER-PLANETARY WIRELESS.

BY ARTHUR E. COTTERELL.

THERE have been so many extraordinary achievements during recent years in which we have seen things apparently impossible made possible and even commonplace that there may well be hesitation in decrying any fresh propositions. On the other hand it is possible for credulity under a plea of open mindedness to carry us too far. Something of this sort has been seen recently. Following on a report that wireless telegraphs have been affected by mysterious disturbances, at times resembling the dot and dash symbols of the Morse Code, some rather highly coloured suggestions have gained a certain amount of currency as to the possibility of such effects being the outcome of attempts on the part of the denizens of some distant planet to communicate with us.

Mars appears to be first favourite though there are some who accredit Venus.

Others with more catholic views look further afield. Seeing that all the stars are suns, many of them indeed more stupendous than our own governing orb, it is impossible to resist the assumption that most if not all are centres of planetary systems. It is probable that amongst these there may exist bodies where the general conditions more nearly resemble those of the Earth than is the case with any of our neighbouring planets.

If we are to assume that attempts have been made or will be made to communicate with us or *vice versa* it is obviously necessary as a primary condition that there should exist beings of at least as high an intelligence as ourselves, and that they should at least have developed their resources and inventions to an equal degree. The physical conditions of the seven other planets of the solar system do not however give much encouragement to the idea that any of them are inhabited by beings like unto ourselves. Mercury, revolving in an orbit, the radius of which is about .39 of that of the Earth must be subjected to intense heat from the sun. The period of its rotation on its axis is unknown. Though it has been thought by some to have a period of 25 hrs. 42 mins., there is reason for thinking that this is not the case, but that its rotation coincides with its revolution, thus it would always present the same face to the sun. In such circumstances one side of the planet would be intensely heated and the other perpetually subjected to a devasting degree of cold. Resulting from this any atmosphere would evaporate from the hot side and such as was precipitated would accumulate on the cold side without chance of general circulation. Thus we may dismiss Mercury as an abode for human life.

Venus, a globe of almost similar dimensions to the Earth, moving in an orbit whose radius is .72 that of our planet, would not be subjected to the same intense heat from the Sun as Mercury, but its period of rotation has not been definitely determined, and it may be that the rotation and revolution coincide, in which case life as we know it would be insupportable.

Mars presents telescopic features which have given rise to much speculation as to its being an inhabited planet. Certain markings on the planet have been attributed to artificial operations, the conjecture being that inhabitants exist there who have constructed huge canals or watercourses, in order to facilitate irrigation. Apart from this highly controversial hypothesis there are several cogent reasons for doubting that Mars can be suitable for the maintenance of beings like ourselves.

Its orbit is 1.52 the radius of ours, hence the warming effects of the Sun must be very greatly less.

Such a difference is not of course an insurmountable difficulty, and the fact that it has definitely been established that the rotation of Mars is accomplished in 24 hrs. 37½ mins. is more than suggestive of some equalisation of temperature. Mars is however very much smaller than the Earth, its diameter being only 4,216 miles, and its mass .11 that of the Earth. Its atmosphere is very attenuated as compared with ours and the gravity much less. It is generally recognised that human beings, organised like we are, could not exist on Mars; our blood circulation, breathing and movements generally would be disastrously affected and thus if beings of higher intelligence do exist on Mars they must be very different from ourselves.

The four remaining planets, Jupiter, Saturn, Uranus, and Neptune may be at once dismissed as possible abodes for human life. These giant planets situated from 5 to 30 times the distance of the Earth from the Sun are too far off to receive any material benefit from his heating influence.

Certainly they appear still to retain a considerable amount of their own original heat, but this seems to be largely due to the fact that they have not advanced to the same state of evolution as our planet has done, and there are several obvious reasons which we have not space to discuss, why astronomers and physicists regard them as unsuitable for the maintenance of any such life as we are considering.

Thus we see the extreme improbability of the existence of human beings like ourselves in any other planet of the solar system.

When we scan the universe, however, we can glimpse certain possibilities. Every star we see is a sun shining by its own intrinsic light. There are many stars which even surpass our Sun in size and brilliance though they look so small owing to the enormous distances which separate them from us. It is impossible to resist the thought that most if not all these suns have attendant bodies, just as our Sun is surrounded with those planets which form the solar system. This being so there must be in the abyss of space innumerable planets in different stages of evolution, and therefore doubtless many which have reached a similar stage of development to that which our globe presents and where conditions may be approximately the same.

Assuming such to be the case and that the inhabitants have similar aspirations and resources, we may now consider the possibilities of an interchange of communications. Our knowledge of wireless telegraphy relates to the propogation of electric waves through the atmosphere and not through the ether of space, but in view of the known transmission of light waves through that medium, it is not unlikely that the former waves may be similarly conveyed. No doubt effective transmission over such tremendous distances as separate the Earth from the nearest planets would necessitate enormous power plants as compared with those in use for terrestrial purposes, but, as will shortly appear, such considerations need not deter us from visualising other aspects of the problem.

If we accept the theory which appears to be most tenable, that it is only amongst the planets circulating around the distant suns that we may speculate on the existence of intelligent beings, we are at once faced with consideration of the tremendous distances involved. The nearest known star Alpha Centauri is separated from us by so enormous a distance that its light, though traversing the abyss of space at the terrific speed of 186,000 miles per second, occupies four years and four months in reaching us. This speed happens to coincide with that of electric waves, hence it follows that if communication was attempted between a Centauri planet and a solar planet, nearly nine years, i.e., about eight years and eight months would be occupied in the transmission of a message and the reception of a reply. This, however, is not only our nearest known neighbour but a comparatively near one.

Let us take the cases of a few others by way of illustration, expressing their distance in light years, which is about the same as electric wave years—Sirius, 8½ years; Procyon, 10 years; Vega, 35 years; Capella, 50 years; Betelgeuse, 109 years; and Rigel, 466 years. From these recognised facts it is abundantly clear that even if electric waves could be transmitted to such appalling distances, some could not reach their destinations within

the space of any individual life, and in many more instances no reply could be received within a like period.

In view of these circumstances it seems idle to enter on a discussion as to the power required to span such distances, or as to questions of language or code and how they are to be interpreted.

As to the mysterious disturbances observed, however much some of them may have resembled some of the symbols of the Morse code, it is probably not doubted that they are the outcome of electro magnetic disturbances from the Sun. Our great governing orb has been not a little marked by sunspots during the last few months.

On August 11 last, there was a great magnetic storm which seriously affected the ordinary wired telegraphs for some hours, and there was a repetition observed in America on Oct. 1. In an article of mine which appeared in *Wireless World*, August, 1914, I drew attention to the possibility of wireless systems being so affected.

The idea of planetary intercommunication seems to be too fantastical to be worthy of credence, but the recent experiences are worthy of the closest attention for other reasons. Much knowledge exists as to the phenomena known as terrestrial magnetism and its intimate connexion with sunspots, auroras and magnetic storms, but the underlying causes are as yet not fully understood. It may be that observations on wireless telegraph systems will assist us in probing a highly interesting but intricate problem the complete solution of which has hitherto baffled investigators of the highest eminence.

REVIEWS.

Telegraphy. By Arthur Crotch (E. & F. N. Spon, Ltd. 4s. 6d. net.)—Excellently printed, it is difficult to see upon what plan this little book is laid out. It takes the reader very carefully through eleven pages of instructive matter on primary batteries but dismisses secondaries in three. A Single Needle, an ordinary Sounder, a S.C. key, a Siemen's relay, an A B C and a Steljes type-printer are all described and illustrated, but the only mention of a Wheatstone transmitter is on page 58 where the following sentence occurs, "Now *imagine* a Wheatstone transmitter running at the distant end of a difficult circuit or submarine cable." Unfortunately this reference occurs in a description of the Gulstad relay which reference is hardly likely to aid the unfortunate student who has never set eyes upon Wheatstone apparatus—and there are many such. The chapters on Duplex working are very helpful as are also those on the polarized sounder and Central Battery working.

The Telegraphists' Guide. By Bell and Wilson. (Rentell & Co. 5s. net.)—It is unfortunate that the eighth edition of this well-known work should have been placed on the editorial table simultaneously with the book which has just been reviewed. The simple reason is that Mr. Crotch's book distinctly suffers in comparison, both as regards the quantity of matter and in regard to the educative value which the authors and publishers of this very faithful "guide" have been able to provide for the small additional sum of 6d. The entire lay-out of a telegraph office from battery room to instrument table is herein described, together with every possible details of all non type-printing telegraph apparatus. While there does not appear to be a superfluous line or diagram there is no attempt at niggardliness either in text or illustration. The book is lucidity itself. Submarine telegraphy, with the inventions of Kelvin, Muirhead, Harwood, and that ingenious type of automatic transmitter known as the Judd and Fraser, are all dealt with, as is also the Undulator and the Gulstad relay.

Messrs. Bell and Wilson have brought the volume well up to date by including the C. and G. Examination papers for 1919. No telegraphist aspiring to a technical knowledge of his profession should be without his copy of B. and W.

Mesures practiques en Radioactivité. Par W. Makower, M.A., D.Sc. et H. Geiger, D.Phil. Université de Manchester. Traduit de l'Anglais par E. Philippi. (Gauthier-Villars et Cie, Paris. 12 frs.).

That the University of Manchester should have produced so informative a volume and one which is recognised to contain the results of many hundreds, if not thousands of experiments in the realms of radio-activity is itself a tribute to British research. That it should have been thought worthy of translation into French and of publication by so well-credited a firm as G.V. places the final standard stamp upon it.

The book is most carefully printed, the diagrams are especially clear and the reviewer estimates that it has in no way suffered by translation into the French tongue. Technical though it must necessarily be it should be understood thoroughly and easily by anyone with an elementary knowledge of French and also of the principles of Radio-activity.

The chapter on the Beta and Gamma rays and that on the Quadrant electrometer, the ancillary apparatus utilised in connexion therewith, and the measurement of ionisation currents, &c., are good examples of this clarity of expression.

Government Service, an essay towards reconstruction. By F. W. Saunderson. (The Faith Press. 1s. 6d.).—This essay of just over one hundred pages has a brief foreword by Mr. Arthur Boutwood in which the latter expresses admiration for the author's enthusiasm, and adds, "I agree very largely with his criticisms and proposals, I hope he will not be disappointed." This is followed by an anonymous Preface which in making one or two statements goes "dangerously near the truth" regarding the Civil Service as many of us have known it, and probably deplored it. Mr. Saunderson, however he may realise the defects of the Service is enthusiastic in his hopes for the birth of a new spirit in its midst, and by no means unmindful of the excellent work which it has done and is still doing. "The British Public of to-day gets full value and more for all that it expends upon the Civil Service," is a statement to which most of our readers can unequivocally assent.

CENTRAL TELEGRAPH OFFICE.

THE INTERKOM CLUB.

THE indefatigable ladies of the Interkom Club are to be heartily congratulated on the second dramatic performance given by them this season at the Cripplegate Institute. On the evening of Feb. 11, Shakespeare's Comedy *Twelfth Night* was presented to an enthusiastic audience, and from the applause which was rendered throughout, it was evident that not only was the Interkom Club's high standard of dramatic art maintained, but that the large assembly enjoyed to the full the entertainment prepared for them.

Miss Margaret Murdoch as Orsino showed that she was quite as capable in the attire of the sterner sex as she was in the gentler habiliments of Rosalind in the recent performance of *As you like it*. Olivia was gracefully and charmingly portrayed by Miss Kate Walters and one's sympathies quite went out to Orsino that his love for her did not find requital. Miss Mary Tynan again excelled as Viola and Miss Nellie Nichols as Antonio was very effective and looked a veritable swashbuckler.

The somewhat difficult part of Malvolio found a delightful exponent in Miss Edith Hodgson while as Maria, Miss Dolly Dawes was equally successful. The bibulous but lovable Sir Toby Belch and that simple and foolish knight, Sir Andrew Aguecheek, furnished Miss Dolly Atterbury and Miss Amy Hodgson will full opportunities for humour of which they took every advantage, both ladies scoring a huge success, being well supported by Miss Agnes Harris as Fabian. As the clown, Feste, Miss Gertrude Mathieson, was, as usual, excellent, her singing being much enjoyed.

The remaining members of the caste were all very good in their respective parts, and the whole performance was evidence of the unremitting care which must have been given to its preparation by the Stage Manager, Miss B. M. Luffman.

The
Telegraph and Telephone Journal.

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Managing Editor - - - W. H. GUNSTON.

NOTICES.

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

VOL. VI. APRIL, 1920. No. 61.

INTERNATIONAL TELEGRAPHY.

IT is probably true to say that the war upset nothing so much as International Telegraphy. The restoration of commerce in the reconstruction period has found International Telegraphy unable to fulfil its needs. There are difficulties in the way of repairing cables ; there are difficulties in respect of land-lines on the Continent. The general result is that all the international routes are congested, and that the world is not in as close communion in its different parts as it was in 1914. Apparently, too, we are face to face with a big development in International Telegraphy. Already the traffic is in excess of pre-war figures, and if only an equable and prompt service can be given it probably would show signs of a large increase.

It is not too much to say that International Telegraphy is one of the most fascinating aspects of telegraphic communication. The man at the other end of the wire is more and not less interesting because he is of a different nationality and speaks in another language. Possibly, too, he has a somewhat different point of view from which he regards his daily work. He has different arrangements for meals and different conceptions of afternoon and of evening. This does not make the work of transmission any easier, nor does the fact that what we may call the national spirit of different countries approaches new machinery from different angles. Intimate as we are with the French we view duplex working a little differently, and quite an interesting essay can be written on national preferences for different telegraph instruments as indicative of national characteristics. Those who have read the Peace Treaty will have detected in it some little paragraphs which point to a general control of International Telegraphy from a centralised point. It may assist us in our present difficulties. It may bring the nations of the world even more closely together than they were telegraphically before the war. We have to be patient and look for that day, and in the meantime to spare no effort to overcome the present real difficulties.

HIC ET UBIQUE.

THE two conflicting voices which clamour alternately for public spirit and profit in telephone administration are in evidence again. The song is seldom a disinterested one and two voices are sometimes heard in the same person, as in the case of the Swedish nightingale. (No allusion to Stockholm telephones is intended.) At the present moment while one voice cries out for the benefits of a commercialised telephone service, another calls on the Post Office to take up a public spirited and patriotic attitude, and provide a trunk line to Wick at a loss of upwards of £1,200 a year !

THE Guernsey Telephone System shows an increase in telephone stations of 143 for the year 1919, the total now being 2,486. The number of calls has risen from 1,634,841 to 1,659,923. The net profit for the year (after placing £1,684 to reserve for depreciation and £5,277 to the Sinking Fund for reduction of loan), was £37 1*s.* 8*d.*

A PROPOSAL is before the French Chamber of Deputies to raise the telegraph and telephone rates still further. Telegrams instead of costing 5 centimes a word with a minimum of 50 centimes, plus a variable surcharge, will cost 15 centimes (1½*d.*) a word, with a minimum charge of 1 franc 25 centimes (about 1*s.*) without surcharge. The address up to five words, will be charged 10 centimes per word. Telephone flat rates in Paris will be raised from 450 to 700 francs (£28) for ordinary subscribers, from 500 to 1,000 francs (£40) for subscriptions paid by proprietors of houses for telephones for the common use of tenants, from 800 to 1,200 francs (£48) for cafés, hotels, etc. In Lyons the corresponding rates will be 525, 750 and 900 francs. Message rates will be raised from 112.50 to 300 francs (£12). Long distance calls will be graded from 1 franc 25 centimes (1*s.*) covering 75-125 kilometres (46½-78 miles) to 8 francs 25 centimes (6*s.* 7*d.*) for 825 kilometres (512½ miles).

THE *Daily News* of March 24, contains an interesting account of speech obtained by Mr. Aldu Cassuto, London Editor of the Rome *Messaggero* with the Rome Office of that journal. He also conveyed greetings from the Italian Foreign Minister (who was in London) to the Italian Prime Minister, and from the Empire Press Union to the Italian Association of Journalists. The experiment was made from the Marconi station at Chelmsford to the Marconi station at San Paolo near Rome. Owing to the absence at Rome of sufficiently powerful instruments no reply by word of mouth was possible, but the experiment was entirely successful, and an answer was promptly received by Marconigram indicating that the messages had been accurately heard.

The range of the apparatus used was 1,500 miles and from Iceland to the Azores, from Poland to Greece, the speakers' voice could have been heard plainly at any receiving station which happened to be listening, even on ships in the Central and Western Mediterranean, in the North Sea, and in mid-Atlantic.

THE CONFERENCE OF TELEGRAPH SUPERVISING OFFICERS.

AN IMPRESSION.

BY A PROVINCIAL REPRESENTATIVE.

IN its successive stages the life of a nation is comparable to the life of an individual. The rough shock-headed boy, the dandy youth, the enterprising age of adventure and schemes, the hard-headed constructive commercial period, and the philosophical interval that precedes the golden age of peace and patriarchal years.

The war seems to have propelled us with something of a jerk, right out of the middle of the hard-headed commercial period, into the succeeding stage of philosophy and sweet reasonableness.

When, even to our late enemies, we try to turn the stern face of mere justice, "An eye for an eye," the small persistent voice is heard, "A new commandment give I unto you," whilst one nearer and quite audible says "Will you subscribe to the fund for the Austrian children, they are starving ?"

In meetings of men and women, anywhere, on any and every subject the desire to impose one's will and opinion has given way to a desire to reach a common ground of meeting and understanding. The one who leads to-day, is not the one who carries his point in the face of opposition, direct or passive, but the one who points the way that all are seeking, but that all cannot see so clearly as he.

A finer or more effective example of this new spirit, could scarcely be found, than was present at the Conference of Supervising Officers held in London from Feb. 17 to 20, 1920. From the opening speech of Sir Evelyn Murray on Tuesday, to the closing words of Mr. Dalzell on Friday, it was present, a compelling and controlling force.

Throughout the Conference one felt that it was good to be there, and one's final conclusion was, that never again would one write a supposedly diplomatic statement, in a mistaken idea that "one never knows what those secretary's men are after." One felt that what they are "after" is the ultimate good of the service as a whole, and of each office as a part.

Projected like the rest of the nation suddenly into the new strong light of present day thought, no doubt our eyes, as perhaps those of others, were a little dazzled, we viewed imperfectly the problems of the future, but, as day by day of the Conference went by, the path became more clear.

Work, and the nature of it; construction, and the way of it, took tangible shape, each as the complement of the other. The thought gradually came that the degree to which it is seen and understood, that work is not a task imposed by one upon another, but a service rendered each to the other, is the degree to which it will be seen and understood, that because it is service, willing, reasonable service, service in which there is perfect freedom, therefore it must be of the best.

So, in the consideration of every question, always the workers' point of view was taken, first, last, and all the time.

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It is an axiom that men of the Army and Navy are fighters first and talkers afterwards. True, some have compiled books, but there undoubtedly is something in a life of unquestioning obedience to orders that stems the flow of words of reasoning and of explanation. The Civil Service in its organisation and associations, retains an arena in which the powers of debate may be kept alive and trained, but even there, men usually are addressing the already converted. It is probable, therefore, that men and women of the Civil Service, brought together to debate a series of a dozen papers, containing different and important points, felt the weight of their training lie heavily upon them, to say nothing of the nocturnal procession of chariots and horses, and the horsemen thereof, that had rattled the hotel bedroom window in fifty-seven varieties of ways.

The Chairman's view that the papers to be read at future conferences should be reduced in number, in order that each might receive fuller consideration, was warmly welcomed, as also was the adumbration of possible interim district conferences. The opinion of a delegate to the London conference would bear added weight and value, when chastened and supported by that of his confréres in the district. To this end it would presumably be necessary that papers to be read should be prepared, submitted, and circulated quite a long time before the conference. A condition useful as welcome.

As a prelude to the Conference, a dinner was held at the Holborn restaurant on Monday, Feb. 16. The chair was taken by Mr. R. A. Dalzell (Traffic Section) who in a brief and happy speech after the loyal toast, extended a hearty welcome to the delegates and referred appreciatively to the presence of the lady delegates.

A most enjoyable entertainment then followed, the items including recitations, in dialect, by Mr. John Lee; songs by Messrs. A. W. Edwards, J. J. Kenny, A. Hudson, F. Riley, and G. Lockyer; humorous interlude by Mr. Frank Hudson; "White Magic," by Mr. J. F. Darby. Mr. C. E. Daggett very kindly performed the duties of accompanist during the evening.

An interval of half an hour was devoted to social intercourse and an exchange of greetings between "opposite numbers"—South meeting North, and East meeting West.

Everyone who attended this agreeable function will, we think, retain very pleasant memories of the good fellowship and comradeship which prevailed.

THE TELEPHONE SERVICE THROUGH NEWSPAPER EYES.*

BY HORACE DIVE.

THE patriarch Job complained "Mine enemy sharpeneth his eyes upon me," and he proceeds, later, to express a fervent wish that the same individual should write a book! Had he, think you, suffered from newspaper critics. He certainly had to listen day by day to criticism, but that was verbal and from his friends, the subscribers at times to remarkable sentiments. Fortunately, or unfortunately, the Telephone Service has no enemies—it has a multitude of friends, many of whom (and amongst them some newspapers) certainly sharpen their eyes upon it. (Those of us who are operators are apt to wish now and then that they would also sharpen their ears upon it).

At the present time the Telephone is so closely interwoven with the life of the community that no day passes when it does not receive notice in the daily press. It would require the pen of a Maycock to picture to you the romance of its associations, and I dare not attempt the task. Nor is it necessary that I should, for the purpose of this paper is to consider the eyes of the press as, with definite and set purpose, they focus their gaze upon us, and attempt a critical examination of our machinery und organisation as a Telephone Service. Time will not allow us to take any account of the casual daily references to the timely aid of the Telephone in meeting some unexpected situation in love or war, and it is in such fleeting glances from the eyes of the Press that romance lies.

It is the privilege, says Emerson, of every human work which is well done, to invest the doer with a certain haughtiness. This may explain the genial tolerance with which the members of the London Telephone Service read the press references to that Service. It is with us as with Charles Lamb who remarked that newspapers always excite curiosity. "No one ever lays one down without a feeling of disappointment." We eagerly beg the loan of a *Daily Post* or *Morning Mail* in which, we are told, appears some comment on this or that aspect of the Telephone Service; and, since there is no greater joy than to be understood, we turn gladly to the paragraph of interest, only to get a feeling of intense disappointment and disillusionment. A thousand examples might be quoted, but let us take one. In the *Globe* for Dec. 17, appears a reference to an article published in the December number of the *Telegraph and Telephone Journal*. A copy of a diagram is shewn indicating the drop in traffic during the years 1915-1918, and the remarkable recovery in 1919. The final paragraph proceeds, "The increase in traffic pressure has been accompanied by an increased proportion of junior staff, *and the service obviously should gradually improve.*" Could anything be more obvious! The greater the pressure, the more junior the staff, the more *gradual* the improvement: but can you really rely on improvement when increased traffic pressure is accompanied by an increased proportion of junior staff?

Before we proceed, however, to a closer examination of the Telephone Service through newspaper eyes let us have some regard to newspapers and the nature of their eyes.

The British Press has great traditions, and its leading journalists are men of high character, but unfortunately the policy of a paper would seem at times to be governed by a desire, not so much to present a reasoned and balanced judgment on matters of moment, as to set out that particular point of view which will best serve the personal interests of the proprietors. Thus in days of active party controversy one found little regard paid to the merits of a suggested solution for a known evil—it was lauded or denounced according to its origin and its possible effect on the fortunes of the party. Read the papers on the subject of the "Referendum" at the end of 1909 and a few years later. Whereas, in 1909 the Tory sheets detracted this method of ascertaining the country's views, in 1914 they describe it as the hope of England, whilst the Radical Press, with which it earlier found favour, in the latter year could work up no enthusiasm for it. In fact, newspapers of all parties in their treatment of ideas new or unfamiliar to themselves adopt an attitude strikingly like that attributed to the rhinoceros by Sir Frederick Treves in his book *A Holiday in Uganda*. He says, "The rhinoceros is the embodiment of blind conservatism. Its hide is impenetrable, its vision is weak, while its intellect is weaker. It has however two marked qualities—combativeness and a sense of smell. It is aroused to its maximum energy by the presence of anything new. This object need not be a thing that is aggressive or inconvenient. Its offensiveness depends upon the fact that it is unfamiliar."

"We are none of us infallible—not even the youngest"—but that is a poor apology for the publication in all its lurid details of the sacking of the Foreign Legation of Pekin to which some years ago we were treated by a journal now claiming the largest circulation. Truly newspaper eyes lack that quality ascribed to ears "which try words as the mouth tasteth meat." They are eyes that see not themselves or they would pause long before issuing some of their pronouncements. It was but the other day I observed the contents bill of a paper setting out in letters of fiery red this indisputable indication of its ideal:—

"TRYING
TO FOOL
EVERYBODY"

and no doubt—if at first you don't succeed you try, try, try again! It is

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* Paper read before the London Telephone and Telegraph Society.

something of a hopeless quest however, for, as has been remarked, you can fool some people all the time, and all the people some of the time, but you cannot fool all the people all the time. This may be hard on some newspapers and some persons, but remains unchallengable.

The eyes of newspapers are not of that character that loves to take long views they are near-sighted. In the nature of things they work at night and by artificial light. They are used to deep shadows and get false perspectives. They do not see things in the clear light of day. If they venture out at noontide they find its brilliance too much for them and have recourse to tinted glasses. They know nothing of the realities of the Telephone Service. They enjoy its benefits as they enjoy the warmth of the sun, but fail to recognise its source. It is not surprising that they know nothing of its material side, for they lift not their eyes to Heaven, where its golden threads may be seen, of the seeing eye, mirrored in a thousand fantastic webs against the azure blue; nor can they penetrate below the surface of things and mark the mystic intertwining of a 600 pair with its unbroken ebb and flow of all that makes the life of the heart of the universe. Perhaps, after all, we expect too much of our brethren of the pen. We who live our lives in a search for a full understanding of the possibilities of the Telephone, and know the difficulties of the task, ought to take a lenient view of those who, having but a nodding acquaintance with its simpler aspects, display ignorance when attempting to deal with telephone questions. I think we do recognise this and can look on with an amused tolerance at their struggles to walk alone. I am not satisfied that this is a right attitude. I think we should take them by the hand, set their feet upon a rock and order their going, but it is not possible in this paper to deal with the desirability of a Telephone Press Agency. In any case these newspaper folk for the most part mean well; they are not malicious.

It is lucky for us that they are not, for we have it on the authority of Napoleon that four hostile newspapers are more to be feared than a thousand bayonets. Fortunately, as I have said, we have no enemies among the Press. We have, however, many friends such as Job had who comfort us with a constant reiteration of our failings, and our sorrows, and assure us with hearts torn with grief that our sufferings are no more than we can expect.

The Telephone Service does not object to reasonable criticism but welcomes it, remembering however, that as one writer has it "neither praise nor blame is the object of true criticism. Justly to discriminate, fairly to establish, wisely to prescribe, and honestly to award—these are the true aims and duties of criticism." Yes, we should indeed welcome criticism built on such foundations, but newspaper criticism as everyone knows is apt to degenerate into reckless criticism, creating false impressions in unintelligent minds. Such criticism may do real harm, involving at once in its pernicious results those *by* whom, *to* whom, and *of* whom it is made. It springs frequently from the fact, already referred to, that the attitude of a particular journal to any current question is apt to be governed by the proprietor's opinion of the view which will best serve his interests.

It will be within the recollection of most of my hearers that a campaign of extreme criticism of the present Telephone Administration was carried out for some months in the later half of 1919. That criticism was confined mainly to one section of the Press and the majority of the articles embraced in its scope were published in the *Evening News*.

The main purpose of those articles appears to have been an indirect attack upon the principle of "nationalisation" as applied to any industry, the Telephone Service being used as the horrible example to point the moral and adorn the tale.

When I originally undertook to write this paper I supposed it would fall to my lot to point out the weakness of the case built on such a superstructure, but in the interval a series of articles have appeared in the *Telegraph and Telephone Journal* from the pen of Mr. Maycock. In those articles Mr. Maycock has examined many of the statements made by the Anti-Nationalisation campaigners, and has produced irrefutable evidence of their falsity. If you have not already read his contributions, I strongly recommend you so to do. They appear in the October, November and December issues of the Journal.

The *Evening News* articles, from which I will quote in some detail later, claimed that there had been a falling off in the standard of Telephone Service in London since the absorption by the P.O. of the late National Telephone Co., and that this falling off was directly attributable to the passing of the Service to the control of a Government Department. Mr. Maycock has shewn that in the main criteria of an efficient service, better results were obtained after the control of London's Telephones passed to the P.O. than were ever attained under the auspices of the late Telephone Company.

I do not purpose loading this paper with statistics and I will recapitulate only a few of the points brought out by Mr. Maycock. They are:—

(1.) *Speed of Answer.*—The best result obtained for any half year by the National Telephone Co. was 5.1 seconds for the half year January-June, 1908. For the *nine* half year periods, January 1913 to June 1917, under P.O. control, the figures *never* fell below 5.1, and for the two periods, July 1915 to June 1916, an average answer of four seconds was maintained.

(2.) *Percentage of Effective Calls.*—Accuracy is the final test of effectiveness, and the best result in this respect obtained by the National Telephone Co., was secured in the half year, January-June, 1908, when 31.3 per cent. of the total originated calls in London proved ineffective. *Under Post Office control the result, except for the first half year of* 1912, *has never fallen below this figure*—the best, mark you, that the Company had reached. The highest quality of Service given in this respect under Government control was obtained in he second half of 1916, when only 21.5 per cent. of the calls proved ineffective That I think is a most remarkable figure when one realises that it includes a figure of 13.6 per cent. ineffective owing to the engagement of the called subscriber.

Written Complaints.—Records are only available from January, 1910 but in the two years therefrom until the passing of the National Telephone Co. the lowest figure was eight written complaints per 10,000 calls for the first half year of 1911. A figure *below* this was maintained by the Post Office for each half yearly period from June, 1915, to December, 1918, and for the first half of 1918 the figure was below five per 10,000 calls. "And so," to quote Mr. Maycock's summing up, "judged on grounds of speed of service, accuracy of service, and expressed public dissatisfaction, the Service of London since the amalgamation with the National Telephone Co., establishes the superiority of State—not commercial, control."

Now whatever may be the wisdom or unwisdom of nationalising mines and railways, those questions should be considered on their merits and not on the merits of the Telephone Service. Much can be said for and against a nationalised Telephone Service, and the matter was fairly and fully reviewed in a book published in 1911 from the hand of Professor A. N. Holcombe, of Harvard University. The volume is entitled "Public Ownership of Telephones on the Continent of Europe," and I draw your attention to the following extracts from the "conclusion" arrived at by the Professor:—

> "According to the theory of the harmony of economic interests the best security for the production of those commodities which the community wants, and the best protection against the production of those which it does not want, is to leave business men free to engage in whatever branch of production they choose. For, it is argued, the test of a want that ought to be satisfied is the willingness of the consumer to defray to cost of satisfying it. Hence the desire of business men for a profit is a sufficient incentive to induce them to direct the production of those commodities that are wanted and no others. By permitting business men to compete freely with one another the amount of these profits may be reduced to a minimum, and the community will accordingly be supplied with the goods it desires at the lowest possible prices. The prosperity of a society that is organised in accordance with this theory depends, therefore, on the correctness of the prediction of the society's wants by business men, on their ability promptly and accurately to direct the productive forces of the community out of those channels where they are not wanted, and into those where they are wanted, and on free competition between them.
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> "In the Telephone business, competition is a failure. Considered as an automatic arrangement for maintaining an accurate adjustment of the supply of telephone facilities to the demand, it easily gets out of order. So long as it remains in order its effect is to diminish the utility of the service to render which telephone facilities are created. For a while it is capable of bringing about low rates and stimulating a rapid development. Sooner or later, however, the self-interest of the competitors or the disillusionment of the public authorities will cause the termination of competition and the substitution of a regime of monopoly. This has been the result everywhere in Europe where competition has once existed, except in Stockholm, and in Stockholm the bankruptcy of the private company or the purchase of its business by the government is only a matter of time. Competition as a permanent status in the Telephone business is neither desirable nor possible.
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> "The alternative to competition is monopoly. But under a regime of monopoly the set of conditions from which is deduced, the theory of the harmony of economic interests does not exist. The same motives of human conduct which, under a regime of free competition, are relied upon to secure to the community at reasonable prices the supply of those commodities and services which are wanted, no longer produce that result. There is, on the contrary, a direct antagonism of interest between the producer and the consumer. The latter which is the community itself in the case of a business of general public importance, must make a special effort of some kind in order to provide a substitute for the automatic action of free competition. This special effort may take the form either of public regulation or of public ownership of the business in question.
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> "The problem is twofold. First, there must be a substitute for the action of free competition as a protector against inefficient management and the uneconomical employment of the productive forces of the community. Secondly, there must be some means of assuring to the community its share in the results of efficient management and economy in operation.
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> "The great advantage of the ownership of business undertakings by the community lies in the power that goes with possession. While the ownership of businesses of general public importance remains in private hands, there is no protection for the ordinary economic interests of consumers, except by free competition or by public regulation. In the telephone business the former is neither desirable nor possible.
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> "The latter may be obtained in only two ways: (1) by special contract between the private owners and the public authorities; (2) by direct legislative action, subject to appeal to the courts for the protection of individual rights. Under either method of public regulation, the antagonism of interest between the private monopolist and the consumer may be subdued but is never removed.

"It was in order to possess complete control over the management of the telephone business that the governments of Europe adopted the policy of public ownership.

"By retaining complete control in their own hands, those governments have had the opportunity to adopt methods for the establishment of rates and the maintenance of service that would have been impossible under any form of private ownership.

"In a business such as the telephone, the best security for the establishment of reasonable rates is to give those who are to pay rates a voice in the making, and the best security for the accurate adjustment of the supply of telephone facilities to the demand is to give to those who are to use the facilities a share of the responsibility for their creation.

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"The great merit of public ownership, as an agent of production, is that under the proper industrial conditions it fulfils more economically than any other method of industrial organisation, the direct purpose of production—that is, the supply of the consumer with the kind and quality of goods that he desires."

These conclusions of Professor Holcombe appear eminently sound, and Mr. Maycock has established the fact that under public ownership the quality of the London Service reached a standard much beyond that attained during the period of private control. It can be claimed also that behind the sentences of Professor Holcombe and Mr. Maycock, one has persons of clearly established identity. Now, to quote Emerson again, "It makes a great deal of difference to the force of any sentence whether there be a man behind it or no. In the learned journal, in the influential newspaper, I discern no form, only some irresponsible shadow—often some moneyed corporation, or dangler, who hopes in the mask and robes of his paragraph to pass for somebody." It is with the criticism of such shadows that we have to deal.

The shadow is particularly ill defined in an article headed, "The Rescue of the 'Telephones,'" which appeared in the *Efficiency Magazine* for October last. It says, "I have gone into the telephone problem thoroughly. I investigated eight London Exchanges, I gathered the data and interviewed the officials who are responsible for the present muddle."

"I may say that I have a right to speak on this subject" (muddle presumably!) "as I wrote *The History of the Telephone* and was engaged as an efficiency expert by several American telephone companies."

"Also when the English telephone officials went to America to learn telephony, I was a member of the committee that received them and *taught them.*"

Probably this last fact explains the muddle if there be one or possibly the whole position is explained by the shadow's instruction in his last paragraph "ask for an efficient TELEPHONE COMPANY, LTD."

I take it that the situation is not greatly changed even if, as in the case of the *Evening News*, the "irresponsible shadow" is given the rather more pleasing style of "special commissioner" or "special representative."

Whatever be the name or style of this speciality, he is put forward as a "technically trained expert," has set out to criticise the present Telephone Administration, and the claim is made either by him or on his behalf that he is in a position to examine the whole question of Telephone Service and apportion praise or blame as it is due. Let us look closely at some of his criticisms and see how far his claim to expertness is justified by his handling of this subject and also how far he does arrive at useful, definite conclusions.

It is quite clear that with the time at our disposal to-night we cannot undertake a detailed analysis of each of his contributions, but I shall endeavour to show you that his criticism lacks every true aim and duty of criticism, and that it does not justly discriminate, fairly establish, wisely prescribe, or honestly award. I know not to what extent you may have perused his two months' campaigning series, and I shall therefore quote some lengthy extracts. Remembering his claims, we are justified in expecting him to present his case clearly and consistently. The campaign is ushered in on August 5, and is headed "The Breakdown of the Telephone."

"We know," says the shadow, "as a matter of fact from our mail bag, from overheard comments, from personal experience that the telephone user is angry as he has never been before and that he has ample justifications for his anger." As already pointed out so far from subscribers being violently angry they have realised that the Telephone Service in common with themselves has many post-war difficulties to surmount, and written complaints are and for some time past have been comparatively low. During the first half of 1919 they were about ten per 10,000 calls, whilst in pre-war days they have reached a figure as high as 16 per 10,000.

As to the subscriber being angry as he has never been angry before, here is an extract from the *Economist* of April 2, 1898, quoted recently by Mr. Emil Davies in the *Daily News*:—

"The simmering discontent at the costliness and inefficiency of the service provided by the National Telephone Co., which has been practically coincident with the existence of the undertaking, has lately become more pronounced."

The shadow goes on, "And then again, there is no use shirking the fact that we are faced by hastily framed schemes of nationalisation based on theoretical rather than practical grounds. (Nationalisation of what?)

"Criticism is never helpful unless it is well informed and explicit. We shall take occasion to explain various technical points of telephone practice without an understanding of which helpful and explicit criticism is impossible. We have retained to that end an expert technically trained and able to express his technical knowledge in an idiom that the laymen can understand.

"What we want then is to get at the truth. *We want facts—not merely impressions.*"

These facts the Post Office supplied for the article of August 7, and the shadow in introducing them says, "It is necessary to make it perfectly clear as a preliminary to the statements given below, that red tape statistics however fairly arrived at do not dispose of the general charges that the public can bring."

Very good, but here is the startling thing: some lines lower down we read, "By way of taking the matter of telephone deterioration from the realm of mere impression to that of observed fact, the following specific details are worth setting down for the public's consideration," and then they quote the red tape statistics. Truly the negations of yesterday do often become the affirmations of to-day, but it takes a technically trained expert to reverse them on the same day.

However, he passes from strength to strength as he explains these observed facts. He says of the *general percentage of all operators' irregularities*: "These figures need explanation . . . They form a valuable index of general efficiency or the opposite."

"In the latter half of the year 1914, covered by the early war period the average efficiency curve was 36.5 per cent. In the corresponding period of last year it was 27.5, a 9 per cent. deterioration."

"To-morrow," says he, "we shall approach the phenomenon of deterioration from the public point of view." I like his choice of word "phenomenon"—presumably he is using it under the Dictionary definition of something as it is perceived, not as it really is, for anyone other than a technically trained expert would know that for the operating irregularities to pass from 36.5 to 27.5 per cent. is the *direct opposite to deterioration.* In truth, *he* has reversed the figures which were supplied to him, but it is pleasant to note that for November the figure was back again at 29 per cent.

The next day the Special Commissioner quotes a business man who tells him that one call out of every two is a failure, because it is engaged, cut off, no reply, indistinct or confused. Why should this be asks the Special Commissioner. "All the appliances for providing a perfect telephone service exist. In short all the plant is available for putting any two telephones in a system however big, spread over an area however large, in communication with each other in a *few seconds* with certainty and precision." You will note the few seconds. So far as one can gather this panacea for all telephone ills is in existence and the reason why a perfect service is not given can only be, says he, that "the organisation is lacking to combine the appliances which are available into a system, to operate that system efficiently and to develop the system continuously so as to meet the public needs." I demand an explanation of the Engineering Department of the statement that there is a world shortage of telephone equipment—possibly shadows see shadow equipment not available to ordinary mortals.

You will remember his thirst for facts. Early in August he calls in the aid of a number of firms to assist in observation. A truce cries he, to impression, let us choose to us judgment, let us know among ourselves what is good, and he appoints a day on which these firms shall record the details of their Telephone Service and advise him of the result. He has read how with the jawbone of an ass thousands were slain. He assumes that he has only to secure the weapon of facts to achieve like results on an effete Telephone Administration, and behold, a miracle! Seeking his jawbone he has grapsed a boomerang, which, released by his unskilled hand, returns with deadly effect. All his observers report a good standard of service. In the issue for August 18 he says, "29 large London business firms co-operated with the *Evening News* in a special test of the Telephone Service. *The result was astonishing.*"

"It proved that even with the present shortage of staff and deficiency of material the Post Office is capable of giving 100 per cent. better service than users get normally."

It proved nothing of the sort really. What it would prove, were proof needed, is, that the realm of observed fact is quite distinct from the realm of business mens' impressions. Struggling to recover from the blow administered by the boomerang of "observed fact" he seeks some sort of excuse for his bungling. He can hardly accuse *his* observers of mis-stating the facts, so he flies to the usual recourse of uninformed minds when presented with similarly unexpected denouements and whines in effect, "It isn't fair, you discovered my secret and it wasn't a secret," and then, after the manner of the quack who diagnoses his patient as at the point of death and effects a marvellous cure by looking at his tongue and prescribing a dose of coloured water he proceeds, "From the results of the various tests it will be seen how the *Evening News* campaign has 'gingered up' the Post Office."

In any case the result is too disturbing for the experiment to be repeated and he risks no more the boomerang of "observed fact." It was a most dangerous lapse—he does well to avoid it.

But because the results of observed facts were marvellous in his eyes they need not be marvellous in our eyes. We know that the service leaves something to be desired in these days. We know the reasons why that is so. We know that in more than one of London's largest Exchanges the volume of traffic increased in 12 months from October 1918, to October 1919, *by more than* 66 *per cent.* We know that in one City Exchange in a few days the incoming traffic increased by approximately 50 per cent., and we know what is entailed in carrying on any service at all under such conditions. But we know also and have pleasure in the knowledge that ours is a progressive service and that the progress is that of the pilgrim—onward yet upward!

Badly beaten in his one excursion into the realm of observed fact the shadow seeks to explain away his defeat and suggests that to meet the observations of unknown subscribers on an unknown date a special instruction was issued by the Telephone Administration. "Focus on accuracy rather than on speed," and after a few plausible platitudes on the value of accuracy, he proceeds—

"It is better to give the right number in 10 seconds than the wrong in six" might well be framed and hung on the walls of every exchange.

Very suitable indeed for the walls of an automatic exchange, but the Administration, here or elsewhere, that spent money in framing such a motto would make itself the laughing stock of its staff and of all others who had an elementary conception of the time values of telephone operations. At present the average time to effect a call in London is 46 seconds. The average has never been better than 35.8 seconds which was secured in February-March, 1916, when a Service of outstanding excellency was rendered.

(To be continued.)

NEWCASTLE-ON-TYNE.

WELCOME HOME TO RETURNED TELEGRAPHISTS AND TELEPHONISTS.

On Thursday, Jan. 27, a "Welcome Home," which took the form of a dinner, concert, whist drive and dance, was given by the ladies and gentlemen of the telegraph and telephone branches to their colleagues who have returned home after serving with His Majesty's Forces during the War. The number of guests entertained was 135, and there sat down to dinner, in all, 300. The event marks an epoch in the history of the two branches and was voted an unqualified success.

In the unavoidable and regrettable absence, through illness, of the Postmaster-Surveyor (Mr. Chambers), the Chief Superintendent of Telegraphs (Mr. A. Potts) was Master of Ceremonies. After Mr. Archer Smith had proposed the loyal toasts, Mr. Pickering (Assistant Superintendent Telegraphs), proposing "The Tribute to the Fallen," said, "In the midst of our enjoyment let us pause for a few moments while we call to remembrance those of our colleagues whose absence from our festive board to-night, we mourn. We sorrow, however, not as those who have no hope. I will sing no dirge, rather would I ask you to sing a psalm of praise when we think of all that we owe to them and of the reward that is promised to those who 'fight the good fight.' In the hour of their country's need, when the enemy was at the gate, they rallied to her cry for help. They forsook the joys and amenities of life, endured hardships, suffered privations, and at last gave their young lives as a sacrifice on the Altar of duty. They enslaved themselves that we might continue free, they waged war that we might live in peace, they died that we might live—'Greater love hath no man than this that a man lay down his life for his friend.' I would therefore ask you to rise and bow your heads as a tribute of our respect and reverence for those who have fallen. Though they have gone from us, and are lost to us—for a while—let us show in this manner that they are not forgotten by us. 'To live in hearts we leave behind is not to die.'"

A solemn hush fell over the gathering as everyone stood with bowed head and paid a silent tribute to those who had fallen.

The toast, "Our Returned Men," was proposed by Mr. A. Potts, the Chairman, who said, "As Mr. Chambers states in his greeting on the front of the menu card, our returned soldiers have 'done their bit.' They have done their bit so well that many of them have been mentioned in despatches, some have received military promotion, while others have won various decorations and honours. We welcome their return to us from military service. Most of us have already done this individually, but at this representative agthering, we do so collectively as a special mark of our appreciation. Our returned comrades have a much wider outlook and are broader thinking men to-day than they were before they stepped into the breach 'to do their bit' in withstanding the enemy. They have been great travellers in strange lands and under strange conditions. They have seen appalling things happen in the Great War. They have had continual uncertainty of movement from one part of Europe, Asia, or Africa. In action, whether on land or sea, they have been at close quarters with a final 'knock-out' at any moment. Even on the lines of communication, in the danger zone, they carried the constant possibility of being a casualty at any time. Those who have been in German prison camps have had the roughest of experiences. After what they have seen and done in the Army and Navy they cannot be expected to fall readily into the same groove as before the War. All of them have had experiences so hazardous, and such as can only be inadequately imagined by those of us who have simply had to support the home front. Our worst experiences were air raids and bombardments of our coast towns—mere flashes of danger compared to what our guests have had to face.

"We feel it an honour to our staff that every man called to the colours went as soon as he was called. Some of them applied to go, and went before the general call came, including a few who were over military age at the time. Of a total staff of 144 male telegraphists, 117 joined the colours, representing over, 80 per cent. of that class."

Mr. T. J. Hodgson (telegraphs) responded for the "Returned Men," and thanked those who had been at home for their helpful and considerate attitude towards the ex-service men since their return. The experiences of active service had bequeathed to the men a higher value of comradeship and co-operation. It was those qualities which pulled the Army through its darkest days, and what that spirit attained in military life it could achieve in civil life. They were all yearning after something better than they had at present. Let them strive after their ideals and ambitions hand in hand with comradeship and co-operation. In thanking those responsible for the splendid welcome accorded the returned men, the speaker paid a high tribute to the women who had carried on so well in the trying times just passed.

Mr. W. A. Abbott on behalf of the telephones, said, "I have great pleasure in responding on behalf of the returned men. After the eloquent speeches that we have listened to I think the ground has been very well covered.

"We are proud to think that what little service we rendered to our King and country in the time of great stress has been so much appreciated by those who were left at home. Any hardships and sufferings which we had to undergo we feel are more than compensated by the very hearty greeting which you have extended to us to-night."

"Our Returned Women" was proposed by Miss Wellbourn (Matron, telegraphs), who said, "On behalf of the ladies of the telegraph and telephone staffs, we wish to thank all members of the female staff who joined the Women's Auxiliary Army Corps and took part in the Great War. We also offer them our heartiest congratulations on their safe return.

Miss A. L. Weaver (telegraphs) and Miss E. A. Bolton (telephones) suitably responded.

Great credit and thanks for an enjoyable evening are due to Mr. T. R. Main (Hon. Sec.) and his able committee for the splendid organisation.

THE CENTRAL TELEGRAPH OFFICE.

CONTROLLING AND SUPERVISING OFFICERS' DINNER.

TRULY signal was the success which attended the dinner of the Controlling and Supervising Officers of the C.T.O., held at the Connaught Rooms on March 8, 1920. The gathering numbering close on 200, was presided over by Mr. John Lee, the Controller, and it is hoped that it will be the precursor of a series of annual gatherings of the kind, not necessarily confined to the supervising staff.

After a most enjoyable repast the toast of the King was loyally honoured. The chairman explained that the Postmaster-General in his hurried departure from the office on urgent political matters, had not signed a letter which he had intended to be read to those present. The latter was to convey the Postmaster-General's admiration of the Controlling and Supervising Staff of the C.T.O., his appreciation of the good work they had done in the interests of the telegraph service and his best wishes for the success of the evening.

In proposing the toast of "The prosperity of the C.T.O.," Mr. Kellet likened the office to a garden which must be trimmed and tended if the best result is to be obtained.

Miss Gibberd in seconding, expressed pleasure at being present that evening, and appreciation of the thought which had prompted the combined gathering. The hint was tactfully thrown out that there had hitherto been a reluctance to associate the female supervisors in general administration.

The toast having been enthusiastically received, the Chairman responded. Speaking of the C.T.O. he was convinced there was a great future before them and so far as he was concerned his mission was one which was capable of accomplishment only by the loyalty of the assistant under-gardeners. It was a task which no amount of individual application could achieve. The prosperity of the C.T.O. needed an intensification of all the means at its command and a corporateness of force, for without strength born of unity and understanding, the C.T.O. could not hope to attain its ends. He felt his position to be the focussing and fusing point, observing that from the highest to the lowest rank of the staff, even down to the humble messenger boy, there was some instruction and enlightenment to be gained to assist in fostering the prosperity of the office. He believed intensely that the very life of telegraphy consisted in rapidity of transit and that applied not to inland telegraphy only, but to international telegraphy which was being conducted against such difficulties.

Mr. Donno proposed the toast of the Ladies and Visitors in felicitous terms. He testified eloquently to the splendid work done by the ladies during the War. As regards the C.T.O. he was sure that without them it would have been impossible to have carried on. Whenever their services were enlisted they had always shown willingness to do their best. On behalf of the gentlemen he hoped that the ladies and visitors, who were mostly ladies, would be present at many future similar gatherings.

In replying to the toast, Miss Tynan in a happy little speech, expressed warm thanks for the opportunity of attending such an enjoyable gathering. Hitherto, she said with some emphasis, the social functions in connexion with the C.T.O., while being quite agreeable to those immediately concerned, had lacked that cohesive spirit which was much to be desired in such a large office.

The toast of the Chairman was proposed in a very able speech by Mr. A. W. Edwards (Deputy Controller), which contained references to Mr. Lee, too intimate for reproduction. He coupled Mrs. Lee with the toast, and the Chairman suitably responded and made special reference to Mr. Wight's great success in organising the gathering and Mr. Daggett's ability as accompanist. Mr. Lee concluded by expressing the fervent hope that whilst he was the Chief of the C.T.O. he would seek to approach the qualities which had been attributed to him by the proposer of the toast.

The musical part of the programme was of a very high standard and much appreciated. It was sustained by:—

Misses Nellie Walker, Ida Sherrington, Nellie Nicholls; Messrs. Archie Hudson, Harcourt Brown, Gurney Russell, and Walter Montague.

With the singing of the National Anthem and "Auld Lang Syne" came to an end an event deserving of indelible record in the history of the C.T.O.

TELEGRAPHIC MEMORABILIA.

A BOOK on the Civil Service and re-construction which was published late in the autumn of last year, dealt with some of the drawbacks of those forms of employment the efficient organisation of which necessitates a very large amount of mere routine and repetition work. The author did not specially apply his theories to telegraph duties, but one could not help associating much of what he had written with many of the present day complaints regarding our own branch of Civil Service activity.

It is a recognised fact that the general educational standard having materially risen since 1870 and the Civil Service presenting certain allurements for educated men and women, it has frequently come about that these same men and women have found themselves in the *cul de sac* of a department which offers no scope for initiative, makes no bid for individuality, and what is worse, creates no love for the work itself but rather a dull nausea.

How far is this true of the telegraph service ? The catch phrase, " There's plenty of room at the top " may be dismissed as unreal as an incentive because obviously untrue. This feeling of tiredness of the monotony of things is in itself a healthy sign, and may be accepted with safety as an indication, sometimes quite sub-conscious of a justifiable yearning *for* better things as well as a realisation that one could *do* better things for the State if only one were given opportunity. Are there then sufficient opportunities for the rank and file to express their inventiveness and to accept a certain quota of responsibility ? Are these virtues really fostered ? Is pride in one's work encouraged? Admitted that machine telegraphy has removed a certain amount of individuality from the art of telegraphy, the writer would maintain that there is still considerable scope for the keenest interest, while the desire to turn out a presentable and readable telegram for delivery to the public should be no less earnest with the printed than with the written form. Each bears the signature of a responsible officer—a civil servant. Is this the whole story ? It is feared not. On the one hand there is at times the temptation to slavishly " follow copy," and thus avoid all risk of infringing departmental rules and regulations. This, the author in his essay, declares very bluntly to be mere cowardice. There is, too, the other side of the shield which he denounces with equal vigour, and that is the insistence on the dotting of every " i " and the crossing of every " t " by pettifogging officialdom not in touch with the practical side of affairs. Does *this* affect the telegraphs ? Personally my own opinion on this latter point is that there has been decidedly more elasticity in the telegraph departments with regard to these matters during the last few years, and the tendency is still towards permitting the wider interpretation and commending rather than discouraging commonsense. Whatever may be the risk of the confession it is no secret in the telegraph world that during the war rules and regulations have been broken galore, in order to speed an urgent national message or to solace the mind of a wounded soldier's relatives. Of course if rules need not be slavishly followed in circumstances for which they were never designed, this is no argument and no excuse for heedlessly and thoughtlessly breaking through them at all times. Only in case of fire should the glass be broken !

Modern conditions and huge organisations imperatively demand specialisation of function, and the tendency is still thitherward. The standard of education is also rising steadily, and it must therefore naturally follow that as many of the ordinary occupations will become more and more sub-divided and the process become more and more monotonous, so more and more of these monotonous sub-divided functions will be performed by a more highly educated type of individual than has been employed hitherto thereon. It is not every man who watches a machine working evolves another and more complex one therefrom, and the monotony of an occupation which to one man means spare thought-time in which to invent a calculating machine (a fact !) to thousands of others spells a deadening of interest and a hopelessness of outlook which can neither be good for the individual or for the State. What will be the solution of this problem ? Shall we always be content to use the fruits of our secondary schools, even those of our universities upon the gumming of tape upon telegraph forms, upon the working of comptometers, or upon card-indexing and filing ? Or recognising the necessity of the satisfactory performance of these simple duties, will the future years fulfil the prophecy of Bellamy ? Was it not he who in *Looking Backward* depicted a state where every man and every woman recognised each function performed however apparently minor in importance, each piece of work achieved, however small, each duty done, however humble, as done for the general weal and therefore redounding to the honour of the doer ? We may be aeons away from this Utopia, though really is it not the loftier ideal, the better way ? But then in Bellamy's new city even the waiters were university men and—took no tips !

I have been trying to obtain reliable figures as to the average " life " of a Baudot type-wheel. Perhaps one of our continental friends could give the desired particulars. Enquiries made within the limits of British experience appear to show that " dead " type wheels are as rare a sight as a dead donkey in the streets of London !

Lawn tennis, it is to be remarked, is in a healthy state of re-crudescence in the C.T.O., after a fallow period of over five years.

The C.T.O. Benevolent Fund has just made an orphanage grant of £30 to the widow of a telegraphist who did not benefit by the usual " year's salary." The case is to be reviewed at the end of twelve months. It is with more than usual pleasure that publicity is given to this comparatively new phase of the activities of this fund. The subscription is so small and the scope of the fund so full of possibilities for good to the distressed, that no single name should be absent from the list of members.

The eighth edition of No. 3 of the *Enquire Within* series now issued by U.O.P.O.W. is on sale, and all interested in the rules, rulings, and regulations governing the various Pension Acts will find most valuable items of information regarding these interesting matters. Telegraphists and telephonists, ranker or controller will find common ground between the pages of this informative pamphlet, the cost of which may be met by one or two coppers.

As we go to press the information comes to hand that over £1,000 has either been promised or already subscribed to the C.T.O. War Memorial. One of the inland divisions alone subscribed more than £150 some week or two ago. The desired £1,200 therefore seems well within reach.

J.J.T.

WESTERN ELECTRIC LOUD-SPEAKING TELEPHONES.

In connexion with the skating match in Christiania between the champions—McLean and Mathison—the various newspapers have tried to make special arrangements for informing the public in the City as quickly as possible of the result.

The Western Electric Co. had three loud-speaking telephones there, left from the Norwegian-American exhibition. They were mounted outside the offices of the paper *Nationen*, located in the main street, and the telephones were in connexion with a journalist at the matches, and gave instant reports of all details of the match.

It was expected that the arrangement would be a success, but expectations were considerably exceeded by the results, as the three loud-speaking telephones entirely blocked the traffic of the main street during the races, to the great annoyance of the police, who had given permission to the newspaper that the loud-speakers might be used, without realising what the permission meant to them. At the Sunday match, there were thousands of people outside the newspaper offices, and it was quite remarkable how far and distinctly it was possible to hear the talk from the loud-speakers.

The newspaper now wants to get these loud-speakers permanently, for giving out the last telegram arriving at the 11 o'clock time at night. It is, however, a question whether they will get permission from the police. In any case, the understanding is that they will instal the receivers at some of the cafés, and give out the telegrams in this way.

Development of the use of these loud-speaking telephones is anticipated, both as a telephone newspaper for cafés and similar places, and in connexion with the Olympic games in Antwerp.

LONDON TELEPHONE SERVICE NOTES.

THOSE who were fortunate enough and those who were wise enough to be present at the Finsbury meeting of the Telephone and Telegraph Society when Mr. Allen, Controller of the Post Office Stores Department, read his paper entitled " Materials and the present economic conditions," had every reason to congratulate themselves and judging by the appreciation expressed there was no doubt that they did so. The Stores Department is singularly placed among the Post Office Departments in respect of its relations with the markets of the world, and from the mass of the activities of his Department Mr. Allen made an amazingly comprehensive selection of evidence to show how labour, transport and materials of all kinds have advanced in price since 1914. Particularly interesting to those concerned with the telephone system was his reference to the difficulties of obtaining supplies of stores quickly and freely for overtaking the arrears of telephone development and no more complete answer to the Press on this point could be found. Perhaps no part of the paper fixed attention more strongly than details of increased wages in the various branches of labour—150 per cent. increases are apparently not rare.

The final meeting of the London Telephonists' Society this session was very successful. The large audience was no doubt attracted by the unique subject, viz., a competition in voicing the day to day operating expressions of the Telephone Service. Sixteen competitors took part and voting papers were distributed to each member of the audience. Each competitor was required to repeat certain of the standard operating expressions after which she was at liberty to give a short recitation. The expressions were well rendered, but nevertheless the audience seemed to experience little difficulty in selecting the best. The three who received most votes were Miss Slate, of Central, Miss Hobill and Miss Young, of Regent. The recitations covered a wide range, but items from Shakespeare and Ella Wheeler Wilcox figured most prominently. The second feature of the evening was a paper written by Miss J. McMillan for the literary competition held by the Society. The subject was " Alice in Numberland." It was a parody on Lewis Carroll's well known book, and Miss McMillan added to her reputation and received much applause at the end of her reading. Mr. Dive who has a reputation for finding things, saying things, writing things and having things made, contributed a parody which he had found from the same author's " Through the Looking Glass." Unfortunately that which was found has been lost, and those who were not present have missed a treat.

Mr. Preston presented the prizes and made a very happy and optimistic speech regarding the future of the London Telephone Service, and the Members of the Society were very glad to have him with them. Mr. Pounds was congratulated on the success of the Society during his presidential year, and Mr. T. A. Beck was elected President for the next session.

* * *

A fitting tribute to the support given by the staff of the London Telephone Service to the Hospital Saturday Fund has been made in the appointment of the Controller as a Vice-President of the Fund.

* * *

Contract Branch.

We offer our heartiest congratulations and best wishes to Mr. H. R. H. Parker, late Contract Officer, attached to the S.E. District Contract Office, London, on his appointment as Contract Manager of the Bengal Telephone Company, Calcutta.

Mr. Parker resigned from the London Telephone Service on Feb. 27, and has already sailed for Calcutta.

East Exchange.

Miss Eveline Chester, Telephonist, has been awarded the Medal of the Most Excellent Order of the British Empire (Military Division) for valuable services rendered in connexion with military operations in France and Flanders.

Before her enlistment in the Signals Section of Q.M.A.A.C., Miss Chester was awarded the Medal of the Civil Division for devotion to duty during air raids.

Gerrard Exchange.

The Gerrard Swimming Club held their third dance on Feb. 4. Miss D. Davies, attired as a Dutch boy, gained the ladies' 1st prize, and Miss Blanks as "red tape," gained the prize for the most original costume.

The second whist drive was given at the Sidcup Hospital on Feb. 7. There are from 500 to 600 men at Frognal, Sidcup, suffering from facial injuries. About 100 of them took part on this occasion, and they managed to carry off all the 10 beautiful prizes. The men have expressed a wish for a dance in the near future and it is improbable that they will be disappointed.

The seventh whist drive in aid of the "War Seals Foundation" was held on Feb. 25, and was as popular as ever.

Hop Exchange.

The Social Club organised a very successful Social on Jan. 14. The occasion was marked by Miss Ashmead and Miss Liddell attending for the first time as President and Vice-President respectively. Mr. Thirkell acted as M.C., and during the interval Mr. Townsend gave several violin solos. A vote of thanks was passed to the committee and artists, Mrs. and Miss Mead being specially mentioned for their services as accompanists. Miss Ashmead was called upon to make announcements but was unable to proceed until the enthusiasm with which she was greeted had subsided. The choir exceeded expectations by their very creditable performances, while Mr. Clark and friends favoured us with some very well-rendered songs and duets.

The staff gave a tea on Feb. 14 to about 230 poor children. Afterwards the little ones were visited by Father Christmas, who distributed toys from a Christmas tree, and the shouts of joy with which they were welcomed told their own tale. A ventriloquist and marionette performance followed, and at the conclusion of the evening each child was given a bag containing sweets, a bun, an orange, and a penny, and one felt as the children departed that their lives had really been brightened for the space of a few hours.

Kensington Exchange.

A dance, arranged by the staff, in aid of the Kensington General Hospital, was held at St. Mary's Hall, Putney, on March 1.

It was a great success, both socially and financially. Mr. Collins was an admirable M.C., and the sum realised for the hospital was £20.

An interesting feature was the fancy dress parade. Prizes were awarded to Miss Narroway (an Eastern lady), Miss Hooper (a lady from the Wild West), Miss Kemp (a Dutch boy), and Mr. Froment (a jester).

London Wall Exchange.

On Saturday, Feb. 21, the staff entertained to a good, old-fashioned tea between 600 and 700 of the children from Heckford Street Schools, Ratcliffe, and a very happy afternoon was spent by both the children and the helpers. After tea the children sang popular comic songs, and later the elder children were taken to the Stepney Central Hall, where a very good cinema entertainment was provided, the pictures being both amusing and instructive. On leaving the school each child was given an orange, bag of sweets, and a bright 1920 penny. Several very amusing letters have been received from the boys who all attest to having had a very good time.

The Kia Ora Club and their friends spent a very enjoyable evening on March 3, at Anderton's Hotel, Fleet Street. The first portion of the evening was devoted to whist. Miss Forge distributed the prizes and, after refreshments, dancing was indulged in. Three elderly gentlemen who watched the frolic from the staircase heartily wished that they were young again.

Mayfair Exchange.

On Friday, Feb. 27, a most enjoyable dance was held by Mayfair Exchange, at which over 200 were present. Mr. Collins contributed largely to the success of the evening by officiating as M.C. in his customary able manner. The prizes for the best fancy dresses were secured by Miss Rigby who wore a charming Japanese dress, and Miss Blakely and Miss D. E. C. Parker who appeared as the "Cocoa Nibs." The release of balloons during the progress of the dance evoked considerable merriment, and added to the gaiety of a very happy evening. Miss Daisy Wiltshire was responsible for the catering arrangements which were excellent and much appreciated.

At a farewell tea the staff presented Mr. R. Gregory with a pair of silver candlesticks as a token of esteem and appreciation on the occasion of his transfer to Central.

Regent Exchange.

An exceedingly pleasant evening was spent at a whist drive held on Feb. 19, and many useful prizes were distributed by Mrs. Pounds, who was lucky enough to win the ladies' second prize. The lowest score prizes, although causing much laughter, were very acceptable. They consisted of a savoy and a cauliflower.

On Saturday, March 6, Regent paid another visit to the permanently disabled soldiers at Gifford House, Roehampton, their special protégés, and entertained the men to tea and music. As usual the girls worked untiringly to make the occasion a great success, and it was very evident from the appreciation of the guests that they were delighted, not only by the many good things provided and the talent of the artists, but also with the cheery girls who waited upon them.

Western Exchange.

On Tuesday, Jan. 20, in the Western Exchange dining room, Miss Wormald, the former Chief Supervisor of this Exchange, was presented with a handsome gold brooch and a bouquet of flowers from the staff as a small mark of appreciation and esteem. The presentation was most ably made by Mr. Collins who, in well chosen words, voiced the feelings of all. Miss Wormald made a very happy speech in response, and hearty cheering for Western's past and present Chief Supervisors terminated the ceremony.

Trunk Exchange.

On Friday, March 12, the Trunk Exchange held their second bazaar on behalf of St. Dunstan's and the War Seals Foundation. To avoid the overcrowding of last year increased space was sought by engaging the largest hall in the Memorial Hall building for the bazaar, and the library in which the bazaar was held on the previous occasion was set apart for tea and refreshments. Music was provided in the library by an orchestra organised by Miss Willis, and conducted by her father, and consisting entirely of members of the staff of the Toll Exchange.

Practically the whole of the articles on the children's outfitting stall, the camisole stall, the holiday stall, and the handbag stall, were made by members of the staff as were also a large proportion of the cakes, pastries and sweets. Valuable assistance was received by those responsible for the holiday stall from Mr. Wood, of "Funland," Edgware Road, who brought along such machines as one frequently finds at popular seaside resorts in the summer season.

Miss M. V. Baldwin who makes a particular hobby of character reading from handwriting, had been working in that direction for some weeks prior to the bazaar, and as a result of her efforts collected a sum of £41 17*s.* 6*d.* The staff greatly appreciated the assistance they received from the City and Central Exchanges, and also from their colleagues at Glasgow, Bristol, Dover and Worcester.

The Lady Mayoress who opened the bazaar charmed us all by her happy speech and the cheerful manner in which she entered into the spirit of the occasion. Her appreciation of all the efforts which had contributed to produce such a splendid display, gave such satisfaction and encouragement, and all feel that they have added Lady Cooper to their list of friends. Mr. Dive's youngest unmarried daughter presented Lady Cooper with a bouquet.

Mr. Dive was chairman of the opening ceremony, and in the course of his remarks referred to the reported statement of Lady Cooper that it should be counted unto every woman a virtue to be able to trim her own hats. He expressed the opinion that the evidence of needlecraft exhibited on the stalls entitled the staff of Trunks to claim that virtue, and he claimed it also for Mrs. Dive, seeing that she had even made a hat for him which had gained him a certain notoriety in the neighbourhood in which he lives. Mrs. Dive who was present received much applause, but the remark gained for its author unexpected publicity in one of the daily contemporaries and subsequently Mr. Dive received pressing invitations to allow himself and the hat to be photographed for the picture press. As, however, a sufficiently large donation towards the receipts of the bazaar was not forthcoming he declined the honour.

Miss Breden, the first Chief Supervisor of the Trunk Exchange, had been invited and was present on the platform and received a warm welcome from all those who had been associated with her. Both financially and socially the bazaar was a huge success, and the organisers wish to thank most heartily all those who assisted either in making or purchasing. It is hoped that a sum of about £700 will be realised, but further details on this point will be given in the next issue.

CORRESPONDENCE.

A WORD FOR "TELEPHONE-TELEGRAMS."

THE EDITOR, "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—Para. 1 of *Telephone Service Instructions*, Sections 9, 10, states that telegrams transmitted between two post offices by telephone are called "telephone-telegrams." It would seem that here is an opportunity and a necessity for the coining of a word.

"Dictagram," being, of course, a hybrid, is perhaps objectionable for that reason and alternatively I would suggest that "Telephonogram" is an improvement on the ponderous "telephone-telegram."—Yours faithfully,

W. E. BEES.

Studd Street Depot, Feb. 24, 1920.

THE MISSION OF THE CONTRACT DEPARTMENT.

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

With the approach of normal telephonic conditions the thoughts of telephone men are centred on the future of the telephone service.

Although during the past five years the Contract Department has been working at high pressure with depleted staff, only selective business has been taken, and general new business activities have of necessity been curtailed. Some degree of plant restriction still obtains, but arrears of construction and suspended development schemes are being steadily reduced by the Engineering Section.

The forthcoming revision of telephone tariffs may preclude the resumption of active and unrestricted canvassing until the new rates become operative, but the time is opportune to consider the future of contract work in its many phases.

Much National discussion has arisen on the complex problem of Transport and Commercial "lines of communication;" it is therefore all-important that the ancillary telephonic "lines of communication" should be developed and extended until every small town, village, and hamlet, possesses adequate and efficient telephonic facilities.

It is only intended to briefly touch upon some of the essentials of efficient and productive contract work, emphasising the necessity for the closest co-operation with our friends in the Engineering and Traffic Sections.

In a recent issue of a "predominant evening journal" the increasing efficiency of the telephone service was the subject of favourable comment, and, although the newspaper in question took upon itself the main credit of the improvement as the result of a telephone campaign in its columns, the public will doubtless give some credit to the efforts of the staff.

The Contract Department can materially assist the Traffic Section and so contribute further to telephonic efficiency by resolutely tackling the "large user" question. Much of the criticism of the telephone service is due to the inadequate facilities rented by large users, who continue to subscribe for the minimum facility of one exchange line to meet the requirements of businesses which have increased tenfold in commercial importance during the past decade; and the education of these subscribers to the private branch exchange system—or the provision of auxiliary lines—is essential. The process is often laborious, and, to cite one of many instances I recall the case of a large departmental store renting one exchange line to meet the requirements of a business employing 300 assistants, where it took two years of persistent effort to secure a contract for a private branch exchange with five exchange lines and 25 extensions, effecting a transformation from telephone chaos to telephone efficiency. The work is hard, but the results amply compensate for the labour expended.

Shipping companies, large stores and drapery establishments, factories, hotels, etc., are all potential private branch exchange subscribers. Motor garages and theatre box offices, or the manufacturers' agent or trader who may be conducting a large business in restricted premises can be best served by the provision of auxiliary lines. The straightening-out of the many existing mixed services is also necessary and can be successfully accomplished when the revision of rates becomes operative.

I do not propose to touch upon the important work of telephone development study, as this has been fully and ably dealt with in a recent issue of the *Journal*.

Coming to the question of new exchange development it is manifest that, with the increased cost of labour and material, the maximum starting support must be forthcoming. It is perhaps too much to expect that authority for the provision of new exchanges serving half a dozen subscribers will be readily obtained in the hope that subsequent accession of new subscribers will justify the provision of such exchanges. Contract managers must of necessity make a wide cast with the new business net in order to secure results which will render new exchanges practically self-supporting at the outset, and the territory to be served must be exhaustively canvassed before submitting results.

Although demands for telephone service exist practically everywhere, such demands can only be converted into paying propositions by systematic and sustained efforts and the application of intensive methods on the part of the Contract Department. In support of this contention I give three instances of new exchange canvasses, all in out-lying territory, which has just been completed in this district, resulting in contracts for 34, 28, and 18 exchange lines respectively.

The provision of call offices in outlying areas is not the true solution of telephone development, which must be computed in subscribers' stations.

The burden of the work in connexion with the forthcoming revision of rates must necessarily fall on the Contract Department, but the future of the telephone service is full of promise, and with effective contract work results can be obtained which should satisfy the most exacting critic. Contract managers should, however, be relieved of detail work so far as is possible, in order that they may devote their energies to the main task of developing the telephone service, together with the training of staff, utilising their own personalities to the fullest degree to achieve results. In this respect occasional meetings of contract managers would be highly beneficial and in the best interests of the service.

The foundation on which the telephone superstructure is raised is subscribers' telephone stations, and large or small schemes can only be planned on this basis. Effective contract work, which includes the retention of existing business, the realisation of the many development schemes, and the opening up of territory not yet served, is essential; but the contract managers are confirmed optimists, and with the application of initiative, concentration, and control, can and will achieve the desired results.

F. W. GEORGE,
Contract Manager.

Brighton, Feb. 16, 1920.

LONDON ENGINEERING DISTRICT CENTRE EXTERNAL SECTION.

On Feb. 13, before a number of his colleagues, Mr. G. E. Hawes, skilled workman, was presented with the Honorary Testimonial of the Royal Humane Society, inscribed on vellum, for having on August 4, 1919, saved the lives of a woman and child from drowning in the Thames at Southwark. The presentation was made by Mr. J. Brown, Sectional Engineer, who related the circumstances in which the gallant action took place. On the occasion of the River Pageant, Mr. Hawes was in a crowded boat proceeding from the shore, Bankside (between Southwark and Blackfriars Bridges) to a barge in the middle of the river. On reaching the barge, a sudden rush of occupants caused the boat to sway, and the woman and child were thrown into the water. Mr. Hawes jumped in and rescued the woman, and then swam after the child who had floated with the current. Mr. Brown voiced the appreciation of the staff and congratulated Mr. Hawes on his gallant deed and on being the recipient of a testimonial of so meritorious a character. The meeting ended with cheers for Mr. Hawes, after which he received the personal congratulations from all present.

PORTSMOUTH.

The second re-union took place at the Town Hall on March 4, and the programme, like its predecessor, took the form of a dinner, whist drive, concert and dance. About 195 sat down to dinner, which was presided over by the Postmaster (Mr. F. Spencer) who was most ably supported by the Mayor, his principal controlling officers, and many other gentlemen connected with the service. A fine concert in the large hall followed the dinner, and in this it was apparent that Mr. Wager (one of ours) who had collected together a splendid orchestra of 45 performers, was in his element, and the items were splendidly rendered under his baton. Simultaneously, with the concert a whist drive, organised by Mr. Yeo, attracted a large company, and the dance which followed was thoroughly enjoyed. The committee are to be heartily congratulated on the splendid success that attended their efforts in entertaining the large company of about 1,000, and the thanks of everyone concerned are due to them, as well as to the Mayor, who again so generously placed the Town Hall at our disposal.

PRESENTATION TO MR. C. S. KEEN, C.T.O.

The hall of the Sunday School Union on Tuesday, Jan. 27, was the scene of a most remarkable gathering. The object was to bid farewell to Mr. Keen on his superannuation.

Mr. Keen has for years made a point of keeping in touch with old colleagues on their retirement, and this resulted in a large number of them turning up to welcome the latest recruit. One pensioner, had 37 years to his credit, he having retired in 1883. A reminder that the following Tuesday was the Jubilee of the Telegraphs as a State Service elicited the fact that there were 12 present who came over from the old Companies. It was hard to believe—they looked so fresh and well that it made some of the present day "old men" feel quite childish in comparison.

As an expression of the esteem in which they were held by their colleagues—both past and present—Mr. and Mrs. Keen—herself an old "T.S." girl—were presented with a Gold Signet Ring and Gold Wristlet Watch as personal souvenirs, and a set of silver-plated entree dishes and silver-plated hot-water jug for their joint use. The presentation was made by Mr. H. E. Adams (Night Superintendent). Those present were invited to partake of the hospitality of Mr. A. W. Ward (late Assistant Superintendent), and an excellent programme, both vocal and instrumental, which followed, under the direction of Messrs. A. C. McEwan and E. Culley was much appreciated.

PERSONALIA.

LONDON TELEPHONE SERVICE.

Miss E. R. JOHNSTONE has been promoted Supervisor at Kensington Exchange.

Miss E. K. BRUNSDEN has been promoted Supervisor at Western Exchange.

Miss A. E. WEST has been promoted Supervisor at North Exchange.

Miss E. A. EPPS has been promoted Supervisor at Park Exchange.

Miss C. K. HOOPER has been promoted Supervisor at Museum Exchange.

Miss M. L. DAVIS has been promoted Assistant Supervisor, Class II. at Trunks Exchange.

Miss N. E. MITCHELL has been promoted Assistant Supervisor, Class II, at Central Exchange.

Miss M. D. C. MORTON has been promoted Assistant Supervisor, Class II. at Trunks Exchange.

Miss E. N. WITTERING has been promoted Assistant Supervisor, Class II. at Gerrard Exchange.

Miss D. M. NOBBS has been promoted Assistant Supervisor, Class II, at Central Exchange.

Miss M. L. ALDRIDGE has been promoted Assistant Supervisor, Class II, at City Exchange.

Miss E. M. N. WOOD has been promoted Assistant Supervisor, Class II, at Avenue Exchange.

Miss A. M. RIGBY has been promoted Assistant Supervisor, Class II. at Mayfair Exchange.

Miss F. E. SMITH has been promoted Assistant Supervisor, Class II. at London Wall School.

Miss E. F. GILMOUR has been promoted Assistant Supervisor, Class II, at Museum Exchange.

Miss M. A. GIBBINS has been promoted Assistant Supervisor, Class II, at Willesden Exchange.

Miss I. McKENZIE has been promoted Assistant Supervisor, Class II, at Mayfair Exchange.

Miss H. SAWKINS has been promoted Assistant Supervisor, Class II, st East Exchange.

Miss G. FOSTER has been promoted Assistant Supervisor, Class II. at Western Exchange.

Miss E. D. GARVEY has been promoted Assistant Supervisor. Class II, at Museum Exchange.

Miss I. V. BIRT has been promoted Assistant Supervisor, Class II, at London Wall Exchange.

Miss M. A. FEAR has been promoted Assistant Supervisor, Class II, at Gerrard Exchange.

Miss E. A. CULVERHOUSE, has been promoted Assistant Supervisor, Class II, at Hop Exchange.

Miss E. V. MARLOW has been promoted Assistant Supervisor, Class II, at Avenue Exchange.

Miss L. E. WITT has been promoted Assistant Supervisor, Class II, at Central Exchange.

Miss L. M. BULLOCK has been promoted Assistant Supervisor, Class II, Museum Exchange.

Miss L. PHILLIPS has been promoted Assistant Supervisor, Class II, at Paddington Exchange.

Miss S. M. BURDETT has been promoted Assistant Supervisor, Class II, at Victoria Exchange.

Miss A. C. TRUELOVE has been promoted Assistant Supervisor, Class II, at Victoria Exchange.

Miss E. WARING has been promoted Assistant Supervisor, Class II, at Richmond Exchange.

The following resignations have taken place on account of marriage:—

Miss W. O. GILBY, Telephonist, Ealing Exchange.
Miss N. F. WILLIS, Telephonist, Park Exchange.
Miss DISSPAIN, Telephonist, Trunks Exchange.
Miss V. F. STUDLEY, Telephonist, Paddington Exchange.
Miss B. L. PHILBRICK, Telephonist, Royal Arsenal Exchange.
Miss R. DOYE, Telephonist, Bexley Heath Exchange.
Miss P. JENKINSON, Telephonist, Avenue Exchange.

Mr. STANLEY A. YOUNG, Contract Manager, Swansea, Telephone District, on leaving to take up a similar appointment at Blackburn, was presented by Mr. P. Edmond, District Manager, on behalf of the combined staff with a handsome suit case as a token of respect and esteem.

Miss L. M. ROBINSON, Assistant Supervisor, Central Exchange, Sheffield, who resigned on Feb. 28 in order to be married, was presented with a handsome set of silver articles for the dining table by the exchange staff, and with a china teapot and hot water jug by the District Manager and staff.

Miss D. CROSS, Assistant Supervisor, Class II., was presented with a travelling trunk by the combined staff on her transfer from Bristol Local Exchange to Doncaster.

THE BRITISH INDUSTRIES FAIR AND CRYSTAL PALACE—1920.

By A.W.

THE Crystal Palace has been the scene of many exhibitions, festivals and the like during its existence, but from a telephonic point of view the most recent exhibition officially known as "The British Industries Fair—1920" has for some reasons been most noteworthy. In previous exhibitions it has not been possible, owing to circumstances over which the Post Office had no control, to provide an adequate distribution scheme, but the recent fair provided such an opportunity. Briefly the permanent part of the scheme comprises a main distribution frame to accommodate 320 pairs, lead covered distribution cables, which in the main are laid beneath the floor of the Palace and 26 distribution cases of various sizes fixed in the majority of cases on the supporting pillars and girders of the building.

By means of this scheme it is now possible to serve subscribers in any part of the Crystal Palace. The "temporary" portion in the present case consisted of a four position multiple switchboard (No. 9 type) equipped for 160 extension and 60 exchange line circuits, the wiring from the distribution case to the extension instruments (amounting to four miles) and the instrument itself.

It is the intention at present in all future cases to recover the "temporary" portion at the close of any exhibition.

The actual number of circuits completed for the British Industries Fair was—

Extensions	155
Exchange Lines (connected with Sydenham Exchange)	60
Call Offices (including one group of five with an Attendant's Booth)	12

At Sydenham Exchange three additional "A" positions and one "B" position were brought into use and 40 additional junctions were connected with various London Exchanges to carry the additional traffic.

The work was commenced on Jan. 27 and completed on Feb. 21, that is in 23 working days.

During the last five years the Crystal Palace has been a great national asset, having been used successively as a naval training depot and great demobilisation centre. It may be of interest to recall that Sir David Burnett, Bt., Lord Mayor of London, 1912-13, conceived the idea of instituting a fund for the purpose of acquiring the Crystal Palace for the nation for all time.

The total amount subscribed, including £30,000 from the late Sir Richard Burbidge (the "Private Citizen" of the *Times*' Fund) was about £195,000.

The Earl of Weymouth had provided the necessary money to purchase the property, and with great generosity had himself contributed an amount of £35,000 (that is, he allowed the Trustees to secure it for £35,000 less than it had cost him) in order that it should be saved for the people.

The Crystal Palace trustees completed the purchase and took possession on August 10, 1914. When war was declared on August 4, 1914, the trustees, appreciating the wonderful potentiality of the palace and park as training quarters for men of the expeditionary force, immediately offered it to the Government rent free for the purpose.

In due course the offer was accepted, and from Sept. 8, 1914, until December, 1918, the palace and park was used as a training centre, first for men of the Royal Naval Division, afterwards embracing men of the Royal Naval Air Service and subsequently for men of the Royal Navy Volunteer Reserve.

Nearly every branch of the service was represented at the Palace during this period and its usefulness embraced every branch from the training of ordinary seamen to the highly technical instruction which was essential to turning out the finished wireless operators, the expert signallers and the men of the mercantile marine gunnery unit, many of whom subsequently distinguished themselves in the work of combating the submarine menace.

The training was of an intensive nature and courses which in the regular service would have taken 18 months to qualify in, were compressed into 26 weeks.

The signalling school was equipped with a working model of almost every form of instrument which would be used in the actual work of naval signalling, including models of whole parts of ships.

During the period of the war approximately a quarter of a million men passed through the depot, and at times there were nearly 10,000 men in training at the same time.

At the end of the naval occupation the military entered into possession and used the Palace for the purpose of a troops dispersal centre until December, 1919, when the trustees assumed control.

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THE TELEPHONE SERVICE THROUGH NEWSPAPER EYES.

BY HORACE DIVE.

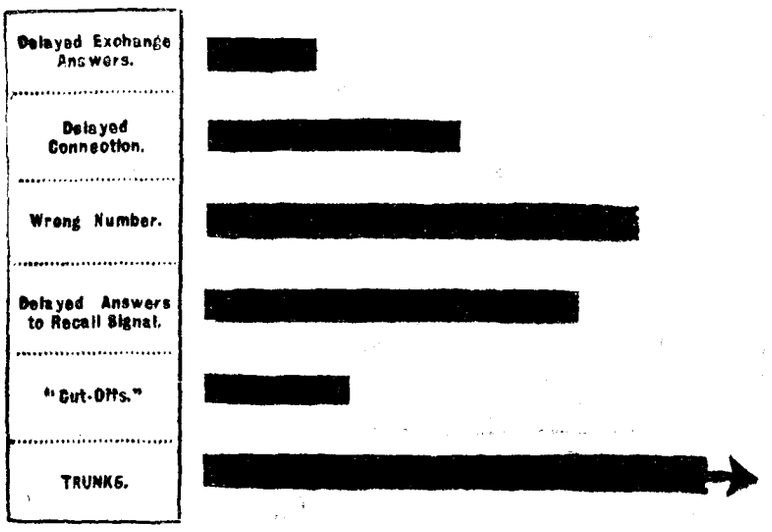
On the same day, August 19, the shadow passes over the face of the Trunk Service and a partial eclipse results. Our special Commissioner, not to be outdone by the Telephone Administration he criticises, prepares and publishes what he describes as "an inefficiency chart." I fancy there must be a printer's error here "inefficiency" for "inefficient," for I ask you, did you ever encounter anything quite so useless. It looks as if he was afraid that some further secret about the *Evening New's* tests would leak out and he is determined to prevent it, by giving no clue to the number of tests embraced in his chart, not any unit of measurement. The only piece of useful information is the statement that trunks take a leap off the chart, and thus presumably prove their efficiency. Yet it is now of the Trunk Service that he rails. He has told us that there is no reason why in a system however great, covering an area however large, two subscribers should not be put into communication with each other in a *few seconds*, and then he distresses us by admitting that in America, which he holds up as a model of all the virtues, it is generally a *mere matter of minutes* to make such connexions. Minutes, mark you, minutes. Why on the very day that the shadow is writing of the Trunk Scandal, on the very day that the life history of Mr. Job Perkins is pictorially displayed from the cradle to the grave as he waits for his trunk call—on that day, August 22, of the completed trunk calls originated in London during the busy hour, over 95 per cent. matured so far as the trunk line was concerned within a mere matter of minutes, 77 per cent. within 30 minutes, 55 per cent. within 15 minutes. Taking the full day the percentages are appreciably higher—not so bad in a country where, according to the *Evening News* the charges for trunk calls are less than one quarter of those levied in America. And this mind you in 1919, when the maximum daily bookings had increased beyond the corresponding figure for 1915 by over 30 per cent.

But newspaper eyes are of that order described by a writer of old when he says, "Eyes will not see when the heart wishes them to be blind: desire conceals truth as darkness does the earth."

While referring to rates it is interesting to study the Special Commissioner's notes. He tells us on August 31, 1919, that the Americans framed tariffs which adapted the charge to the value of the service rendered, and on Sept. 12, he tells us how it was done. The pioneer Telephone Companies with everything to learn about the work they had undertaken charged what they thought the tariff would bear. They fixed a price as high as they thought a certain number of people in the big cities would pay for a novelty. I suppose that is how one adapts a charge to the value of the service rendered; during the war it was referred to as profiteering, I fancy!

The Post Office, says he, has pursued a half-hearted policy of mixed tariffs, part flat rate and part measured rate, under which there can be neither a generally efficient service nor sound finance. In other words they have carried on the rates of the Telephone Co., Ltd., so dear to the heart of the Special Commissioner. On Sept. 19, under the heading "Why the 'phone doesn't pay," *our* (note the possessive pronoun) Special Commissioner explains.

In that explanation one meets this italicised sentence—"By making the telephone a Post Office monopoly we" (note the pronoun; presumably the Proprietors and the Special Commissioner) "have insured that the country shall not possess it and shall have one of the last places in the field instead of one of the first—as it might easily have had."



At first one is inclined to exclaim, "Ye take too much upon you ye sons of Levi," but I suppose this is really another instance of moving the hand that moves the world. It has always known that these particular organs claimed to set up and pull down governments and thus presumably they are able to claim responsibility for the setting up of what they please to describe as the Telegraph monopoly. The truth is that after seven weeks of their Telephone campaign they had hopelessly lost all clear conception of what they were or were not responsible for, what they believed or did not believe, what they heard or had not heard, what they desired or did not desire, and one is half inclined to leave them immersed in that slough of despond to which they refer in one of their numbers.

Let us, however, take just two more phases of their informed criticism. The first shall be their attitude to the operating staff, and the second their estimate of what Britain's telephone development should be.

They deal with the operator and her training quite early in their campaign. On August 11 the technically trained expert writes :—

"The second charge is that it" (i.e., The Telephone Administration) "*does not know how to train the girls it already employs.*" That is August 11. On Sept. 2, the Special Commissioner starts, "The congestion of the Exchanges *is not due to careless or incompetent operating or defective training.* The school instituted by the London Telephone Service—the first of its kind and a model for succeeding ventures—is intelligently planned and competently conducted."

What a change from August 11 to Sept. 2—more "gingering up" by the *Evening News* presumably.

But to return to August 11, our sage says, "Treat the girls well, pay them well and train them well and they will give you service equal to anything in the world. We *understand that conditions are not what they should be at some of the London Exchanges.* In America they know better how to do these things. They give the girls an environment that makes for rest as well as for efficiency."

That is August 11. On Sept. 9 the pronouncement runs, "It is not suggested that the authorities are indifferent to the health and comfort of employees. On the contrary, the rest rooms are adequate and the head supervisors are women in whom the welfare idea is strongly (and tactfully—an important point) in evidence."

Note again the contrast between August and September and return with me to August 11.

"*The failure is not that of the operator at all.* There is *of course* a shortage of operators now." Do not on this occasion go directly to September, but read with me a paragraph or two later on the same date, August 11—referring to a difficulty with a trunk call. "The machine has been used to no purpose. It is not the lack of operators. Indeed, with trunk calls one's common experience is that the operators take too much part in the conversation, snap and rattle and bang too much."

You will remember however the failure is not that of the operator at all, yet most of the contribution three days later, on August 14, seeks to throw blame upon her. The technically trained expert, an idiom understood of the people, describes the apparatus and its method of operation thus. "Beyond manipulating a cord and a plug, and sometimes a key, and speaking a few words the operator has very little to do. The marvel is that she manages to do that little so badly, to create so much confusion with such elaborately designed and beautifully constructed appliances."

Grieve not over much for consolation cometh on Sept. 9, when we learn that "the quarrel is not with these hard-working people" (i.e., the operators).

"Although an exasperated subscriber is strongly tempted to work off his annoyance on the telephone girl" (and as we know he is at times tempted beyond that he is able) "it does not help matters much. She is in all probability doing her best *and the fault rests with the system.*"

That is just to cheer up the Telephonist before I draw attention to the issue for August 15 which contains more railing accusation against the operator who is at once in these newspaper eyes guiltless and guilty. Our Special Representative for this one day replaces our Special Commissioner, but he writes with the same intelligent grasp of his subject, and I ask you to listen to this gem, "*It is certainly no exaggeration to say that in large London Exchanges this year the operators' answers at the busy time of the day has easily averaged a minute.*" I say deliberately that this is a cold, calculated, frigid lie. It is not idiomatic—it is idiotic. How can such a statement be true. "Avenue" has suffered as acutely as any Exchange from post-war pressure, with a resulting falling off in the service, but Avenue has an average of only 61 lines per "A" position, and the busy hour calling rate is over 2.5 calls per line. There are but 60 minutes in an hour and the operators are dealing in that time with over 150 calls from 60 circuits, yet we are told the average answer is a minute.

At London Wall the conditions are substantially the same, and Exchange after Exchange could be cited to show the impossibility of the truth of the expert's statement. He then dilates learnedly on loads and service troubles. He is amazed and shocked at the wrong number difficulty. I am not—why in wonder's name we ever borrowed our design for a telephone multiple from America I cannot comprehend. It seems to have been conceived for the special purpose of bewildering the operator. It is constructed sometimes of 4, sometimes of 6, sometimes of 8, and sometimes of 9 panels. Whilst in certain cases the strips of jacks in each hundred are built from the bottom upwards, they generally follow the reverse order. Left to ourselves, without the influence of America I feel sure we should have constructed multiples of 5 or 10 panels, so that the operator could with speed and precision score a bull's eye every time the subscriber gave her the number he really wanted. They don't always, as you know—numbers are elusive things—for, to take only one instance—in the *Evening News* of Sept. 24, there appears a report of an interview with a Captain who was to be one of a deputation to the Postmaster General and to speak as an engineer. He is reported to have said, "Let us look at the position. You have the Postmaster General at £5,000 a year, which is regarded as the top figure." The men who really run the service get perhaps about £1,500. (That is between them, I suppose.) Let us take the Captain's advice and look at the position. He is only overstating the Postmaster General's salary by 100 per cent. He quotes only two numbers and both are wrong numbers. Why, the *Evening News* never claimed in its wildest estimates, based on impressions, that operators gave 100 per cent. of wrong numbers.

We will proceed in chronological order (it is after all the only possible way of associating order of any kind with these estimates).

In the *Evening News* of August 8, 1919, we read what the public feels and says with vehemence in street, club and office is that the British telephone service does not meet its requirements at any point. "It is undeveloped to such an extent that there are *approximately seven possible customers for every one actual user.*" Figures are quoted to emphasise the *accuracy*—800,000 existing—should be five or six millions. In the same journal of August 21, 1919, in boldest blackest type we find, "The failure of officialdom. Cramped electrical industry. Way to disaster. How great inventions are repressed. The conspiracy to kill the telephone. More lies." (I am reading exactly as it is printed.) "More lies at the door of the State (Mis)Management than a telephone service *under*developed to only a fifth of its capacity."

If that has any real meaning it is that the service is developed to four-fifths of its capacity, but I think it was not the intention of the expert to give such an impression. I am confirmed in my view by a later paragraph the same day. He writes, "Had no legal monopoly been granted no real harm would have been done. A few millions of public money would have been wasted and then the whole would have been turned back to hands capable of running it efficiently and economically. We should have had a full and free development of the telegraph; the telephone would have been a free business *and would have been developed ten times more* effectively *than it has been.*"

And again lower down "We have to-day only *about a fifth part of the telephone system that we ought to have.*"

The *Daily Mail* on September 5 reviewed the useful work done by the *Evening News* and summed up its conclusions. Amongst these was one which read, "After eight years of officialisation *we have only a sixth of the telephone we should,* and how they are worked every business firm knows only too well."

The *Evening News* on September 23 in a thoughtfully worded leader headed, "Sack the lot," invited the public to hear the conclusion of the whole matter. It said, "The Government have chosen to make the telephone service a sub-branch of the Post Office, and thereby have made the service *less than one quarter of what it ought to be.* The reference to *the* Government as if the present Cabinet had any responsibility for the steps decided upon by Mr. Hanbury twenty years ago is rich indeed, but a comment of the *Evening Standard* on October 30 deals with the situation pretty well. The *Standard* says of the expert press, "Having taken up the position that the Government is a 'wastrel' Government, and leading the nation on the 'road to ruin,' these newspapers must make good, though the heavens fall. It does not matter what happens to British credit, how far the confidence necessary to business prosperity is disturbed, how great an encouragement is given to the forces making for domestic discord. Every emergency must be used as a means of discrediting a Government so unfortunate as no longer to find favour in this quarter, and if there is no emergency, one must be manufactured. It is not easy for the country to take a calm view of its position when those responsible for forming public opinion deliberately cultivate an intellectual epilepsy."

To return to the experts.

On October 7 the *Evening News* expert gave us the last of his estimates. It is "To-day we have a telephone system *one-fifth of what it ought to be* in development and *inefficiency.* "Inefficiency" is printed as one word—what a scathing indictment one could level against these newspapers for their appalling falling off during the war and thereafter from the 1914 standard of newspaper production. The quality of the paper was poor, there was little of it, the printing was blurred, and their columns were full (I speak after the manner of a trained expert) of misplaced words and words which had so far lost their identity as no longer to justify the description of words. Surely a little forethought might have saved all this. However we do not blame the journalists, we have no quarrel with the compositors, and we feel sure the proprietors could not have been responsible. It must have been the *system* which was at fault! Yes, the system, that's it, unless it is reasonable to suppose that the war had something to do with it.

I have digressed, let us return to estimates. On this same date, October 7, we get estimates of the London service. As one has learned to expect from the expert there is not one estimate but three estimates. He writes, "*If it were as it ought to be, more than three times as big,* it would *be equipped* with more modern plant," etc., and in the next paragraph, "The inefficiency of the London system arises mainly from slow development in the past . . . *the possible users are to the actual users as four or five to one.*"

Now in London we have 288,950 telephone stations, and the technically trained expert on one day gives us the following estimates of what we should have, namely,

288,950	×	3	= 866,850
	×	4	= 1,155,800
	×	5	= 1,444,750

The Post Office cannot afford to frame estimates on lines like this, but then it does not regard the wasting of a few millions of public money as being a matter of no great harm.

Is it, in fact, surprising if wrong numbers in London do reach 4.5 per cent. of the calls made. (In November the last available figure it was 4.2 per cent.)

Do you realise that with only 149,829 separate exchange lines in London, and excluding all incoming Trunk calls, each connexion between two Exchange lines represents one out of 11,224,139,878 possible combinations of 2 circuits and that possibility is invoked each time a call is established after deferment. On the date of the October, 1919, peg count, the originated calls in London numbered 1,293,574, so that the possibility of combination invoked during that day was roughly 14,500,000,000,000,000. Are you surprised if having regard to these possibilities 4.5 per cent. of the calls or only .000,000,000,051 per cent. of the possibilities go astray. Personally, I am not, and I take off my hat to the operator that connects numbers woth speed and precision amongst such pitfalls.

One would like to spend time examining some other telephone troubles, their causes and proper perspectives, but time is of the essence of telephone considerations, and we have still to look at the press estimates of the proper telephone development for this country.

On August 12 the technically trained expert complains there is no real direction of the enterprise as a whole, no one to frame and direct a telephone policy, and again on Sept. 2 he writes, "There was no really "imaginative plan," and after kindly absolving from blame those whom he describes as the actual expert telephone administrators and the engineers he passes a sentence of guilt on the Secretary's Department. Now we have most of us at some time or another thought just one harsh thought of the Secretary's Department (always of the Department, mark you, never of an individual), and we have argued that if this, that or the other suggestion of ours had been adopted all might have been well, but if we are to be controlled by the Secretary's Department, I pray we may be spared the presence there of even one "technically trained expert" of the Press variety, since on the evidence before us it can be shown conclusively that if what we and the public want is accuracy and clear thinking we shall never get it from such a source. Practically the first duty of a telephone administration is to make up its mind what the development should be and frame its estimates for plant extension accordingly. As we know, the best of prophets err in their forecasts, but what are we to say of technically trained experts who lash the Post Office for its hopeless failure to grasp the possibilities of the telephone, and then treat us in the course of a two months' campaign to no less than five definite, separate and distinct estimates of what the development should be, and this, taking no account of minor efforts, intended to make the position clearer, but in reality heading the prophet further into the mists of confusion.

Let us summarise the expert estimates of the proper development for the British system as a whole. They are :—

Date.	Existing.	Ratio.	Estimated Proper Development.
August 8, 1919 ...	1		7
August 21, 1919 ...	1		10
	1		5
Sept. 5, 1919 ...	1		6
Sept. 23, 1919 ...	1		4
Oct. 7, 1919 ...	1		5

Taking the figures which the *Evening News* quotes as the existing development, that is 800,000 telephones, the estimates vary from 3,200,000 to 8,000,000—a difference of 4,800,000, but it is only fair to point out that the maximum variation in the different estimates of any one day is not more than 4,000,000 representing a capital expenditure of about £120,000,000, and it was never suggested that the Government should waste this. No, it was for a private company who would presumably fleece an ignorant public. Let us recall the circumsances. They are related in the issue for August 21. The Commissioner tells us that as a free business, telephones would have been developed ten times more than they have been, and a few paragraphs later he tells us we have about a fifth of what we ought to have. If his two statements are true, therefore, under free business conditions £120,000,000 would be locked up to-day in idle, useless, worse than useless, telephone plant, for it would entail heavy maintenance charges. What a millstone about the neck of a community which desired to instal modern automatic apparatus.

No, the methods of the post office may leave much to be desired, and how much may one day be told by an abler pen than mine when "The Telephone Service through the Eyes of the Telephone Staff" comes to be written, but however much it may leave to be desired it were as a drop to the ocean of muddle and waste in which the community would have been involved it the control of the telephone had been placed in the hands of shadowy experts.

You may say, well, after all, there was much that was true in the *Evening News*' articles. Of course there was, for the London telephone service placed unreservedly at the disposal of that paper all the details of its observed facts and many of these details were published. Yes, there was much that was true ; there was also much that was new, but in the words of a jingle which I faintly recall, "That which was true, alas ! it was not new ; whilst that which was new, it was, alas ! not true." The Post Office supplied the truth and the expert the impressions. But it may be urged, surely the technically trained expert must know the laws which govern telephone progress. Possibly, but if he knew the laws, then were those laws entwined in a tangled skein of inexplicable confusion.

The articles claimed to have been produced in an earnest desire to assist the Telephone Administration and the public, and bearing that fact in mind all I can say after very carefully studying them is precisely that comment which was made by the charity boy after struggling with the alphabet. "It seems hardly worth while going through so much to learn so little."

THE BAUDOT—VIII.

By J.J.T.

Now consider a governor of which the speed remains absolutely consistent whatever may be the amplitude of the weight M (Fig. XXVI). The line AL shall represent the law of the increase of centrifugal force. When then the centre of gravity of M is at A the centrifugal force is nil, but as M moves along the line AH (*i.e.*, as the amplitude increases), say, to M^1 and M^{11}, so the intensity of the centrifugal force will show its augmentation by the height of the ordinates BE and CF respectively. Take the amplitude AB, there the ordinate BE represents the intensity of the centrifugal force developed for that particular amplitude, and if we presume that the equilibrium between the tension of the springs and the centrifugal force is there reached, then we may safely conclude that the tension of the springs is also equal to BE. We have thus established that E is a point of the tension line. Let us however suppose that the equilibrium desired be established with another amplitude, say, AC, then CF will equally represent the intensity of the centrifugal force or the tension of the springs, consequently the point F belongs to the tension line. As we now know two points in this line, the direction of the line itself is definitely determined, and AL is the result. That is to say *it coincides with the line of the law of the increase of centrifugal force, and the zero point of tension of the springs should therefore be found as the centre of gravity at the centre of rotation.*

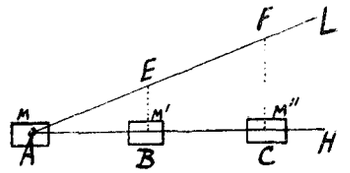


FIG. 26.

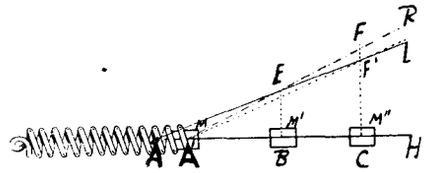


FIG. 27.

Let us take a case of a badly adjusted governor. (a) With an increased amplitude we obtain an increase of speed, or inversely, with a decrease of speed we note a decrease of amplitude.

See Fig. XXVII. Let us suppose that an equilibrium has been temporarily established between the centrifugal force and the tension of the springs with the amplitude AM^1, then M^1E = the intensity of centrifugal force, and upon our previous premises this ordinate also equals the tension of the springs, and E belongs to the tension line AL. Join E to A, the zero point of the CF or the centre of rotation, and the line AL will represent the law of the increase of centrifugal force, presuming the governor to maintain the same speed. Suppose, however, that for a larger amplitude AM^{11} we have noticed an *increase* of speed, then we know that the intensity of the centrifugal force developed has become *greater* than that which the weight would have developed had the speed remained the same We have thus a larger ordinate $M^{11}F$ than $M^{11}F^1$. As too at that instant we have again equilibrium between the tension of the springs and the centrifugal force, we have therefore F, a second point on the tension line which will give the line R as the tension line, thus shifting the zero point. From this we may conclude that the tension of the springs is insufficient, and we must raise the adjusting bar. If the speed had *decreased* with a decreased amplitude, the result would have been the same, and therefore the remedy applied.

Rule 10.—*If the speed varies as the amplitude the tension of the springs is not sufficient.* Raise the adjusting-bar.

Case (b).—With an increased amplitude we obtain a decreased speed, or with a decreased amplitude an increased speed.

Fig. XXVIII will form the text for a study of this next point.

(*To be continued*).

THE NEW CLERKENWELL EXCHANGE.

By A. H. DYER, A.M.I.E.E.

THIS Exchange was opened on March 27 at 2 p.m., when 595 subscribers were transferred from London Wall Exchange, 131 from Holborn, 21 from Central, 16 from City and 3 from Bank Exchanges.

If the writer were asked what was the outstanding feature in connexion with the transfer, he would say, without hesitation, the opposition to the name of the Exchange of many of the subscribers listed for transfer. "What's in a name?" Clerkenwell is associated now with the metal trades generally and watch and clock making, and although the latter have given way very largely to mass production by machinery, the district is still important industrially. Squalid streets of houses are disappearaing, to be replaced by modern factories or residential flats. Like all inner London, especially the part north of Old Father Thames, it is rich in historical interest. With St. Luke's it forms the borough of Finsbury. The origin of the name is literally Clerks' Well, from the clerks' well, the site of which is in Ray Street. This was an actual well, near which the parish clerks in days long since gone by, performed their miracle plays. There were other wells—Sadlers' Wells, Skinners' Well, Godewell, from which Goswell Road takes its name, and Islington Spa for instance. The whole district was justly famous for its water springs. Although Clerkenwell in not mentioned in *Domesday Book* (A.D. 1086), historians tell us it was included then in Islington. The Priory of St. John of Jerusalem, with its Knights of St. John, dates back to the 12th century, and, although this was burnt by Wat Tyler and his fellow rebels, it was rebuilt. The present church of St. John is the choir of the old Priory. The crypt is still preserved, and with its early Norman architecture is one of the most beautiful and ancient in England. We are told that the Priory was visited many times by sovereigns and princes, and that people of wealth and position resided in the parish. In regard to this, we who are living now may exclaim truly, Ichabod! Historically the Charterhouse will for ever be associated with the district. Wesley, Thackeray and Leech were old boys of the famous school. But enough has been written perhaps to recall to mind some of the history of Clerkenwell—a history which should make us think quite kindly of the name, and discount the opprobrium which some attach to it nowadays.

The building which houses the exchange is erected on an island site, about five-eights of an acre in area, bounded by Ironmonger Row, Lever Street, Hull Street, and Dingley Road. The site was acquired by the department, and the building projected and begun before the War, which, however, stopped operations until the Armistice. There are five floors including the basement, each with an area of 7,050 square feet. Ample accommodation is provided for a 10,000 line manual exchange, apparatus and power room, accumulator room, large operating school, operators' and engineers' quarters, and stores. Every convenience is installed for the comfort of the staff. Telephonists will appreciate the continuous domestic hot water supply. The kitchens and cooking appliances should delight the heart of the most critical cook. Visiting the various rooms, one is struck by the very fine natural light afforded by the many large windows, of which there are no less than 200. The building is, of course, fireproof. Externally it presents a handsome solid appearance. Undoubtedly it improves the district greatly.

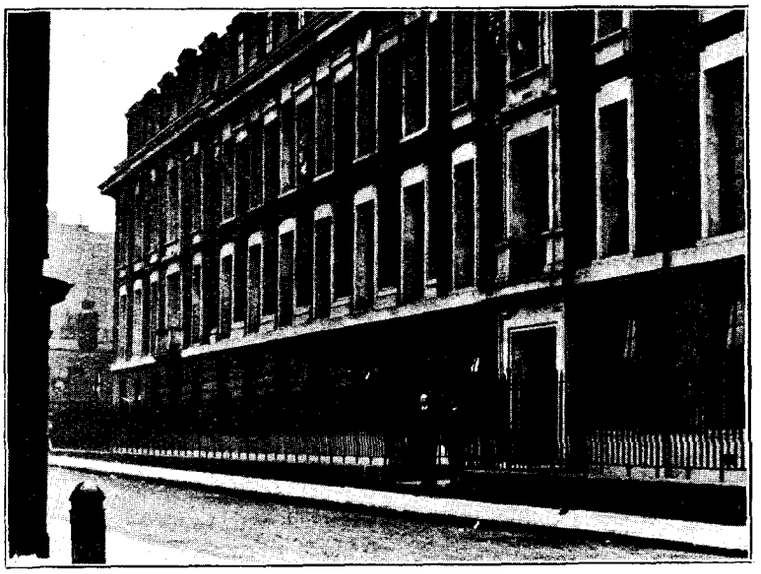
The exchange is being installed primarily for development. It is one of several designed for this or relief purposes. Two others, Latchmere and Broadway, have been opened during the past few months. It involves correcting the areas of London Wall, Holborn, Central, City and North. The need for relief in the case of the first exchange was extremely pressing on account of the post-war increase in the calling-rate, coupled with the fact that there were no spare "A" positions on which the load per operator could be reduced by distribution. The lack of positions also created another difficulty in regard to the enquiry work connected with incoming calls which would be passed to London Wall for the transferred numbers, after the opening of the new exchange. This was met by concentrating exclusively by distribution all the first batch numbers listed for transfer on 13 adjacent "A" positions, on which also the special enquiry lines from "B" and "A" positions were terminated; so that, after the transfer only the enquiry lines would remain, thereby converting the positions to enquiry positions. An alternative method was to deal with this work at the new exchange by running a group of special junctions thereto from London Wall, and diverting the calls to these circuits, but this was impracticable for engineering reasons.

The urgent need of relief led to the decision to instal a 1,500 line exchange to be replaced at a later date by a permanent exchange with an ultimate capacity of 10,000 lines. To expedite completion of the smaller exchange, the switchboards formerly installed for the Air Ministry at the Hotel Cecil have been utilised, together with the additional plant necessary for a public telephone exchange. The board is a C.B.1. full multiple, six panels to both subscribers' and junction multiples with service and line registers and testing positions. Provision is made for 344 incoming and 374 outgoing junctions. There are 28 "A" and 11 "B" positions. The answering equipment consists of 50 to 60 jacks and line lamps per position. The service equipment includes a 2-position monitor's desk and chief supervisor's desk. Contrary to standard practice for some years past, the lowest subscriber's number is 1,000. The numbers 0 to 999 are reserved in connexion with automatic working, but that is another story.

To turn now to the transfer of the subscribers and the opening of the exchange, it was decided to effect the former in two batches with a fortnight between, the first to consist of the London Wall, Holborn, Central, City and Bank lines, 766 circuits in all; and the second batch to comprise the remainder of the London Wall lines and one North subscriber—514 circuits. The subscribers affected were notified on forms of the date and time of transfer and of the test call to be made immediately after, and a franked counterpart was included for them to reply and say whether they would be in to answer the call. Eighty-five per cent. returned the form, and 40 per cent. stated they would be in attendance. This was a very high proportion, and subsequently it was evident that a large number of the subscribers had overlooked the fact that the day of transfer was a Saturday. Profiting by this, the day of the week, in addition to the date and time, was given on the second batch advice of transfer forms. Seventy-seven per cent. of the counterparts to the forms were returned, and 22 per cent. indicated that they would be in to answer the test call. It was a relief to the supervising officers to know that, after many unavoidable postponements, the date of opening was irretrievably fixed by the despatch of these forms to the subscribers.

For some days prior to the opening day the subscribers' circuits were through to the new as well as the old exchange, but were rendered "dead" at the former by wedges in the cut-off relays. It was possible, therefore, to speak over the new portion and verify the number connected. Frequent speaking tests of all junctions were made with the co-operation of other exchanges in the Metropolitan area. On the morning of the opening day these speaking tests gave the following very satisfactory results:—

Outgoing junctions (284) 10 faults.
Incoming junctions (281) 8 faults.
Subscribers' lines (766) all O.K.



CLERKENWELL EXCHANGE, EXTERIOR OF BUILDING.

In regard to the actual opening and after, all the junctions were spoken over and the clearing signals checked for satisfactory working just before the subscribers' lines were transferred. This work was accomplished easily in just under an hour, and revealed three faults only on the outgoing junctions, all the incoming lines being O.K. The transfer of the subscribers' circuits was begun at 2 p.m. and completed at 2.5 p.m. With the agreement of the superintending engineer the following tests were carried out immediately:—

(1) Test of calling equipment with 750 ohm plug.

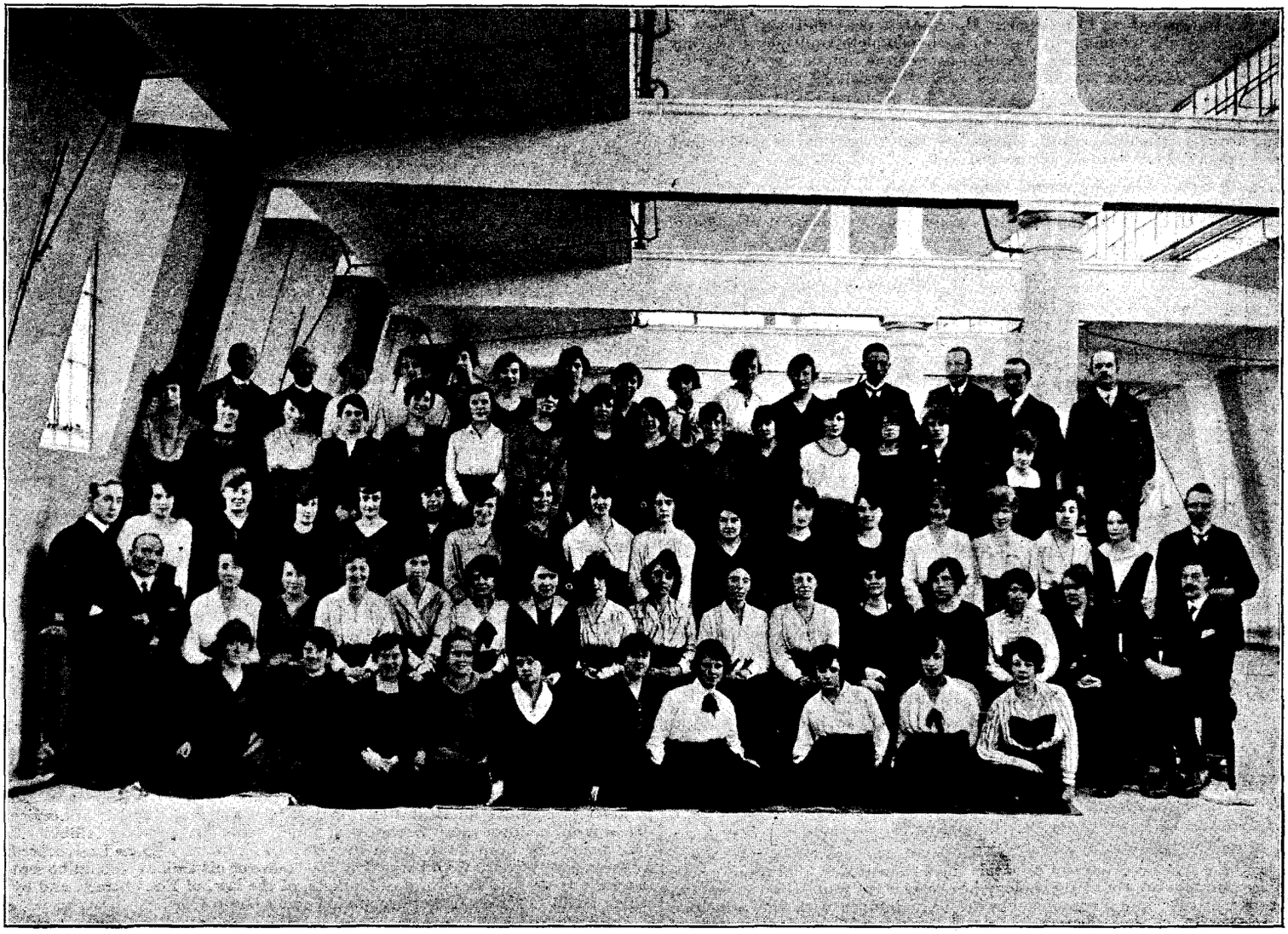
(2) Speaking test by ringing in the subscribers' multiple jack, and verifying the new Clerkenwell number with those subscribers who answered, and checking the calling signal by momentarily withdrawing the plug from the jack. Subscribers not available were tested on the following Monday morning.

(3) Voltmeter test of all the lines transferred.

At 5 p.m. the state of affairs was as follows:—

Number of subscribers' lines tested	766	
Result of 750 ohm plug test	3	no glows.
Other faults	5	
Faults on outgoing junctions	Nil	
Faults on incoming junctions	Nil	

The voltmeter test disclosed 11 faults, but one of these existed on a line before the transfer, and five others were cleared before 5 o'clock. These results speak for themselves. They augured well for the practical trial which was to begin on Monday, when the traffic load would rise to a maximum. This load, as anticipated was comparatively moderate—135 equated originating calls per operator in the busy hour. Everything appeared to be working smoothly, and other exchanges had no difficulty with calls for Clerkenwell



STAFF, CLERKENWELL EXCHANGE.

numbers. Subjoined are results of service observations for the five days subsequent to the opening of the exchange. The London figures are included for purposes of comparison.

	Clerkenwell.	London—Feb.
Average time taken to answer	6.3 secs.	7.1 secs.
" " " " clear	5.6 "	5.9 "
Percentage of calls answered in 10 seconds or less	84.9 "	83.1 "
Percentage of calls ineffective through called number being engaged	22.5 "	18.2 "
Percentage of calls—no reply	3.7 "	3.7 "
Percentage of wrong numbers connected ...	3.7 "	3 "
Ditto cut-offs	2.8 "	.4 "
Ditto double connexions ...	1.8 "	.5 "

Experience shews that the opening of a new telephone exchange is always a ticklish business, fraught with possibilities of partial failure—failure, too, which may re-act adversely on the service of all the other exchanges in the area for days; and this is no small thing in the case of a huge place like London. Service difficulties are increased if the new exchange is an additional one, *i.e.*, not replacing an old one of the same name, and therefore necessarily cutting into the areas of contiguous exchanges, and taking their subscribers from the districts absorbed, because, after the transfer the exchanges relinquishing subscribers must for some time handle incoming calls to them, divert them to the new exchange, and impress the callers with the new number, so that they may cease to ask for the old one, and thereby avoid delay and hasten the time when the special enquiry positions can be closed and used for productive working. Success in all this would appear to depend on the most careful attention to an immense amount of minute detail and the complete co-operation of the traffic branch with the engineers.

In conclusion, brief reference may perhaps be made to the important part borne by the London Wall Exchange relative to the opening of the new exchange. 1,108 lines were relinquished in the two batches. London Wall is a full multiple exchange with a large multiple field, and the transfer of all

SWITCHROOM.

these lines involved pegging the multiple jacks with 76,500 pink pegs, each of the two groups having to be done in the shortest possible time. This was carried out by 69 telephonists, one to each complete multiple, and they finished the task in 90 minutes. Printed lists of the numbers were used for this purpose. The work was, of course, carefully checked.

Immediately after the lines had gone over, the engineers took in hand the 13 special enquiry positions and modified the combined listening and ringing keys by disconnecting the ringing, so that they could be used to flash distant operators into circuit on inward calls.

At the same time all the answering jack number plates were removed, and by 2.30 p.m. the positions were ready to receive the special enquiry calls. Some details of these during the days following the transfer may be of interest :—

Date	No. of Special Enquiry positions	Number of Calls — Busy Hour.			Number of Calls— Day.			Calls per operator at Special Enquiry positions Busy Hour.
		Special Enquiry positions	Over-flow to Enquiry positions	Total	Special Enquiry positions	Over-flow to Enquiry positions	Total	
29.3.20	13	702	91	793	4,242	535	4,777	54
30.3.20		598	69	667	3,880	395	4,275	46
31.3.20		581	33	614	3,455	247	3,702	45
1.4.20		538	35	573	2,551	217	2,768	41
6.4.20		366	28	394	2,184	128	2,312	28
7.4.20		463	17	480	2,810	98	2,908	35
8.4.20		437	19	456	2,581	136	2,717	34

The Easter holidays intervened between the 1st and the 6th April.

The load for the first four days was heavy, but it has been handled throughout in such a way as to reflect the greatest credit on the officers responsible.

The photographs are by Mr. Arthur F. Hills, R.P.S.

THE PSYCHOLOGY OF THE CIVIL SERVANT.

BY H. G. CORNER.

IN these strenuous days of scientific management and Whitley Councils the once abstruse subject of Psychology has become the foundation of modern business methods, and at least a bowing acquaintance with the principles and discoveries of that pleasant science is considered an essential part of the equipment of the man of affairs, of the manufacturer and, especially, of the advertiser. Readers of this journal are familiar with discussions on the psychology of supervision and of the supervisor, of telephone operating and of the telephonist, and now we are able to study under the expert guidance of Mr. John Lee, the psychology of that interesting genus, the Civil Servant.

The very suggestive lecture, under the title which heads this paper, was the last of a remarkable series arranged by the Society of Civil Servants for the purpose of advocating the claims of the Civil Service to the status and dignity of a profession. They were delivered during the month of March by various prominent civil servants who had caught the spirit of the moment and who desired to rouse the interest of their colleagues therein. The series was opened with addresses by Sir Cecil Harcourt Smith, the President of the society, and by the late Sir Robert Morant—his last public utterance. Lord Haldane discoursed with authority upon the machinery of government, Mr. E. F. Wise, on the State and its relation to commerce and industry, and Dr. Harmer, the Director of the Natural History Museum, on museums and scientific research. The externals of the subject had thus been well covered when Mr. Lee brought his intimate knowledge of psychology to bear upon the mentality and temperament of those at whose expense the baser press has thought it becoming to relieve the severe strain of the War and the still more severe strain of the Peace, by ponderous gibes and sneers. The common accusations brought against the Civil Servant, his lack of initiative, his slavery to routine, his reluctance to assume responsibility, were cleverly examined, and Mr. Lee lost nothing in the unfolding of his case by at once admitting the measure of truth contained in these allegations. His lecture, compact of thought and plentifully besprinkled with humorous reflections in his well-known vein, led on his hearers to a consideration of the causes of these defects, how they might be but the defects of their complementary qualities, and how indeed they might even stand for virtues in some circumstances. Mingling grave thoughts with refined pleasantries, like the American at the funeral of his mother-in-law, Mr. Lee developed his theme until his hearers saw themselves more clearly than they had hitherto done, and it is a sign of grace that they were ready to join in the frequent laugh at their own expense.

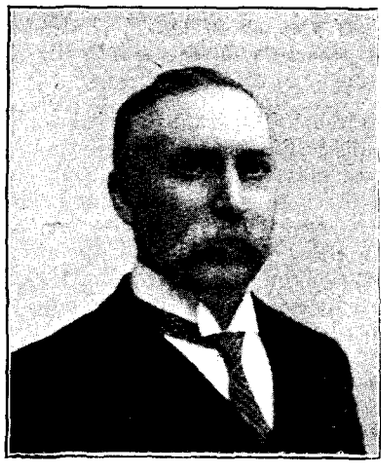
Space forbids anything like a report or even a summary of the lecture and it is the less necessary, as the whole series is shortly to be published, but some of the ideas developed may be briefly indicated. "The public," he said, "if it thinks of our psychology at all, regards it as the psychology of the secure job, without anxiety or ambition, whose only care is the Office of Works in the matter of coat-hooks," and thus the civil servant is pictured as a timid, shrinking being, without enterprise, or ambition or interest in his work. The fallacy lies in the ingrained habit of the man in the street, of judging his fellows by the fortunes they have made or can make. No civil servant makes a fortune out of his job, but the very security which displaces the necessity for that achievment encourages that corporateness of thought and action which is so healthy for the human species. Jobbery and corruption, the debasing struggle of individual interests are more or less eliminated. "His relationship to his fellows is not that of bitter rivalry to the death. . . . His psychology is less a psychology of competition than of emulation, less a psychology of destruction than of construction, less a psychology of dominant personalities than of inclusive and mutual personalities." Moreover the intense individualism of nineteenth century business methods is rapidly giving way to something approaching this corporate organisation. "Business is moving away from that crudity which mistakes smartness for ability and unscrupulousness for strength." More and more do big business concerns come to appreciate the advantage of functional organisation, of the sharing of responsibility, of fixed scales of pay, promotion more or less by seniority and a hierarchy of officials. Are these things then incompatible with enterprise and initiative, and, if so, what is the antidote? Or, again, if it is not practicable to secure the highest development simultaneously of all varying human qualities, which series of qualities is it best to cultivate—enterprise, with its risks, or routine, with its safety?

These questions are not answered by Mr. Lee, but he gives us very plain indications of what lines of development he thinks most fruitful of permanent results. "Red tape is the symbol, not of inefficiency but of ultra-deliberative thought, and this is not necessarily an evil. We have learned that there is a far longer chain of causation than the business world assumes, that there are more relevant factors, that balanced enquiry is not to be brought to a fine and just conclusion between the whiffs of a superman's cigar. No doubt some minds among us are unfavourably influenced by this characteristic of Civil Service machinery, they become sluggish as the wheels become sluggish. But, when all is said, the fact remains that in the weighing of fact and of precedent, in the valued art of looking all round a question, in the development of true positiveness of decision, a positiveness which has its moral element of trusteeship prominent, there is far more to be said for the psychology of the Civil Servant than at first appears." And if we accept these qualities of careful and deliberate thought we must accept all their implications and, moreover, the defects of those qualities, and the real question becomes: how are these defects to be minimised? One suggestion made by Mr. Lee is that the public must be more tolerant of mistakes made by the Civil Servant, infallibility must no longer be expected of him, and ministers must be prepared to defend and fight for their subordinates. Then again, "the Civil Service needs more change, more freshness of mind, more invigorating fallibility." This point had been dwelt upon by previous lecturers who had advocated a system by which the Civil Servant in the course of his training should be sent out for a space into the world of markets, of the law, of Fleet Street, and by which facilities for change of occupation could be provided.

Enough has been said to indicate the suggestive lines of thought opened up. Cynics refer to us as bureaucrats and limpets. Let us clear our minds of cant. The average man earns his living not for the sake of the State but for the sake of himself and his family, and the more sure he is of his living, the more is his mind set free for wider interests, those of the State or the community. So that the psychology of the Civil Servant is perhaps not so complex after all.

MR. J. SINNOTT, O.B.E.

MR. H. J. MACLURE, M.B.E.



MR. F. J. BROWN, C.B.E.

MR. R. A. DALZELL, C.B.E.

THE MOST EXCELLENT ORDER OF THE BRITISH EMPIRE.

THE following appointments have been made for services in connexion with the War :—

To be Commanders (C.B.E.)—

BROWN, FRANK JAMES Assistant Secretary, G.P.O.

DALZELL, REGINALD ALEXANDER, Chief Inspector of Telegraph and Telephone Traffic, G.P.O.

FERARD, ARTHUR GEORGE, Honorary Secretary to the P.O. Prisoners' of War Fund (late Assistant Secretary, G.P.O.)

PRESTON, GEORGE FREDERIC, Controller, London Telephone Service.

THORNLEY, REGINALD ERNEST, Senior Establishment Officer, Ministry of Food (of Secretary's Office, G.P.O.).

To be Officers (O.B.E.)—

ARMAN, EDWARD WILLIAM JAMES, Deputy Food Commissioner, Reading (late Postmaster, Portsmouth).

CROMPTON, CHARLES, Assistant Superintending Engineer, G.P.O., Edinburgh.

DALTON, MICHAEL, Assistant Controller, Central Stores Dept., Ministry of Munitions (Stores Dept., G.P.O.).

GILL, FRANK, Deputy-Controller, Central Stores Dept., Ministry of Munitions. (Better known to our readers as Engineer-in-Chief of the late National Telephone Co.)

HARRINGTON, EDWARD JAMES, Deputy Accountant-General, G.P.O.

HEADLAND, ROBERT VINCENT, Assistant Director of Costings, Contract Dept., War Office (Stores Dept., G.P.O.).

KERR, KENELM, Assistant to General Manager, North Eastern Railway (formerly of Secretary's Office, G.P.O.).

POLLOCK, SAMUEL ALEXANDER, Staff Engineer, G.P.O.

SADLER, ANNIE, Supt. Female Staff, Accountant-General's Dept., G.P.O.

SINNOTT, JOHN, Staff Engineer, G.P.O.

SPARKES, HENRY, Vice-Controller, Stores Dept., G.P.O.

TAYLOR, ARTHUR THOMAS, Head of Section, Sugar Division, Ministry of Food (Secretary's Office, G.P.O.).

To be Members (M.B.E.)—

BARRETT, KATE EVELINE, Deputy Superintendent, Female Staff, A.G.D.

BAZLEY, WALTER STANLEY, Ministry of Shipping (London Telephone Service).

BENNETT, EDWARD, Principal Clerk Saving's Bank Dept., G.P.O.

FINCH, DAISY AMELIA, Telephonist, War Office.

HART, SURREY RUTHERFORD, Principal Clerk, London Postal Service.

HAWKINS (MRS.) SARAH ANNIE, Deputy Supt., Money Order Dept., G.P.O.

KINNEAR, JAMES FRANCIS, Postmaster, Stirling.

KING, JOHN, Head of Section, Petrol Control, Board of Trade (Secretary's Office, G.P.O.).

MACLURE, HARRY JULIUS, Section Director, Surplus Stores Dept., Ministry of Munitions (Secretary's Office, G.P.O.).

MANN, FREDERICK WILLIAM, Staff Officer, Investigation Branch, G.P.O.

PARSONS, ARTHUR AMBROSE, Staff Officer, Stores Dept., G.P.O.

ROBERTS, ARTHUR HARRY, Assistant Engineer, G.P.O.

SHARROCK, ALICE EDITH, Deputy Superintendent, Savings Bank, G.P.O.

STORRIE, JOHN HAY ATWALL, District Manager, P.O. Telephones, York.

WESTELL, EDGAR LEWTON, Assistant Director, Establishment Division, Ministry of Food (Secretary's Office, G.P.O.).

Miss IVY GRACE FISH, Telephonist, Trunk Exchange, Manchester, has been awarded the Medal of the Order of the British Empire (Military Division) in recognition of valuable services rendered in connexion with the military operations in France and Flanders.

MISS IVY G. FISH.

PRESENTATION TO MR. JOHN H. STORRIE.

Mr. John-Storrie, District Manager, York, was presented with a travelling bag and fountain pen by the staff on his transfer to Aberdeen at the end of February.

Mr. Garrow, Chief Clerk, in making the presentation on behalf of the staff spoke of Mr. Storrie's genial outlook, and the excellent relations that had always existed between him and his staff, and wished him every success in the future.

Mr. Storrie in thanking the staff said that any success that had attended his period of office in York, was attributable to the loyalty and earnest co-operation of the whole staff, from whom he parted with regret.

REVIEWS.

"Wireless Telegraphy," a handbook for the use of operators and students. By W. H. Marchant. Second edition, revised and enlarged. Published by Sir Isaac Pitman & Sons, Ltd., 1, Amen Corner, E.C.4. 305 pages. Price 6s. net.

The present edition of this book is described as being "revised and enlarged." We have not before us a copy of the first edition, so that we are unable to ascertain what changes have been made, but we are afriad that a considerable further amount of revision is necessary before it can be considered as an up-to-date book, suitable, to quote from the preface, for "the needs of sea-faring operators and of students preparing for the Postmaster-General's certificate in Radio-Telegraphy." The whole field of wireless telegraphy, excluding wireless telephony, is covered, but a large proportion of the book is devoted to long descriptions of obsolete or obsolescent apparatus, while only extremely brief references are made to many modern improvements. In several instances, too, we have noticed portions where the wording could be improved with advantage. For instance, nearly four pages are devoted to the Marconi coherer, and over four pages to the magnetic detector, while the three electrode valve, the invention of which constitutes the most important improvement made up to the present in wireless apparatus, has only one and a half pages given to it, and the explanation of its action is by no means clear. Again, in connexion with the reception of continuous waves, nearly three pages are devoted to the tikker method, while only half a page is given to a very unsatisfying explanation of the heterodyne method of reception.

The author is not consistent in his use of symbols. He uses C and K indifferently for capacity, even in the same paragraph, while he also used C for current (even in paragraphs where he uses C for capacity), and K for the co-efficient of coupling. In dealing with methods of coupling the author says that when "all the lines of magnetic force which come into being when oscillations are set up in the closed circuit cut across all the turns in the second coil, the coupling is said to be close." We do not criticise the accuracy of this statement, except to point out that such a state of affairs is an impossibility, as there must always be some magnetic leakage, but we are afraid that the unfortunate sea-faring operator or student preparing for the P.M.G.'s certificate will get from it the impression that when *all* the lines so produced do not cut across *all* the turns in the second coil the coupling is not close, which of course is not necessarily the case.

In dealing with the various types of aerial in use the author says: "The radiation from a T-shaped aerial will be more symmetrical than that from an L-shaped aerial, but the latter will give a greater natural wave-length." The latter part of this statement is misleading as it stands, as nothing is said about the relative dimensions of the two aerials. In the description of the short-wave condenser used by the Marconi Company in their ship sets, no explanation of its action is given. Current measuring instruments are described as "ampere meters," instead of by the term invariably used by electrical engineers—"ammeters."

Considerable extracts are given at the end of the book from the regulations governing stations licensed for wireless work. We consider this as unnecessary padding, as any operator will always be in possession of the P.M.G.'s Handbook. The space so occupied could much better have been devoted to an amplification of the descriptions of important portions of wireless apparatus, some of which, as already mentioned, are at present treated in a very unsatisfactory manner.

There are many other points to which we could refer, but we feel we have said enough to indicate the general character of the book, and to show that, to bring it into line with the present requirements of wireless students, it needs thoroughly revising and bringing up to date.

"Wireless Telegraphy and Telephony: First principles, present practice and testing." By H. M. Dowsett, M.I.E.E. Published by The Wireless Press, Ltd., 12-13, Henrietta Street, Strand, W.C.2. 331 pages. Price 9s. net.

Apart from the literature on Wireless Telegraphy, written in a popular style and usually in journalistic English for the information of the man in the street, and, we may add, often, though unintentionally, for the amusement of those really acquainted with the practice of wireless, there exist two classes of books on this subject. There are those written purely as guides to operators, and giving only sufficient information on the underlying theory to enable the reader to handle the wireless gear of which he may be in charge with some appreciation of the functions of the various pieces of apparatus concerned, and there are also those which deal almost exclusively with the higher theory of the subject, and which necessarily assume on the part of the reader a knowledge of mathematics beyond that possessed by the average wireless operator.

A need exists for a book which, going beyond mere operating details, shall give an account of the more theoretical side of wireless telegraphy which will be of use to the operator desirous of increasing his knowledge of his work, without going so deeply into the subject as to be beyond his depth, Mr. Dowsett, in the present book, seems to have succeeded in meeting this need, and we think it should prove of great use to the class of reader for which it has been designed.

In the fourteen chapters into which the book is divided the author deals with modern views of electricity and of atomic structure; the elementary theory of alternating currents, with special reference to their practical applications to wireless telegraphy; spark dischargers; continuous wave transmitters; valves; wireless telephony; high speed wireless telegraphy; and methods of measurement of current, electromotive force, resistance, capacity, inductance, frequency, dielectric strength, decrement, the direction and distance of a transmitting station and the intensity of received signals.

The subject matter is treated throughout in a readable and interesting manner. It is very fully illustrated, and though a few of the reproductions of photographs of apparatus and machinery are somewhat blurred, the diagrams, which, after all, form much the more important portion of the illustrations, are exceptionally clear and well drawn. The book is well printed on good paper, and it should form a welcome addition to the library of every wireless operator who is anxious to learn as much as possible about his profession.

"Selected Studies in Elementary Physics." A handbook for the Wireless Student and Amateur. By E. Blake, A.M.I.E.E. Published by The Wireless Press, Ltd., 12-13, Henrietta Street, Strand, W.C.2. 171 pages. Price 5s. net.

One of the difficulties which meet the average wireless operator in studying his subject is that, since it is a branch of applied physics, some previous knowledge of physical science is necessary before a proper appreciation can be reached of the facts with which he meets. Although there are many excellent books on physics to be obtained, they hardly meet the special requirements of the wireless man, being usually either of the elementary type designed for children at school, which do not go sufficiently deeply into the subject for his purpose, or else, on the other hand, of the type written for students studying for examination, which cover much more ground than the wireless operator needs, at least at the beginning of his work.

The small volume before us has been written to fill this gap. It is divided into two parts. Part I commences with a general survey of the field covered by Physics, and then proceeds to discuss, in an elementary manner, conceptions of space and the representation of position by two and three dimensional co-ordinates, matter, force, motion, harmonic motion, waves and wave motion, work and

energy, stress, strain and elasticity, and finally the conception of an all-pervading ether and the electro-magnetic theory of light.

Part II deals with Chemistry. It may appear strange at first sight that more than one-third of a book nominally dealing with Physics should be devoted to Chemistry. We think, however, that the author is quite right in the plan which he has adopted. The boundaries between Physics and Chemistry are daily becoming more and more vague, and, furthermore, some knowledge of chemistry is a necessity to anyone who has to handle primary or secondary cells, and to know just what to do to keep them in the best condition.

The ground covered in Part. II comprises atoms and molecules; the distinction between chemical and physical changes; elementary notions of thermo-chemistry; a section on heat and temperature, placed here instead of in Part I as coming most conveniently immediately in conjunction with the following section, which deals with the thermo-chemistry of the simple voltaic cell; chemical nomenclature; formulae and the quantitative meaning of chemical symbols and equations; valency and chemical and electro-chemical equivalents.

Owing to the limits of space it has not been possible for the author to deal with the subject of optics, and electricity and magnetism are not specially touched upon. Optics is hardly of special utility to the beginner in wireless telegraphy, while the knowledge of electricity and magnetism required by him is far more than could be given in the limits of a small book such as that under review, and must be obtained from special treatises.

As far as it goes, however, the book is excellent, and we are sure it will be welcomed by wireless operators, especially by those who are cut off from the benefits of class tuition and who have to rely on their own efforts for acquiring the knowledge they require.

THE IMPORTANCE OF CONTINUING OUR EDUCATION.

BY CELIA KATE HOOPER (Supervisor, Museum Exchange).

"The fault, dear Brutus, is not in our stars
But in ourselves, that we are underlings."
Julius Caesar.

It is not unusual to hear remarks which suggest that a girl who has left school to enter the service is insufficiently equipped to take up, later on, a superior position, or to hear complaints on the part of those who are about to be promoted that they are not capable of filling the part which is offered them.

It must always be borne in mind that education is not a one-sided process, it is mutual. The energies of a teacher are lost if the one taught is not a student. Education is but the sowing of the seed of knowledge. The experience of the sower of the parable is common to all who sow, and the teachers share his lot and find, as he did, that the seed they sow is just as liable to fall by the wayside, upon stony places and among thorns. It is not their happy fate often to discover the good ground and it cannot be imputed in them a fault if their labours are not always crowned with the success of an hundred fold, or the production of a genius.

The moral of the parable applies equally as well to mundane as to spiritual education, and it may be fearlessly asserted that learning is acquired by different individuals in varying degrees, notwithstanding the fact that they may all have been subjected to much the same amount of teaching. Success in life, and, therefore, success in the Service, is not so much dependent upon the education which has been received as upon the character which has been formed, nor is it so much what she has been taught as what she has learned, and the manner of learning, which qualifies anyone to succeed.

The function of education is not so much to teach facts as to teach the scholar the proper method of acquiring knowledge, and there is little doubt that the faculty of acquiring knowledge depends mostly upon the interest the student takes in the work, whatever the work may be. It may be called application, concentration, or what not, by those learned in such matters, but one will be more readily understood if it is merely called interest, for we all know whether or not we take interest in a subject. The idea one wishes to convey is wrapped up in the adage, "Where there's a will there's a way."

Now if it were asked what kind of a preliminary education should be recommended to ensure success in the Service, what could be answered but this: That if a girl has been given and received a good elementary education, she is capable of most things, and the Service should not present to her any insuperable difficulty in any of its grades. Being in the Service should of itself be an education. Anyone who is in it and keeps her eyes and ears open and takes an interest in what she and those around her are doing, ought, when the time comes for promotion, to find herself fully equipped for her new post. If she avails herself of the opportunity which is given to her to attend classes dealing with the technical side and theory of the work, she will obviously be better equipped than before, provided, of course, that she has gone there with the intention of learning. Merely attending classes will avail nothing and there is nothing to be gained by temporarily holding facts and figures in one's head solely for the purpose of gaining a diploma. It is an essential condition that the desire to acquire further knowledge should be there, otherwise the temporary fabric which has been built in the brain will fall away like a house built of cards.

It is to be feared that many who enter the Service attach too little importance to their work. It is, perhaps, only natural for girls to feel that *their present occupation is but a temporary expedient and that they will* shortly be married and that any effort they may make towards proficiency will only be thrown away when they come to draw their dowry. The thought is, however, fallacious. "There is many a slip." We are assured that the marriage market is overstocked and that the percentage of women over men is exceedingly high, so the most attractive of us cannot be certain of what the end will be. But apart from the folly of being over sanguine on such a matter, it should be borne in mind that no one is the loser by perfecting herself in any direction. To have surmounted difficulties in one direction will shew one how to surmount them in another, however wide apart they may be. There can be little doubt that to have mastered the intricacies of an Exchange and its management will make a girl more proficient in managing a home and its master!

It cannot be urged too strongly upon any member of the Service that she should always adopt an enquiring attitude towards her work and make a point of finding out from those around her the whys and the wherefores of what she does not understand. After all work loses half of its drudgery if one knows what one is doing. It will ultimately fall to her lot to direct others what to do and how to do it, and this cannot be done unless one has been through the mill oneself. It is impossible to control without knowledge—one is soon found out and then all real authority disappears.

The question of "finish" was included as part of the subject upon which the writer was asked to express her views. The hesitation felt on approaching the subject of education is increased when one attempts to say anything upon so delicate a matter, for it is felt that unintentional offence may so easily be given.

Finish is acquired most easily perhaps by associating with others possessing the same quality. It has its springs in the fount of altruism. Its largest component, politeness, is but the outward sign of an unselfish spirit—a desire to please, to subordinate one's own wishes, inclinations, convenience and pleasure, to that of others—a desire to secure, even at some sacrifice to oneself—the greatest happiness of all.

It is only too obvious that this comes easily to people so minded, but requires a large amount of self control on the part of others whose early training has made for selfishness. But to those in the Service whose daily occupation involves its practice, its acquisition should prove easy if not possessed at the outset. In the expression "finish" would no doubt be included manner of speech, which is akin to politeness. The desire to please will undoubtedly eventuate in an agreeable speaking voice. It will be seen, therefore, that these matters are not so much things to be learnt as to be acquired by an attitude of mind.

Unfortunately there are a few in the Service who have not mastered such elementary parts of their education as spelling, punctuation, and composition, who find when they come to the test for promotion that they are disqualified for their deficiency in this respect. The reading of books by good authors and practice ought to be a cure. Spelling can be acquired after one has left school without the laborious repetition that the young scholar is subjected to, by familiarising one's eye to the form of words through constantly seeing them in print, and all who feel themselves deficient in this particular are recommended to devote more time to reading and to raise the standard of the literature they read. Unconsciously one will acquire new phrases, new words, and new and more various and complex forms of expression which will displace the limited vocabulary and simple methods with which one was formerly satisfied. If there is any doubt about a word it should at once be turned up in a dictionary. This will fix it in the mind and save confusion another time. The art of composition is not impossible of acquisition to any one. Ruskin says, in effect, I think in "Sesame and Lilies," that if anyone has anything they really wish to say, any information they desire to impart, they will never fail to find the words to give it expression. Practice makes perfect. One need not, however, be writing essays all one's life, but by taking a little trouble with private correspondence, by describing something in a letter, some scene, some sensation, or some object, one at once begins to realise one's limitations, but it is extraordinary how rapidly the difficulties disappear with a determination to make oneself clear. As "paper work" enters largely into the occupation of those in the superior positions of the Service, one cannot be wrong in practising this most necessary of all arts.

The incentive to shine in the Service should not be necessary as an inducement for its acquisition. A time comes in everyone's life when they wish to write an account of something which has happened, and when it arrives they will not be sorry that they have given the matter some attention. It may even fall to their lot to be asked to contribute an article to the *Telephone Journal*—one never knows.

The
Telegraph and Telephone Journal.

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

Editing and Organising Committee - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - - W. H. GUNSTON.

NOTICES.

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

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TELEPHONE TARIFFS.

IT is perhaps not surprising that from the early years of the war up to and including the present time, telephone rates in Europe should exhibit a continued tendency to rise. Nor is it astonishing that increases which were originally projected as War Measures of a temporary character should in view of present economic conditions not only become fixed but actually augmented. The revisions of rates which have occurred in Europe and America since 1915 have been so many and various that it is sometimes difficult to keep trace of them: in many countries two revisions have been made within the last five years, and in others one has actually been made and another is in immediate contemplation. We need not dwell upon the painful subject of the cost of living, only too well understood by our readers in this country and abroad: we will content ourselves with remarking that the increased cost of labour and materials, to say nothing of the difficulty of procuring them, is felt perhaps as heavily in the telephonic field as anywhere. The increased rates in question, then, may present an element of disappointment in regard to the future development of the telephone service of Europe, but hardly one of surprise.

The charges introduced are, as we have said, of a varied nature in different countries. In France for instance, the unlimited rate in Paris was first increased from £16 to £18, and has now again been raised, this time to £28. In addition, subscribers have to provide their own apparatus. Nor is this all. The old rate applied to unlimited connexions of all kinds, but the new rate will not apply to flats, hotels, cafés, clubs, &c. The proprietor of a block of flats who subscribes for a telephone for the use of his tenants will pay £40 in future, and the proprietor of a café whose telephone is at the call of all his clients will pay £48. This will be a very considerable increase on £16.

In Amsterdam, the flat rate has risen from £7 10*s.* to £9 7*s.* 6*d.*, and the installation charge from £2 1*s.* 8*d.* to £2 12*s.* In Norway and Switzerland the increases are slight, but in Italy rates have risen from £8 to £14, with an annual surcharge of £4 16*s.* (terminable two years after the conclusion of Peace) for business connexions in the largest towns. Austria has twice changed her rates since 1916, and from a note in the Press we learn that it is now proposed to double them. Germany has contented herself so far with an increase of 20 per cent., but we believe that here also a further revision is under consideration.

In Sweden and Denmark, two countries which have a preponderating interest for students of telephone economics, important changes have taken place. In Denmark, which telephonically is more highly developed even than Sweden, the business rate at Copenhagen has gone up from £8 16*s.* to £22 10*s.*, and an establishment charge of £5 12*s.* 6*d.* is now levied. There are of course other and lower rates, but it is impossible in a brief review like the present to give them in their complicated and varying details. In Stockholm the principal rates are now about £10 and £7 5*s.* plus an entrance fee of £1 8*s.* 0*d.* and an installation charge of £11 5*s.* 0*d.* The Swedish Administration is unable to apply these rates to subscribers holding five years' agreements, and there are consequently many subscribers still enjoying the benefit of older and cheaper rates. The State and Company's systems are now amalgamated and most of the subscribers enjoy inter-communication between the two systems. The statistics for 1918 afford an interesting commentary on the effects of the cessation of competition, there being a decrease in Stockholm of over 700 stations, as compared with an increase of nearly 18,000 in 1917. Subscribers of course no longer find it necessary to subscribe to both systems.

The position as regards America is somewhat difficult to summarise, except that it may be said that the rates generally have an upward tendency. Whilst the Postmaster-General had the system under his control, small temporary increases were levied and were to remain in force for a period not exceeding four months after Aug. 1, 1919. Many companies on resuming control applied to have these increases made permanent, and the Public Services Commissioners now have the question under consideration. Numerous applications have been granted, and hardly a week has elapsed during the past year without a record in the journal *Telephony* of authority to increase the charges for various systems in States ranging from Nebraska to Massachusetts. These increases apply chiefly but not entirely to the cheaper rates of the Independent Companies, and the list which we published on page 37 of our December issue shows that they are not confined to the smaller towns.

Only the flat rates, the long distance rates and some minor charges were raised in this country, and a sur-charge was levied in the case of new connexions. These of course were temporary measures, and bear no adequate relation to the enormously increased cost of providing the service. What recommendations the Rates

Committee at present sitting will ultimately put before a Select Committee of the House of Commons we are quite unable to forecast but we imagine the incidence of charge can only be in one direction, viz., upwards. But we may be assured that they will be carefully designed to bear the burden of increased cost with as little restriction as possible of the great development of the British Telephone system to which we all look forward, and which is at present manifest in an expansion of business greater than the existing system can bear.

HIC ET UBIQUE.

THE *Evening News* says "official complacency is imperturbable." So also, we might rejoin, is that of our contemporary. Why do they say that Mr. Pike Pease's figures showing that American telephones increased by 5.5 per cent. and Post Office telephones by 7.1 per cent. are inaccurate? And why do they substitute an incorrect and phantasmal figure for his correct one? Possibly they are confounding the increase in the "Bell" system with the increase in the whole of the States. Why should percentages *per se* be said to give a misleading comparison? Again, whilst we are only too well aware that the relation of telephones to population in Great Britain is immeasurably behind that of the United States, why is it "meaningless" to show that the percentage increase on our much smaller total happened to be better last year than that of America? After all, Mr. Pike Pease was replying to a question concerning the increase in the number of telephones and not the development per population.

THE Swedish official statistics for 1918 show that the total number of telephones in Sweden at the end of that year was 373,633 as against 347,664 in 1917. The figures for Stockholm, however, show a decrease of 726. This is accounted for by the amalgamation of the Company's system with that of the State. There was formerly no inter-communication between the two systems and those who wished to communicate with all the Stockholm telephone subscribers had perforce to join both systems. This necessity, of course, no longer exists and the usual result is apparent. There are now 124,824 telephones in Stockholm.

The report of the American Telephone & Telegraph Co. for 1919 shows that the number of telephones owned by the Bell companies increased by 537,402 to 7,739,159, and the number of telephones connecting with the Bell system by 192,346 to 4,056,588, making a total of 11,795,747. In addition there are about 873,000 owned by independent companies not connected with the Bell system, making a total of about 12,668,000 telephones in the United States. There are, we learn, approximately 11,000 separate telephone companies in the States. Of these 36 are associated companies of the A.T. & T. Co.; 9,403 are independent companies whose stations are connected with the Bell system, and about 1,500 companies entirely independent of that system.

THE April issue of *Business Organisation and Management* includes an interesting article by Mr. P. W. H. Maycock on the London Telephone Service, dealing with the organisation, reconstruction and post-war difficulties of that Service.

THE new French telegraph and telephone rates to which we referred in our last issue came into force on April 1st last.

THE *New Statesman* has the following remarks in its review of Mr. Emil Davies' work on *The Case for Nationalisation*:—

It is indeed astounding to what an extent intelligent Englishmen will let themselves be duped by the farrago of puerilities and cant that passes for logic in this matter. But the explanation is, of course, not far to seek. "The average man," as Alderman Davies says, "devoid of any training in economics, is unable to think out things for himself, and is therefore at the mercy of tendencious articles which appear in a Press almost wholly owned and controlled by persons whose interest it is that the present system of society should continue." For the moment the public is not likely to get a thorough grounding in economics, nor does the Press leopard show any sign of changing his spots. Mr. Davies therefore sets himself the task of proving to the public that it is being duped, and that the leopard is a leopard and not a kindly watch-dog.

The point with reference to the "tendencious" article will not be lost on our readers.

In the article entitled "British Industries Fair and the Crystal Palace" which appeared on page 114 of our last issue the name of the Earl of Weymouth was unfortunately incorrectly given instead of the Earl of Plymouth.

THE ELECTROPHONE SERVICE.

BY G. F. GREENHAM.

IN January, 1892, the attention of the Directors of the National Telephone Company was drawn to a scheme successfully established in Paris for transmitting by the aid of the telephone, musical performances from theatres to hotels, clubs and other places. The name theatrephone was used in connexion with this. As an experiment a concert room at the Crystal Palace was fitted up by the Company and connected with the Lyric Theatre in London where the comic opera, *The Mountebanks*, was being performed, and with certain theatres in Birmingham, Manchester and Liverpool. The venture was a great success.

The word "Electrophone" probably conveys little or nothing to a large proportion of the public, and many telephone subscribers would no doubt be unable to explain what the term refers to. The same could not be said of those connected directly or indirectly with the Telephone Service in London. It is possible, however, that many of these know what the Electrophone Service is without having a very clear idea how the results are obtained. This being so the following notes which are purposely of a non-technical character, will perhaps be found useful, despite the fact that previous articles on the subject have been written.

In 1893 a Syndicate was formed by Mr. H. S. J. Booth to work certain patents for the telephone transmission of theatrical and other performances over the system of the National Telephone Company. In 1894 the Syndicate became the Electrophone, Ltd. Its activities were confined to the Metropolitan Area.

Lloyd's *Encyclopaedic Dictionary* states that the word Electrophone is derived from the Greek words *elektron* (amber) and *phone* (a sound or tone), and that the term was given to an instrument invented by a Mr. Wright in 1864 for producing sound by electric currents of high tension. The author is not aware who was responsible for appropriating the term to its present day use, but though it does not in itself indicate the special purpose to which it has been applied, it serves well enough.

It is not proposed in this article to detail the various stages of development through which the system has passed, but to explain it as it exists to-day.

The electrophone service enables telephone subscribers to listen to performances at selected theatres, music halls and concert halls while sitting at their ease in their homes. Connections are also made to some of the City and West End churches. In this article the term "theatre" is used to cover all places from which electrophone hearings are given.

The system comprises the following:—

(1) The transmitter installations at the theatres.

(2) The music lines from the theatres to the Electrophone Exchange

(3) The Electrophone Exchange.

(4) The junctions to telephone exchanges.

(5) The electrophone equipment at telephone exchanges.

(6) The telephone subscribers' lines.

(7) The telephone subscribers' electrophone listening sets.

Fuller information will now be given concerning each of these.

(1) The theatre installation consists of a number of special type of transmitter generally fitted along the foot-lights. They are designed to stand considerable heat and are mounted on a spring base so as to be unaffected by vibrations of the stage. They are very sensitive and when properly adjusted will permit words spoken from any part of the stage to be heard quite loudly by a subscriber listening many miles away.

Four transmitters spaced regularly along the footlights are connected to each music line. This arrangement ensures an approximately uniform volume of sound to reach subscribers whatever the position of the performers on the stage may be.

FIG. 1.

Fig. I gives a view of the transmitters at the Adelphi Theatre. Each set of four transmitters is connected in series with a 4 volt battery, and the primary winding of an induction coil. The secondary winding of the coil is connected with a pair of wires to the Electrophone Exchange. The induction coils and batteries are fixed in a specially designed cupboard of fireproof construction, generally located under the stage. Fig. II shows the arrangement. The batteries are brought into circuit as required by an operator at the Electrophone Exchange momentarily applying a strong current to selected music lines associated with which at the theatre end are electro-mechanical switches.

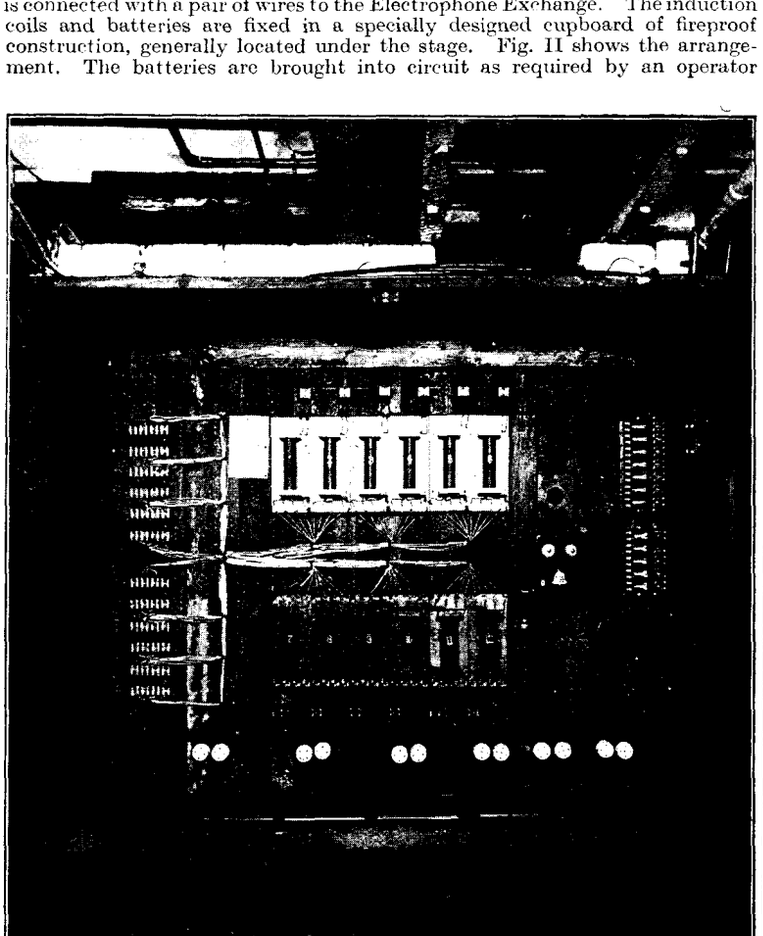

FIG. 2

(2) The circuits from the secondary windings of the induction coils to the theatres are called music lines. As the Electrophone Exchnage is situated in the heart of theatre-land the majority of the music lines are quite short.

(3) The Electrophone Exchange is similar to a telephone exchange, inasmuch as it consists of a suite of operating positions, but differs considerably therefrom in detail. Its function is to provide means for connecting the subscribers' lines extended over junction circuits from telephone exchanges, with one or other of the music lines as desired. More detailed information about the switchboard is given later in this article.

(4) The Electrophone Exchange is housed in a building adjacent to Gerrard Exchange. In order that any telephone subscriber's line may be extended to the Electrophone Exchange a certain number of junctions terminating at or passing through Gerrard Exchange are allotted for electrophone use and are extended to the Electrophone Exchange. As the electrophone service is given when the junctions would otherwise be idle, their revenue-earning period is thus extended.

FIG. 3.

(5) The telephone exchange ends of junctions allotted for electrophone purposes are so arranged that they can be connected by means of specially wired cord circuits to the electrophone subscribers' lines. That portion of the switchboard at the local exchange on which the connexions are made is spoken of as the electrophone position.

(6) Telephone subscribers who are also electrophone subscribers do not require special circuits to the local exchanges as the music is transmitted over the ordinary exchange connexions.

(7) Electrophone subscribers are divided into two classes, those who pay £10 per annum, and those who pay £5 per annum, for the service. The former

are supplied with four receiver sets and a hand transmitter, the whole attached to a small table. The latter have only two receiver sets, no hand transmitter and no table. The advantage of having the transmitter at the table is that the subscriber can signal and talk to the electrophone operator without having to use the telephone, whereas the £5 subscriber can only do these things from the telephone, which may be some distance from the position in which the electrophone receivers are fitted. In both cases a switch is supplied to control the connexion of the exchange line with either the telephone or electrophone apparatus. The apparatus supplied to the subscribers who pay £10 per annum is shown in Fig. III. The operation of the system will now be described.

A subscriber wishing to have a "hearing," calls the local exchange operator in the usual manner and asks for "Electrophone." The local operator passes the call to the operator at the electrophone position in her exchange, and the latter communicates with the Electrophone Exchange by means of an order wire and quotes the telephone number of the calling subscriber. A junction is allotted and the subscriber's line is connected with it by one of the cord circuits at the local exchange. The local operator after performing this operation has no further control over the connexion.

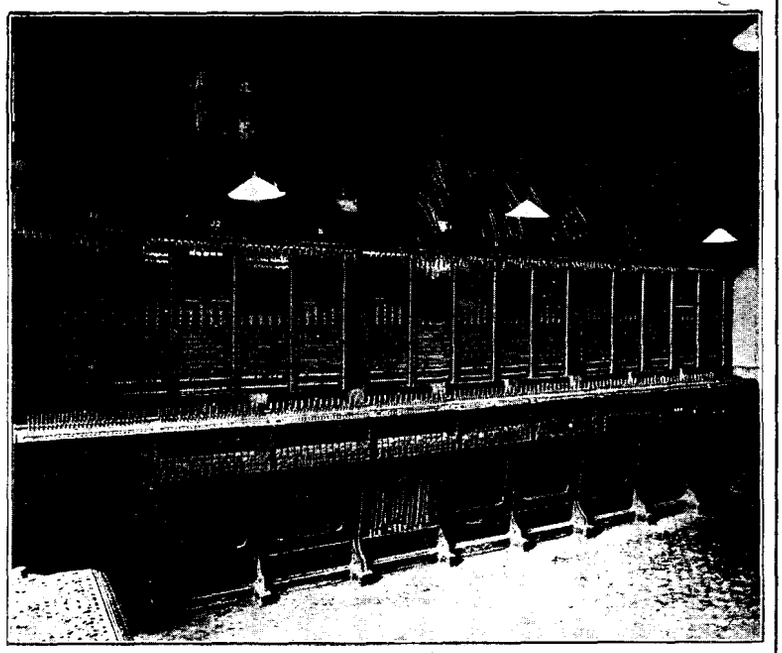

FIG. 4.

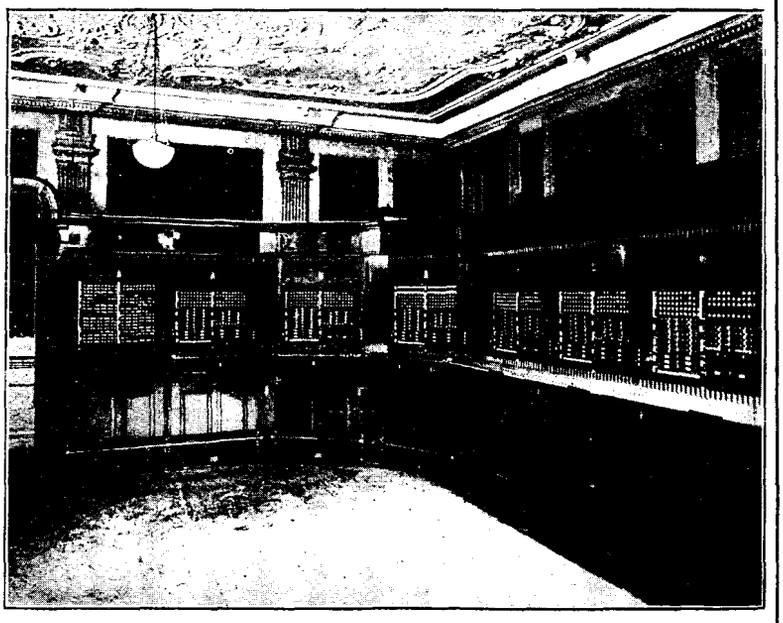

FIG. 5.

The operator at the Electrophone Exchange connects one of a pair of cords with the junction and asks the subscriber what he wants to listen to and makes the connexion with the desired music line. Signals from the subscriber are now received in the Electrophone Exchange.

MR. H. S. J. BOOTH.

The ideal arrangement would be to have enough music lines to all theatres to enable every subscriber who wants a "hearing," to have a line for his sole use. This is not a practical proposition, and therefore a number of subscribers may be connected with one music line. This is made possible by connecting each music line with a number of jacks in parallel. The distribution of "hearings" from one music line to a number of subscribers simultaneously, is so governed as to ensure that each shall be able to hear satisfactorily. Due regard is had to the electrical constants of the lines so grouped. If the distribution were done in a haphazard manner, those subscribers with electrically short lines would benefit at the expense of those with long lines.

At the time of the transfer of the National Telephone Company's business to the State, the electrophone business was in a more flourishing condition than at any previous period in its history. This was largely due to the improved service that was being given as a result of the adoption of scientific methods made available by the then rapidly increasing knowledge of the theory of telephone transmission.

During the War further considerable development in the business took place. The growth since has been so rapid that the capacity of the Exchange, which had served its purpose for so many years, was quite outgrown and it became necessary to provide a new one. In June 1919, the design for a new exchange was prepared by the staff of the London Engineering District. This was approved in due course, and the exchange which was built entirely by the District staff was opened for service on March 29.

A view of the old Exchange is given in Fig. IV. The photograph was taken after the board had been partly dismantled to provide some apparatus required for the new Exchange. The shortcomings in the old Exchange were borne in mind when the new one was being designed, and experience during the short time the latter has been in operation has proved that the change has been advantageous.

The new switchboard consists of a number of positions called music positions, and one called the switching and transfer position. The former will, for the sake of brevity, be referred to as "A" positions, and the latter as a "B" position. The electrophone junctions are divided amongst the "A" positions in such a way as to ensure that the "A" operators are equally loaded. So far as the electrophone operators are concerned the junctions when in use represent subscribers' lines.

The maximum load for an "A" operator is 50 connexions, and each position is therefore equipped with this number of cord circuits.

Every music line is connected with the "B" position. The large groups appear also on the "A" positions, being divided equally among them. Some of the groups are, however, too small to permit of this, and facilities are therefore provided to enable the "B" operator to extend them to the "A" operators as required.

One of the "B" operator's duties is to switch the batteries at the theatres into circuit, hence the need for all junctions appearing on the "B" position.

The traffic in the Electrophone Exchange is peculiar, inasmuch as a very large number of connexions have to be set up at the commencement of each period of service, and thereafter the operator's duties are comparatively light.

A view of the new Exchange is given in Fig. V. At present the number of subscribers in an exchange area is limited by the number of junctions in excess of those required for normal telephone traffic during the hours when the electrophone service is available. It is possible that in the near future this limitation will be overcome with the aid of some form of telephonic amplifier. Experiments with this object in view are already in hand. No doubt some day a loud-speaking receiver will be introduced which will make it possible for a number of persons to hear simultaneously without the need for them to hold receivers to their ears.

This article would be incomplete without an explanation of the working arrangement between the Postmaster-General and the Electrophone Company. Under the terms of the agreement the Postmaster-General provides, instals and maintains all the apparatus and lines, and the Company undertakes the operating at the Electrophone Exchange, and incidentally negotiates agreements with would-be subscribers. The Company is fortunate in having for its Managing Director Mr. H. S. J. Booth who has been associated with the electrophone business since its inception.

Some day no doubt Mr. Booth will feel constrained to tell the readers of this journal some of the many interesting uses to which the Electrophone System has been put in this country, and give a fuller account of its history.

TELEGRAPHIC MEMORABILIA.

THUS "Figaro," the Paris correspondent of *Everyman* quite recently on the telephone situation in the French capital. The telephone trouble and human nature seem very much the same both sides of the Channel :—

"There are complaints about the telephone service here. That is hardly surprising. Sometimes you hear your telephone ring, and when you get there, the cupboard is bare—in other words, there is none to reply, save a lady at the exchange who wishes to know, with some acerbity, what number you want. Sometimes you hear it ring, and when you get there you hear that you have been rung continuously for an hour, and its no use protesting because the caller *heard* the exchange ringing. Sometimes you don't hear anything at all, except, perhaps six months later, that So-and-so does think you might have said whether you would dine with him or not. Sometimes you ring up, hear your interlocutor's voice, and are immediately cut off.

For this service we are now to be charged seven hundred and fifty francs a year—normally thirty pounds. Before the war we paid sixteen pounds a year for the telephone service here ; we had to supply our own instruments, which might at any moment be classed as out of date by the Government, in which case we had to renew them : and although we had unlimited calls for that sum, of course very few people used more calls than were included *in the British system of a fixed number of calls for a fixed price.* Now the price for this unlimited service has gone up nearly a hundred per cent., the service has become so bad that every telephone call ought to be followed *by a postcard to record it to the callee (who would certainly reply in nine* cases out of ten that his telephone was free, and he at hand, at the hours when a call was answered by "Engaged," or "No reply"), and the young ladies at the exchange consider persistence on the part of the caller a sign of the worst possible taste. The other day I was so foolish as to begin my request for a number with the word "Please." I had not finished pronouncing it when I received the news that it was engaged. Evidently it is an exchange which does not usually reply."

The Vlug system of wireless telegraphy in which the "aerial" consists of something like one hundred yards of buried wires has recently been tried between Scheveningen and the Dutch colonial town of Bandoeng with apparently no small measure of success. The claim made for the system which includes a special form of receiver containing special improvements of the inventor, is that of increased distinctness of the received signals. On the other hand it is stated that the new system presents special difficulties to ordinary operators. The Dutch newspaper the *Vaderland* is responsible for the information.

A recent Admiralty instruction authorises the following :—In order to assist ratings of the Wireless Telegraphy Branch, due for discharge, and who may desire to take up civilian telegraphy, their Lordships have arranged for the Postmaster-General's certificate of proficiency to be issued to such telegraphists.

We are indebted to *Electricity* for the following interesting item :—"The 'Leader' electric cable which has just been installed at Portsmouth Harbour is likely to prove a very valuable assistance to the navigators of ships when low visibility prevails. The cable, which is an armoured one, lies at the bottom of the fairway, the land end being connected with an A.C. generator in one of the generating stations. Interruption of the current corresponding to prearranged signals of the Morse code, conveys to ships fitted with the necessary receiving apparatus their position in the fairway to within 500 yards of either side of the cable.

At a conference of provincial and suburban wireless societies which took place in March of this year at the Royal Society of Arts and at which Sir Charles Bright, F.R.S.E., presided, Captain F. C. Loring, R. N., representing the Postmaster-General made a statement which may be accepted as official and which will doubtless give considerable satisfaction to many an amateur wireless experimenter. He stated that the Post Office officials were more than favourably disposed towards an amalgamation of the wireless clubs of the United Kingdom, as such a combination of these societies would have the happy effect of keeping the amateur within the limits of his licence. The captain further stated that the Postmaster-General proposed to grant a "transmitting" licence of about ten watts where an amateur could prove that he thoroughly understood the apparatus he was asking to make use of ; that he was conversant with the Morse code and proficient, and that his transmitting station was to be used for genuine experimental work, and not merely for communications between other stations in a general way.

Among those who have been nominated for the vacancies which will occur in the offices of Ordinary Members of the Council of the Institute of Electrical Engineers, it may be interesting to note are the names of Mr. F. Gill, chief engineer of the International Western Electric ; Mr. F. Ryan, chief engineer of the Eastern and Associated Telegraph Companies, and the present engineer-in-chief of the G.P.O.

While writing of the I.E.E. members of the Post Office Telephone and Telegraph Society will be pleased to read that at the Institution annual dinner the President was able to announce that there were high hopes of the return of the members to their own beautiful building on the Victoria Embankment before the opening of the new session in September next.

Mr. L. Gaster, in a paper read before the Royal Society of Arts on March 24, on "Industrial Lighting in relation to efficiency," touched upon many phases of the subject. One sentence seemed particularly applicable to the Telegraph service in general and is accordingly herewith quoted :—"The practice of working several shifts would only answer well if the conditions of artificial lighting were thoroughly satisfactory, *rendering the conditions by night as conducive to good work as those in the day time.*"

Mr. J. Y. Bell and Mr. John Lee, M.A., have been appointed as Trustees of the Post Office Clerks' Benevolent Fund, in place of Sir Alexander King, K.C.B., and Sir Robert Bruce, C.B.

J.J.T.

LONDON TELEPHONE SERVICE NOTES.

AFTER many disappointments on reading through previous lists of those on whom has been bestowed the Order of the British Empire, we find included in the last and largest list the name of the Controller. Mr. Preston becomes a Commander of the Order, and the large volume of congratulations he has received testifies to the popularity of the award. The list contains the last of the awards granted for work done during the period of the War, and it would have been incomplete without the name of him who was our chief throughout the War when the London Telephone Service had such large responsibilities in so many emergency arrangements, all of which were carried out with credit. Again we offer Mr. Preston our hearty congratulations.

It is with much pleasure and satisfaction that we note that the Controller was among those who attended the levee held by the King on March 22.

Unique among the wide range of papers read before the Telephone and Telegraph Society were those presented by Miss Knapman of the London Telephone Service, and Miss Chillman, C.T.O., at the March meeting. We all from time to time have experienced the idiosyncrasies of subscribers, but it was quite interesting to have the subject reviewed and to realise how the subscribers consciously and unconsciously introduced factors which make for diversity in the daily round of our task. One could not fail to appreciate the extent to which the telephonists and supervisors assist subscribers in essential operations, and one wonders whether subscribers will really find machine switching satisfactory.

The staff of the Trunk Exchange have taken us all, and themselves also, by surprise by the amount raised at their bazaar. The total sum realised was £925, including £50 in respect of goods sent by St. Dunstan's and sold for that institution. If only *the hat* had been taken round a four figure total would no doubt have been reached. The amount remaining for distribution was £845, of which £420 (in addition to £50) has been forwarded to St. Dunstan's, and £425 to the War Seals Foundation. The magnitude of the result is an indication of the efforts made by all who contributed to the occasion, and also the high grade of the hand-work of those who made so many of the articles on the stalls, and of the efficiency of the organisation. The staff of the, Trunk Exchange may well be proud of so splendid an achievement and the L.T.S. is no less proud of them. Three cheers for the *Trunk Exchange* !

A party from the Trunk Exchange recently visited St. Dunstan's Institute and found it most interesting. Two points which impressed themselves most forcibly were the amount of thought and care given to the comfort and assistence of the men, and also the cheerfulness and energy of the men themselves in spite of their affliction. In the grounds gravel underfoot indicates the presence of steps, and inside the building they were guided by strips of carpet. The men receive instruction in the making of baskets, bags and mats, in woodwork, boot repairing, poultry farming, typewriting and telephone switchboard operating. The switchboard of the Institution is operated by a blind man. It is s atandard board with five exchange lines and twenty extensions. The sound of the dropping of the exchange line indicators differs from that of those associated with the extensions. The number of the calling line is ascertained by touch, the left hand feeling for the indicator while the right hand takes up the cord, and there is little hesitation in selecting the right jack. The progress of the call is ascertained by listening on the connexion from time to time, and all connexions are challenged before being cleared. The building contains a dining room, rest room, and a hall for dancing and concerts which are arranged for the men, and in the grounds are churches of various denominations. The party came away convinced of the good work which the Institution is doing and feeling justified in all the efforts which they and their colleagues in the Trunk Exchange and other Exchanges in London are making to increase the funds of the Institution.

It is with great regret that we report the death, on March 24, of Miss L. Gilson, an Assistant Superintendent, Class I, of the Trunk Exchange.

Miss Gilson had been connected with the London Telephone Service for nearly 21 years, and during the war had served for a considerable period with the nursing forces in France. Miss Gilson's kindly and sweet disposition endeared her to all who came in contact with her, and her loss will be felt keenly by many who knew and appreciated her worth.

Battersea Exchange.

On Feb. 25 a social was given by the Battersea Exchange Staff, and the proceeds, amounting to £7 5*s.* 8*d.*, were sent to the War Seals Foundation Fund.

Central Exchange

A highly successful concert in aid of the War Seals Foundation was given by the Central Exchange staff at the Y.M.C.A., Tottenham Court Road, on April 9. The many excellent items on the programme were thoroughly

enjoyed by an audience of over 600. During the interval Mr. Roberts, of the War Seals Foundation, explained the object of the Association. The Committee wish to take this opportunity of expressing their thanks to the artists who so kindly gave their services; to Mr. Pounds who so ably carried out the duties of stage manager, and to all who helped to make the concert a success. As a result it is hoped to hand over £85 to the War Seals Foundation.

Dalston Exchange.

A successful concert was given by the staff on March 19, as a result of which the sum of £12 10*s.* 3½*d.* was contributed to the War Seals Foundation. The concluding item, "Mrs. Jarley's Waxworks" caused much amusement, especially the effigy of a Government official which, when wound up, did nothing. As Mrs. Jarley explained, "Well, 'oo-ever 'eard of a Government official ever doin' anythink."

East Ham Exchange.

The above exchange held their second dance of the season on March 12, and on March 25 a sale of work was held and a sum of £20 raised in aid of the War Seal Foundation.

Gerrard Exchange.

The fourth dance in connexion with the swimming club was held on March 12. Miss P. Blanks gained the ladies' prize for the most original costume, representing "Vanity," while Mr. Preston of Gerrard Exchange, attired as "Bindle," was awarded the gentleman's prize.

Hornsey Exchange.

Whilst the large exchanges still contribute large amounts to the various charities, yet it is with equal gratification that we record the efforts of the smaller suburban exchanges in the same field. The Hornsey Exchange Dance in aid of the War Seals Foundation was held at the Camden Athenaeum on March 23 last. Under the guidance of Miss Sewell, the dance committee was responsible for a most enjoyable and successful evening, and as a result £12 was forwarded to the War Seals Fund. About one hundred and fifty guests attended, and a special word of thanks is due to those members of the staff who gave up their whole evening to the refreshment department and ministering generally to the comfort of all.

Lee Green Exchange.

A very enjoyable social was held on March 20 in aid of the War Seals Foundation, and as a result a cheque for £25 has been sent to the fund. The entire expenses of the function were borne by the staff. The artists were Misses Worth, Mubill, Stokes, and Messrs. Sarney, Coeshott, Anderson, Dapp and Davis, the latter earning a hearty reception with their concertina duets.

Park Exchange.

The excellence of the "social element" in the North West Traffic District was again manifest in a social evening organised by the staff of the Park Exchange on Monday, March 22. The committee, headed by Miss Epps, should feel very pleased with the delightful evening spent as the result of their efforts. It was arranged for the staff only, and the enthusiasm with which the programme of dances, concert, competitions, etc., was received, reminded one of the lines:—

"And the cares that infest the day,
Shall fold up their tents like the Arabs,
And as silently steal away."

The Misses Ayres, Chetwood, Mutch, Welsh, Chivers, Chambers, Rutter, Bott and Huckill, provided the musical items of the programme.

Victoria Exchange.

A social was held on March 5, the proceeds being divided between the War Seals Foundation and the Hospital Saturday Funds. A very enjoyable evening was spent and plenty of merriment was derived from the games and dances. An excellent musical programme was also arranged, and thanks are due to the artists who so kindly gave their assistance in helping to make the social a success. The sum of £24 5*s.* was realised, £14 of which has been handed over to the War Seals Foundation, and £10 5*s.* to the Hospital Saturday Fund.

Willesden Exchange.

The sum of £10 was realised at a social and dance which was arranged by the staff at the Willesden Exchange on March 19 in aid of the War Seals Foundation. The evening was most successful and enjoyable, the musical items being especially appreciated.

Wimbledon Exchange.

On Saturday, March 13, a dance arranged by the staff was held in aid of the War Seals Foundation. Thanks to the generosity of the staff and the friends who loyally supported them, they were able to send the sum of £7 10*s.* to the Fund.

THE LANGHAM CHORAL AND ORCHESTRAL SOCIETY.

The first performance of the above society is to take place at the Queen's Hall on May 11, when *Hiawatha*, Parts I and II, and a miscellaneous programme will be presented. The Society is fortunate in securing the services of the following soloists:—Miss Ethel Best, soprano; Mr. John Booth, tenor; and Mr. F. Ranalow, baritone. Tickets can be obtained from Miss Nurse, West Traffic Office, at the following prices:—stalls, 8*s.* 9*d.*, 5*s.* 9*d.* (numbered and reserved) and 3*s.* 6*d.*; grand circle, 5*s.* 9*d.* (numbered and reserved) and 3*s.* 6*d.*: balcony and area, 2*s.* 4*d.*

AMONGST THE CONTRACTS.

BY NOBLE MORRIS.

"DEAR SIR," the letter read—"Please send me particulars of the Telephone Service."

The applicant's address was in a district where plant was available, so an Agreement, with the usual forms and covering letter, was forwarded. The laugh was against us, however, when these were returned, accompanied by the following note:

"Dear Sir,—It is a job I want, not a telephone."

Evidently those foolscap-size, red-lettered posters, which look out modestly on the world from the dingy windows of Post Offices, are not so ineffective as their appearance would suggest!

* * *

BOLSHEVISTIC.

"Please remove my telephone from the 'anti-'-drawing-room to bedroom on first floor."

We do not like this subscriber's phrase, "anti-drawing-room." It is Bolshevistic and sinister. We think Charley's Aunt(ie) much better!

* * *

OUR "EXPERT" COMMISSIONER.

The last column on the front page of a certain evening journal was observed recently to contain the following announcement:—

LATEST NEWS.

EDITORIAL TELEPHONE: HOLBORN 6,000.

Had it not been that we know otherwise this might have been regarded as the first fruits of our "Expert" Commissioner's telephone campaign!

* * *

TELEPHONE: GHOSTLAND!

"The telephone here seems 'very bad' and requires 'verifying!'"

A clear case this, for Sir Arthur Conan Doyle in his three-fold capacity of M.D., "Sherlock Holmes," and seer (of ghosts)!

* * *

OUR BOYS.

In earlier—and happier—times the unconscious humour of our Messengers, as shown in their written explanations of irregularities, formed a feature of *St. Martin's-le-Grand*. It was a well evidently inexhaustible and new springs were discovered frequently. We have just found one bubbling up refreshingly in the Contract Branch. Of its mirth-creating waters, drink!

"With 'referance' to attached report. The reason for the late attendance which is incorrect. My time of attendance is 9 a.m., before I reach my office I make up the pouch which after I have locked and greeted 'good morning,' respectively is 9.10 a.m. . . . "

* * *

THE UNKINDEST CUT.

"I am leaving for the country. One of my reasons for leaving for the country is the abominable nuisance of the telephone service, which makes life unendurable."

We felt depressed after reading this until we remembered the valorous declaration of the poet:

"Our heads are bloodied but unbowed!"

* * *

THE TWO APPLICANTS: A TALE OF THE TELEPHONE.

1. *The Facetious.*

Dear Sir,—A reminder that I'm still alive and still waiting for my telephone.

P.S.—How about pinching one of the 70 'phones at the Ministry of Pensions, — — Square?"

2. *The Complacent.*

SECTIONAL CLERK (on the telephone): "I am very sorry, but the arrangement I made with you for an officer to call on you this morning about your installation has been overlooked."

SUBSCRIBER: "Oh, that's all right! I don't mind! You know, when you made the appointment I bet my partner £1 it would not be kept. I've just collected the sovereign now!"

* * *

HOPE SPRINGS ETERNAL.

SUBSCRIBER (at the counter): "I've called for the refundment of my surcharge."

SECTIONAL CLERK: "Refundment of your surcharge?"

SUBSCRIBER: "Yes. I hear all surcharges are being refunded. I had a telephone a short time ago and paid £4 surcharge."

SECTIONAL CLERK: "I'm afraid you must be mistaken. The surcharges are not being refunded."

SUBSCRIBER: "Oh, yes, they are! I know a case exactly the same as mine in the same street, where the surcharge has been refunded. The question was raised in the House, and the Postmaster-General promised they would be."

SECTIONAL CLERK: "Well—we know nothing about it here! Perhaps you had better write to Queen Victoria Street about it."

SUBSCRIBER: "I see! Thank you! Good morning!"

SECTIONAL CLERK: "Good morning!"

LONDON ENGINEERING DISTRICT NOTES.

IT has been felt for some time that information referring to topics associated with the London Engineering District should appear in the pages of the *Telegraph and Telephone Journal*. The notes of our colleagues in other departments have been appreciated by a large number of engineering readers, and it is hoped that more news of the engineering side will tend to increase the usefulness of the journal still further. Advantage is taken of this opportunity to thank the Editors for their kind and ready acquiescence in response to our request for the necessary space.

RELIEF TELEPHONE EXCHANGES.

So urgent has the London Telephone problem become that the provision of relief or temporary exchanges has been resorted to. Three of these have been completed already—Latchmere (relief to Battersea) Broadway (relief to Stratford) and Clerkenwell, which relieves a very congested part of the London Wall area. The Clerkenwell Exchange consists of 30 positions and has a capacity for 1,500 lines. The board was formerly in use for the Air Ministry at the Hotel Cecil. It was dismantled and re-fitted at Clerkenwell entirely by the staff of the London Engineering District. Equipment for four 2,000 line No. 10 exchanges is shortly due for delivery. The Mayfair and Holborn areas will be among the first to be relieved by two of these exchanges which will be probably called Langham and Gray's Inn respectively. The naming of new exchanges is a matter which provides much scope for ingenuity. It is rumoured that a new post has been created, viz., the Controller of Exchange names. The most likely candidate for this office recently suggested 500 names for the Clerkenwell Exchange and several reasons why each of these were unsuitable. The principal reason which led to the adoption of the name "Clerkenwell" is believed to have been that the Exchange is not in the Clerkenwell area. From time to time it has been suggested that exchanges should be named after famous men. As the difficulties of finding suitable territorial names are becoming increasingly difficult owing to the increase in the number of exchanges, the suggestion is worth serious consideration. The objection may be advanced that with the large number of exchanges which will be necessary when the automatic system is introduced into London, the names of great men would soon run out. Should this happen we can always fall back on the names of notorious men.

UNDERGROUND WORK.

A very interesting paper on "Recent Developments in Underground Construction" was read before the London Centre of the Institution of Post Office Electrical Engineers at the Royal Society of Arts, on March 31, by Mr. A. O. Gibbon. The speaker dealt briefly with the great advances that had been made during the past few years in the methods of providing speech channels. A few years ago it was the practice to use trunk cables in which the conductors weighed 200 lbs. each per mile. Even with these it was possible only to speak over moderate distances. The department is now about to lay cables to Bristol and Southampton, in which the conductors will each weigh 20 lbs. per mile, and the number of pairs in a single pipe will be increased from 52 to 308. When we remember that the greater part of the cost of a telephone system is incurred in the provision of line plant it will be realised that the work of the Engineering Department in investigating and developing methods for improving transmission and in cheapening the cost of providing circuits will result in the saving of vast sums of money. The full extent of this saving cannot be stated here, but as some indication of the magnitude of the costs involved in underground work, it may be mentioned that the amount authorised for local lines in London alone during the financial year which ended March 31, 1920, was over £600,000. If to this sum is added the cost of new trunk cables and the cost of bringing into use existing spare plant, the cost for London would be somewhere in the neighbourhood of £1,000,000.

It was an American who said that "an engineer is a man who can do for £1 what any fool can do for two." The post office engineer has always that ideal before him. It has frequently been asserted that the civil servant has no appreciation of real economies. This may or may not be true of some departments, but it is certainly not true of the Post Office Engineering Department, which is constantly striving to get the utmost efficiency with the minimum expenditure. Mr. Gibbon indicated that experiments had been made and improvements effected in the methods of laying conduits, constructing jointing chambers, drawing in, jointing, and desiccating of cables, also the improvements which have been effected by the use of loading coils and the telephonic repeater.

During the discussion which followed, the Engineer-in-Chief made the interesting statement that the Secretary had given cordial support to a scheme for the establishment at Dollis Hill of a properly equipped laboratory for engineering research work. Hitherto such work has been done in cramped quarters, and to anyone who is acquainted with the very important investigations which have been carried during the last few years, and with the contribution which has been made to the advance of telegraph and telephone science in general and to the war services in particular, it must be a matter of surprise that so much should have been done with the limited facilities which were available.

The Engineer-in-Chief also stated that the policy in future would be to depute more of the executive work in the districts, leaving the Headquarters Office to act as an advisory character and to deal with matters of investigation and research.

Mr. Moir made an interesting comparison between the New York and London telephone systems, dealing particularly with records of faults. From the figures furnished it would appear that the engineering faults in London are considerably less than those in New York. Such comparisons are, however, not quite conclusive unless the respective authorities agree on the definition of the term "engineering fault." It is clear nevertheless from the evidence received that London would not compare unfavourably with New York or any other very large city.

Mr. Byng of the Western Electric Co., gave some instructive descriptions of telephone engineering methods in continental cities. His final conclusion appeared to be that in most of these cities the methods of construction were such as the British Post Office had abandoned several years ago, and that the cabling contractors would like to see British practice, as being of a higher standard, adopted generally.

THE HOUSING DIFFICULTY.

There does not appear to be any truth in the rumour that the Department has decided to allow members of the staff who experience difficulty in finding housing accommodation to occupy the larger manholes.

PROMOTION.

Was Shakespeare thinking of the Civil Service when he put the following words in the mouth of Iago ?

> "Why there's no remedy ; 'tis the curse of the service.
> Preferment goes by letter and affection
> Not by the old gradation where each second
> Stood heir to the first."

The annual clerical supper was held in the refreshment room at Denman Street, S.E.1, on Tuesday, March 23. This was the ninth of the series, the last one being in 1914. 250 members of the staff from the Headquarters and Sectional Offices, etc., attended. Mr. A. E. Cooke, principal clerk, presided, and the superintending engineer, Mr. A. Moir, O.B.E., was "The Guest of the Evening."

Mr. Cooke, before proposing the toast, "The Guest of the Evening," welcomed the presence of former colleagues now serving in the Engineer-in-Chief's office, Accountant General's office, Ministry of Pensions, Air Ministry, etc. He spoke with feeling regarding the 300 clerks of the district who had joined the colours, and made special reference to the 39 clerks who had lost their lives in the Great War. As to the Reconstruction Scheme, he could well understand that the staff were on the tiptoe of expectation. The Post Office clerks were naturally anxious to learn how they would be graded in the new scheme. The clerks in the district had proved themselves thoroughly competent and would continue to do their utmost in carrying out their clerical and accounting duties in a highly efficient manner. He believed in awarding good pay and favourable conditions, and in return the staff would give of their best. The one would follow the other. The grading of the staff, however, was "on the knees of the gods," and they must wait patiently for the result to be announced. Mr. Crooke, in proposing Mr. Moir's health, congratulated him, on behalf of the staff, on receiving the honour of O.B.E., and he also referred in a complimentary manner to the interest Mr. Moir had taken in the function of the evening.

Mr. Moir, in responding to the toast, stated that he hoped that all the good things Mr. Cooke desired for them might be realised, and that in the interests of the work of the office the attractions of the Treasury Pool might be correspondingly diminished. He made special reference to the beautiful illuminated scroll exhibited in the hall at Denman Street, as a tribute to the memory of those who had fallen in the War. The scroll was a labour of love on the part of their colleague Mr. Brockett, who had succeeded in achieving a most artistic result. In conclusion he stated that although O.B.E.'s were pretty plentiful, he still regarded his own decoration with much satisfaction ; not so much on personal grounds as because it was a token of appreciation from those in authority as to the excellent and efficient manner in which the work of the London District was at all times carried out.

The supper was followed by an excellent musical programme, under the direction of Mr. J. W. Kimber. Among those who contributed where Miss Pitfield, Messrs. S. L. Bickerton, J. Cordineer, C. W. Cornwell, J. J. French, S. G. Frost, J. J. Gerke, H. Gilbert, E. F. Griffiths, Chas. Harris, J. W. Kimber, F. G. A. Terrill, H. H. Thorne, R. W. Turk, and A. A. Turner. Messrs. T. H. Ayre, E. W. Casserley and H. Curtis accompanied on the piano. The L. E. D. Orchestra led by Mr. H. W. Gardener, proved the instrumental accomplishments existing in the district. Praise is also due to the committee who, with the aid of the refreshment club staff, transformed the prosaic dining room into something resembling a West End restaurant, and provided a supper in keeping with the surroundings.

All concerned are to be congratulated on the success of the function.

SOUTH INTERNAL SECTION.

Members of War Savings Associations in general and of the South Internal Section Association in particular, will be interested to learn that a certificate of appreciation of the services rendered by the Hon. Secretary, Mr. F. Saunders, has been received from the National War Savings Committee.

The certificate is worded in the following terms :—

"We hereby record our high appreciation of the
services rendered to
The Nation
and to
The War Savings Movement
during the
Great War 1914-1918,
by
Frederick John Saunders
as Hon. Secretary of the South
Internal Section, War Savings
Association.

(Signed) D. LLOYD GEORGE.
" R. M. KINDERSLEY."

The Association was formed in the South Internal Section in August, 1916, *and has a present membership of approximately 100. It is gratifying* to know that the savings movement is to be continued under the new title of Savings Associations.

The following promotions in the London Engineering District have been announced during March.

G. E. WEST, from 2nd Class Engineer to Assistant Engineer.

W. L. HARRISON, from 2nd Class Engineer to Assistant Engineer.

G. JAMES, from Skilled Workman, Class II., to Skilled Workman, Class I.

C. J. WILTON, from Skilled Workman, Class II. to Skilled Workman, Class I.

C. F. CLARK, from Skilled Workman, Class II. to Skilled Workman, Class I.

Items of interest (Engineering, Social or otherwise) for insertion in this column should be forwarded early to Mr. W. Dolton, Superintending Engineer's Office, Denman Street, who will be grateful for the co-operation of the Engineering Staffs.

ABERDEEN NOTES.

A meeting of the District Office staff was held in the District Manager's room on Jan. 16 last, to bid farewell to Miss Kate P. Fullerton, F.C.A., on the occasion of her resignation to go abroad. Mr. J. T. Whitelaw, District Manager, occupied the chair, and on behalf of the staff presented Miss Fullerton with a Scotch pearl solitaire ring, and a volume of poetry. Miss Fullerton thanked the staff for their gifts and their many kindnesses which she had received during her period of service at Aberdeen.

A meeting of the District Manager's staff, was held on Feb. 27. Mr. A. L. Barclay, Traffic Superintendent, in the chair, to bid farewell to Mr. J. T. Whitelaw, District Manager, on the occasion of his leaving Aberdeen for Middlesbrough.

Mr. Clow, Chief Clerk, in presenting Mr. Whitelaw with a handsome *smoker's cabinet, referred to the importance of the period during which* Mr. Whitelaw had been District Manager at Aberdeen, and voiced the regret of the staff at parting with him, and their good wishes for his continued success and prosperity. Mr. Whitelaw feelingly replied, thanking the staff for their kindness and hearty co-operation during his term of management at Aberdeen.

The District Office staff held a party on March 6, in the Imperial Hotel, to Welcome Mr. J. H. Storrie, their new District Manager.

An attractive programme of songs, recitations and dances was gone through, and at the tea interval, Mr. Clow, Chief Clerk, on behalf of the staff extended their welcome to Mr. Storrie. Mr. Storrie replied thanking the staff for their kindness, and an enjoyable evening was brought to a close at 10 p.m.

In the recent Honours List appears the name of Mr. J. H. Storrie, late of York, now District Manager at Aberdeen, who has been made a M.B.E., for work done while at York.

ABOUT 90 attended an enjoyable and successful whist drive and dance, held in connexion with the Post Office Engineering Department. Mr. James Fraser, Executive Engineer, and Mrs. Fraser, presided, and was accompanied by Mr. John D. Taylor, Superintending Engineer, Scotland East District; Mr. James S. Harvey, Postmaster, Aberdeen, and Miss Harvey; Mr. J. T. Whitelaw, District Manager, Post Office Telephones, Aberdeen, and Mrs. Whitelaw; Mr. F. E. W. Cowie, Assistant Engineer, Aberdeen, and Mrs. Cowie. After supper, the Chairman, in a racy speech, referred to the progress and advancement which had been made in telegraphy and telephony during the last 50 years, and especially referred to the growth of the Aberdeen Section. Mr. Taylor feelingly asked the company to remember those brave fellows of the Department's service who had given their all for *freedom.*

Whist prizes were thereafter presented by Mrs. Fraser to the following : Ladies—1 Mrs. Dean, 2 Miss Singer; Gentlemen—1 Mr. Black, 2 Mr. R. Anderson. Mr. John G. Dean, the Secretary, on behalf of the Committee, thanked the company for their presence, and expressed the hope that the gathering, the first held in connexion with the Department, would become an annual event.

ABOUT REORGANISATION.

BY H. MORGAN (*City Contract Office, London Telephone Service*).

THE necessity for reorganisation of a general character arises from a variety of causes. The three principal are :

(1) External Commercial or National changes.

(2) Internal modification of procedure.

(3) Alterations in policy.

The need for organising capabilities was never more apparent than it is to day. In the Commercial world this fact is recognised and ability valued and paid for accordingly. It is comparatively easy to organise by proxy, especially if the necessity and responsibility to make "both ends meet," or ensure dividends, is absent.

The exigencies of the National crisis proved this. Unlimited spending, coupled with compulsory powers, made it possible to attract, or compel, men of known organising abilities and acumen, to serve in the Empire's interest and organise its resources for war-like operations.

The absence of ability to carry on without these factors has resulted in a tremendous amount of criticism, consequent upon the failure of many of the schemes promulgated since the cessation of hostilities. While it is appreciated that a large proportion of this criticism has been irrelevant, *and perhaps somewhat unjust, there has been, and undoubtedly is still, ample* cause for constructive criticism.

Civil Servants have recently been publicly designated, by one of our leading Members of Parliament, as the "Cream of the Proletariat," and it was observed that there were no dissentients in the audience when the pronouncement was made. *En passant*, it should perhaps be noted that the meeting was composed of over 6,000 Civil Servants, so it is thought that the adage "Silence gives consent" may have been applicable. Fortunately or unfortunately according to the view point cream is a controlled commodity and it is incumbent upon those who enjoy the benefits derived from it to pay well for them; applying the metaphor — but this is a slight digression.

The Civil Service undoubtedly contains many men with pronounced ability for organisation, but who, in some cases have never "discovered themselves," or who, having become personally aware of their aptitude, can find no outlet for its development, or valuation from a financial standpoint.

It is desired for the purpose of this article to apply it more particularly to the London Telephone Service and the basic principle of organisation as applied thereto can be formulated in the following manner :

Organisation—efficiency without redundancy, *i.e.*, efficiency of work performed, without redundancy of staff, or the necessity for extra duty (overtime.) It necessarily follows that organisation is the amendment, or re-arrangement, of the various organised functions appertaining to the staff affected. It necessitates on the part of the organiser some direct knowledge of the *personnel*, and the particular duties, applicable to the department or branch. The ultimate and complete success of all reorganisation depends upon each member of the staff having a comprehensive knowledge of his, or her, particular duties, and an intelligent grasp of the methods covering performance of the same. Experience indicates that generally speaking reorganisation is carried out from the higher to the lower.

This leads to superficial rather than basal and satisfactory results. If the branch messenger is busily occupied with his proper duties, it is collateral evidence of the fact that the officer, be he clerk, or otherwise, under whom he directly acts, is keeping him busy. It by no means follows however, that, because the chief of a department or branch appears to be busily occupied, all his subordinates are. It is the cumulative effect of the organisation of the small details that secures the desired result.

Standardisation is closely related to reorganisation and serves a useful purpose, but if carried out in too rigid or extreme a manner will have a tendency the reverse of that desired. Lack of success is frequently engendered by a mistaken conception that a big alteration necessarily spells efficiency. It is the analytical mind capable of absorbing a mass of small details that is required in an organiser, coupled with the ability to plan them in their relative sequence, both from the point of view of proportionate importance and general effect upon the régime.

Right here lies the way to successful reorganisation.

Extract from Subscriber's letter—

"I beg to inform you that my troubles in this connexion are practically over as on Saturday I detached it and threw it into the front garden."

"It" referred to his telephone instrument, but—

Alas! he counted not the cost and now accounting trouble has arisen.

PRESENTATION TO MR. D. J. BARNES, DISTRICT MANAGER, GUILDFORD.

AN interesting function took place at the District Offices, Guildford, on Feb. 29, when a representative gathering of the District Office Staff, Postmasters and Engineering Department af the Guildford District met to bid farewell to Mr. D. J. Barnes, on the occasion of his promotion to the York and Lincoln District, and also to make a presentation to symbolise the esteem in which he had been held. Mr. T. Elliot, Chief Clerk, presided and expressed also their congratulatory sentiments on Mr. Barnes' promotion. Mr. R. S. Grosvenor, Traffic Superintendent, made the presentation in an appropriate speech in which a high tribute was paid to the undoubted qualities of Mr. Barnes. The gifts consisted of an old Sheffield plate spirit tantalus and a pair of silver candlesticks.

Mr. T. J. Hickmore, Contract Manager, voiced the general sentiment in wishing Mr. Barnes every success in his new District. The following were also present, and all spoke in similar terms concerning Mr. Barnes. Mr. J. Thompson, Postmaster, Guildford; Mr. J. H. Haynes, Sectional Engineer, Guildford; Mr. T. L. Davies, Postmaster, Aldershot; Mr. E. T. Huggins, Postmaster, Godalming; Mr. H. E. Cockerell, Superintendent, Post Office, Guildford; Mr. T. A. Freeman, Overseer, District Office; Mr. G. Johnson, Assistant Traffic Superintendent; Miss Hillier, Travelling Supervisor.

WAR-GRAVES.

The following copy of a letter received from Lieut. Stiles, of the London Telephone Service, who was in the Service des Tombes, Section Anglais, nosieres en Santerre, Picardie, France, will be found of interest.

YOU will be glad to know that I am getting on very well with my work here and am deeply interested in it. I am at present living in this battered village in one of its battered houses. I am the only British officer in the place and work in conjunction with a French officer who is here for the same work as myself. The country for miles around is searched methodically by means of squared maps for all isolated graves. The bodies are then exhumed and searched for identification purposes and are re-buried in central cemetries which it is my duty to site and plan and record.

The whole countryside is teeming with interest as much of it is in exactly the same state as at the moment everyone "downed tools" at the hour of the Armistice. The trenches with ammunition and bombs ready in their places. Dugouts with the rough beds just as they were vacated. Smashed guns, aeroplanes, in fact all the debris of war, and, of course, the objects of our search, the little rough crosses in gardens, trenches, by the roadside, in fact everywhere just where they were interred as chance had it at the time.

Many villages are difficult to find, and miles of roads have disappeared altogether. At the moment of writing I am sitting in our mess where five French officers and myself have established ourselves. It is what remains of a once magnificent house. We have repaired the kitchen and some of the rooms. The room I am in at the present is panelled in beautifully carved and gilded wood. There is a great marble open hearth on which we burn logs taken from the debris in the trenches. The ceiling is beautifully painted by a well-known French artist, but, alas! shrapnel has torn through it in many places. The house was once the German Staff Headquarters, and over a wonderful mosaic pavement in the hall is about a foot of concrete and railway metals, under which in the cellar below the staff used to shelter from our bombardments. My office is situated in what is left of a three roomed cottage. I have had it covered all over in planks and tarred roof felting and it is fairly comfortable, although the snow has found out come weak spots, and when my stove is lit and the place gets warm the snow melts down through the ceiling and makes things a trifle unhappy for office work.

However, I am wonderfully fit and well with the open air life. I am out all day in my car inspecting my area and superintending the exhumations when these are carried out and the re-burials of the remains found. I have a handful of men with me to do the actual work of exhuming and lifting out the bodies, which I personally search for identification. Such work as I have in the way of carpentering, digging, fencing, building, etc., is done by German prisoners of war.

I could write pages and pages of interesting data but of course I have not the time. However, some day I shall no doubt have the pleasure of recounting much to you personally. I am now perfecting my winter quarters for my men, and preparing for the commencement of a big new cemetery here. Of course, winter is a great hindrance to the work, but there will be much to catch up in the spring when the frost and snow have gone.

TUNBRIDGE WELLS WAR MEMORIAL.

ON Sunday, Jan. 25, a Memorial Service was held at Christ Church, Tunbridge Wells, to the men of the Tunbridge Wells Postal and Engineering Districts who lost their lives in the War. The service, which was very beautiful and impressive, was attended by the Mayor of Tunbridge Wells, Col. T. Kelly, C.M.G. (Surveyor, South Eastern District), Mr. S. C. Smith (District Manager, Telephones), Mr. R. Ramsay (Postmaster), Mr. F. L. Gardner (Superintendent), and Capt. Hannam-Clarke, M.C. (Engineering Dept.). The church was filled by the Post Office employees and their friends. Subsequently a Memorial Tablet, which has been erected in the Public Office at the Post Office, to the men of the Tunbridge Wells Postal District who lost their lives, was unveiled by the Mayor. The tablet, which is an exact replica of the prize design by Mr. Frank Rosier, the sub-Postmaster at Frant, Tunbridge Wells, a copy of which appeared in *St. Martin's-le-Grand* about four years ago, has been beautifully executed by him in massive oak. The names of those who lost their lives (15) appear on the centre of the Memorial, and at the foot, the number of the Staff who enlisted during each year of the War.

The tablet is a beautiful specimen of the art of wood carving, and any member of the Service who is in the neighbourhood should make a point of seeing it. The Post Office has had the honour of association with many people who have become famous in art circles, and the ever increasing number of Post Office servants who become acquainted with the work of Mr. Frank Rosier are proud of the fact that he is our colleague.

The Staff is grateful for the indefatigable efforts of the local War Memorial Committee which have resulted in such beautiful tributes to the memory of our fallen comrades.

PERSONALIA.

LONDON TELEPHONE SERVICE.

PROMOTIONS.

Miss E. E. HAMMERTON has been promoted Assistant Supervisor, Class I, at City Exchange.

Miss E. L. VINE has been promoted Assistant Supervisor, Class I, at Trunk Exchange.

Miss L. L. GIBSON has been promoted Assistant Supervisor, Class I, at Trunk Exchange.

Miss E. H. WIDDINSON has been promoted Assistant Supervisor, Class I, at City Exchange.

Miss G. M. M. JOHNS has been promoted Assistant Supervisor, Class I, at Victoria Exchange.

Miss A. TIMEWELL has been promoted Assistant Supervisor, Class I, at Richmond Exchange.

Miss E. C. MEADOW has been promoted Assistant Supervisor, Class I, at Woolwich Exchange.

Miss C. E. PHILLIPS has been promoted Assistant Supervisor, Class I, at Mayfair Exchange.

Miss I. E. H. GILBERT has been promoted Assistant Supervisor, Class II, at Dalston Exchange.

Miss L. M. COTTINGHAM has been promoted Assistant Supervisor, Class II, at Victoria Exchange.

Miss M. K. WALSH has been promoted Assistant Supervisor, Class II, at City Exchange.

Miss A. L. BURN has been promoted Assistant Supervisor, Class II, at City Exchange.

Miss E. I. STEPHENSON has been promoted Assistant Supervisor, Class II, at Mayfair Exchange.

The following resignations have taken place on account of marriage:—

Miss H. M. DAVIE, Telephonist, of the Trunk Exchange.
Miss H. D. STEWART, Telephonist, of the Trunk Exchange.
Miss D. M. SMITH, Telephonist, of the Trunk Exchange.
Miss A. M. SPENDLEY, Telephonist, of the Trunk Exchange.
Miss L. E. BURROWS, Telephonist, of the Trunk Exchange.
Miss E. G. RICHARDS, Telephonist, of the Trunk Exchange.
Miss C. E. A. GRAY, Telephonist, of the Trunk Exchange.
Miss L. C. HECK, Telephonist, of the Holborn Exchange.
Miss W. H. CHURCH, Telephonist, of the Stratford Exchange.
Miss R. ANDREWS, Telephonist, of the Avenue Exchange.
Miss E. JOHNSON, Telephonist, of the Woolwich Exchange.
Miss E. E. RAWSON, Telephonist, of the Victoria Exchange.
Miss G. J. GRIES, Telephonist, of the Victoria Exchange.
Miss B. F. FREITAG, Telephonist, of the Victoria Exchange.
Miss C. M. BETTS, Telephonist, of the Victoria Exchange.
Miss E. H. MCNEALE, Telephonist, of the Victoria Exchange.
Miss E. M. SHELDRAKE, Telephonist, of the Victoria Exchange.
Miss F. E. WEBB, Telephonist, of the Battersea Exchange.

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PROVISION OF ADDITIONAL TELEPHONE LINES IN THE LONDON ENGINEERING DISTRICT.

BY CAPTAIN J. G. HINES.

A PERUSAL of letters and articles which have appeared in the daily press and the letters of complaint which have been received from the public indicate that much misconception exists as to the work involved in providing additional telephone lines at the present time. The prevailing idea appears to be that in order to connect up a new subscriber, it is only necessary to send out a mechanic with an instrument, a coil of wire and instructions to connect the prospective subscriber with what is vaguely termed a telephone main.

Although all readers of this JOURNAL will be better informed, many may not be acquainted with the extent of the efforts that are being made to give an efficient service to all prospective subscribers. It is proposed, therefore, to give a brief description of the work which has been done, and also some indication of the plans in hand. It will be necessary to say something about the effect of the war on the telephone position in London, and why it is that one year and a half after the armistice there are still numerous applicants who cannot get telephones.

As most of the readers of this JOURNAL are aware, the National Telephone Company's system was acquired by the Post Office in 1912. The wire mileage in use for subscribers' circuits and junctions in London was—

	Open	Underground.
Post Office	7,793	416,716
National Telephone Co. ...	83,193	196,199
Total	90,986	612,915

and the task was at once undertaken of co-ordinating the two systems. This was no easy matter, since, as was inevitable in the growth of two rival concerns, many differences of engineering practice had arisen. There was also a considerable amount of overlapping. In many cases the exchanges of the competing systems were within a short distance of each other, but the areas which they served did not coincide. At first sight this may not appear to be a very serious matter, and in the case of small exchanges, served entirely by pole routes, it is not serious, but when, as in London, the main portion of the line plant is underground, the matter is very serious indeed, as when conduits are once laid they cannot be transferred to meet shortage in another neighbourhood. The capital is buried "right there," as our American cousin would say. It was therefore necessary to make a careful survey in order to ascertain exactly the relation of the existing combined plant to the probable requirements.

The location of each existing subscriber was indicated on a suitable map. These maps were then forwarded to the London Telephone Service where they were marked with the probable development in each building or distribution area. The method of doing this has already been described in this JOURNAL and elsewhere. The development maps and the plans of existing plant were then studied by the engineers with the object of ascertaining how the existing plant could be re-arranged and new plant provided so as to ensure a high grade of telephone transmission at a minimum cost.

There are many factors that enter into this study. The minimum average length of a subscriber's line can be obtained by providing such a large number of exchanges that no subscriber's building is an appreciable distance from an exchange. This method would, however, involve very heavy costs for exchange buildings, equipment and operating since apart from line costs it is more economical to build, equip and operate one large exchange than to divide the same number of lines between a number of smaller exchanges. On the other hand if the grouping into large exchanges is carried too far it will be found that the additional costs incurred in providing subscribers' lines of greater average length will outweigh the reduction in the cost due to grouping. It should also be borne in mind that the increase in the cost of a subscriber's circuit does not vary directly with the length, but increases more rapidly owing to the fact that in order to give a satisfactory grade of transmission, it is necessary to provide heavier conductors for long circuits.

The necessity for junctions also has a very important bearing on the number, size and position of telephone exchanges. If there were only two or three telephone exchanges in London the outlay for junctions would be relatively small, but the cost rises rapidly with the division of exchange areas into smaller parts. Not only is the total number required greatly increased, but the cost per circuit mile is greater owing to the fact that the full capacity of a pipe is not required to carry the small groups of junctions, and no appreciable economy can be effected by the use of smaller pipes.

Another very important point to consider is the period for which provision should be made. The method of determination need not be described here, but it will suffice to say that it involves calculations of the capital cost, maintenance and depreciation of the various classes of plant, and in order to make a proper comparison, finding out the present values of the amounts that would be expended over certain periods.

Separate curves have been prepared showing how each of the above factors vary with different conditions and by combining these curves together it is possible to determine the most economical size of exchange to establish in an area of a particular telephone density.

After the economic size of exchange has been determined it is necessary to decide where the exchange should be located. The ideal position from an economical point of view is that which involves a minimum cost for line plant, but it does not follow that the centre of a telephone area is the best position even if the subscribers are evenly spread over the area. In some cases the majority of the junctions are laid in one direction, and that will give a decided pull to the economic position. A position is ultimately found which will involve the lowest mean cost for subscribers' lines and junctions. In the final determination of this position consideration is necessarily given to practical details such as the accessibility of a site, the character of the roads in the immediate vicinity, the presence of railways, canals, rivers or parks, the location of existing plant and the cost of diversion. The suitability of the site as a working centre for the men who will maintain the plant is also considered.

In order to illustrate the importance of such a study, only the merest outlines of which have been touched upon, it may be mentioned that in a particular case where an exchange was required which would ultimately accommodate 3,000 lines a site was considered which was 500 yards from the centre. After making allowance for the fact that much of the expenditure on line plant would be deferred for a few years, the additional cost for line plant due to the acceptance of this site would have been £3,000, which was above the total cost of a site at the centre. In another case where the site offered was 440 yards away the additional cost was £5,000. In this case the site was accepted as the cost of getting a site at the practical centre would have been considerably more than the additonal cost for line plant.

There is another factor in the case and that is the degradation of transmission due to the added length. In some cases this has to be provided for by increasing the transmission value of the junctions and the cost of doing this is included in the comparative costs.

While dealing with the question of costs the necessity for foresight in the provision of underground plant may be again referred to. Assume that there are approximately 100 applicants for telephones in a street and that without giving consideration to other possible requirements in the neighbourhood a pipe is laid and a hundred pair cable drawn in. The cost of each pair of wires in that cable will be from £15 to £18 a mile. If, however, provision is made for other subscribers in the neighbourhood the lines for whom must pass through the same street, the cost per mile may fall to £3 or even less. In the aggregate, therefore, the difference in cost may amount to a very considerable sum and unless the line plant is laid down on thoroughly sound lines the provision of a telephone service at reasonable rates becomes an impossibility.

If the Department were to attempt to meet all the claims for priority by laying isolated sections of underground work the cost of provision would be greatly increased besides indefinitely delaying the provision of plant for the main body of waiting subscribers.

Before the outbreak of war considerable progress had been made with the work outlined above, and there is little doubt that but for the war there would have been no shortage of plant now except in isolated areas.

At an early stage in the war, however, it was realised that telephones and telegraphs would play a very important part in the struggle and the resources of the cable manufacturers were taxed to the uttermost in order to satisfy the Army demands. The placing of the orders for this material and the supervision of the contracts was undertaken by the Post Office. Not only was it necessary to supply material, but it was also necessary to supply the Army with men fully trained in the work of providing electrical communications and no less than 2,346 workmen went to the Army from the London Engineering District. This represented over 50 per cent. of the construction and maintenance staffs. The writer can testify to the relief experienced by officers when it was found that the signal company contained a fair sprinkling of men from the Post Office Engineering Department, and when it is remembered how vital the telephone and telegraph communications became as the theatre of operations expanded, it is not too much to say that the measure of success due to the efforts of the trained engineering staff was out of all proportion to the number of men employed.

When the Armistice was signed the London Engineering District was faced with a general shortage of wires, owing to the suspension of the development schemes and the absorption of spare wires for special Departments of State and war industries. About one-half of the total number of workmen were still away; the manufacturers of telephone plant had not changed over from war to peace conditions and there was a general shortage of material.

With the return of the first few men from the Army, however, the most urgent cabling schemes were at once put in hand and the Department soon overwhelmed the manufacturers with orders for material.

Owing to the very excellent understanding that exists between the Department and its Contractors it was possible to arrange an order of precedence in manufacture so that the more urgent cases could be dealt with first. Of course every one who is anxious to have a telephone considers his case the most urgent, but the principle of selection was to proceed first with the cables which would allow the largest proportion of demands to be met

During the war period the art of automatic telephony had made considerable advance and this had to be taken into consideration when recommencing the cable schemes. In some cases the cabling schemes would not be materially affected by a decision to adopt automatic working, but in most cases the whole lay-out would be altered as the number and location of the exchanges differ in the two systems. The plans were therefore re-cast so as to be suitable for temporary manual working and also to be satisfactory for automatic working if and when the latter is adopted. The re-casting involved a fresh detailed study of the whole requirements of London, but it was not allowed to interfere with the progress of the work as it was seen at an early stage that certain cabling requirements were common to both systems. The revised lay-out will increase the number of exchange areas in the ten-mile radius from 52 to 125, and there will be ample scope for the cabling engineer in covering this vast area with a network of plant in which the smallest possible amount shall be non-revenue earning and the transmission shall be of a uniformly high standard.

Notwithstanding the difficulties above referred to, especially in obtaining material, those interested in the telephone service will be glad to know that some progress has been made in the provision of additional telephone facilities for the public that we are so anxious to serve. As Mr. Horace Dive has so ably demonstrated, it is useless trying to convince a section of the Press that does not wish to be convinced and would be much more rejoiced at the failure of the Telephone Service than its success.

One hundred and sixty miles of new pole route were constructed in London during the past 12 months bringing the total mileage of pole route to 2,780, and the open wire mileage to over 60,000. (A considerable amount of the open wire acquired from the National Telephone Company has been replaced by underground wire.) Fifty miles of single pipe were laid bringing the total to 3,625.

Over 45,000 miles of underground wires were laid bringing the total to over one million miles.

Over 20,000 new lines were brought into use and over 30,000 telephone stations connected with these lines.

Three temporary exchanges were opened and others commenced. More could be said, but perhaps quite enough has been stated to show that, although the Telephone Service is managed and operated by Government officials, it is doubtful if any industry, at all comparable in size, has made greater or more successful efforts to repair the disastrous effects of the war on its operations.

WHERE THE ARCTIC CABLE ENDS.

BY A. E. THOMPSON (*Cable Room*)

SLOWLY our vessel threads her way through the long, tortuous estuary of the Dvina, where the numerous huge sawmills send their chutes slanting down to the water's edge. The belt of forest inland gleams irridescent in the clear northern sunlight, as though the foliage held, and gave out again, all the glorious hues of the *Aurora Borealis*. But as we clear the last sand-bar there is a sudden opening out of the narrow channel, and immediately we see the great river, stretched out to its full noble width.

Before we can realise that our journey is ended, a ringing cheer rises from a French man-o'-war anchored 'mid stream, and as we respond, a booming hurrah comes echoing from our American and English comrades in the harbour. This was the first impression I obtained of Northern Russia, on a fine September evening, after the dreary and hazardous passage from the Firth of Forth to the White Sea on a packed transport.

Of the peculiar military situation, and the operations during the ensuing winter, when we were struggling against truly fearful odds, I shall say nothing; merely contenting myself with a description of those experiences likely to be of general interest. Meanwhile we have just arrived in that wooden city of the north, Archangel.

To one who expects to find a shanty city, it certainly comes as a pleasant surprise the impression obtained from the ship's deck being one of real grandeur.

It stretches its whole length along five or six miles of the right bank, showing off to advantage the pleasing Russian architecture, the painted facades of some of the buildings, and the rich gleam of the numerous gilded domes and cupolas. Below, runs a tastefully set-out promenade, fringed at the water's edge with slender, graceful birch trees. Disillusion, however, awaits him who leaves this outer magnificence to enter the town itself. Everyone is familiar with the hawker who, with infinite cunning, attracts by placing all his choicest fruit in front of his stall. Similarly all that is best in Archangel is thrust forward along the river bank. Inside there is nothing to balance the long imposing exterior view. It is a magnificently long city, but very, very lean: as typically lean in fact, as the mangy, wolfish mongrels that prowl its slipshod streets.

Troitsky Prospekt, the main street, runs the complete length of the town, the electric tramway, whose single-decker cars rattle their noisy way along its whole length, being the one touch of modern civilisation in the place. The sidewalks, made of rough wooden planks, are barely wide enough to permit of two persons walking abreast. They are raised about a foot high, while underneath a ditch is cut to take the drainage. During the frozen months, this primitive sanitation is not obtrusive; but in summer, the miasma rising from the stagnation beneath scarcely enhances the pleasures of a constitutional!

There were some ghostly-looking shops in the main street and their lack of interest for the shop gazer spoke eloquently enough of the terrible privations the people were enduring. What little buying and selling could be done was enacted in an open market held on the river bank; but such was the condition of things that foodstuffs or articles of clothing had more purchasing power than money. Jewellery, for instance, would be given for biscuits.

Not far from this market, in the main street, the chief Government and municipal buildings were grouped in a large square, where also one finds the fire station and a school. This latter was taken for British Headquarters, and here the small party of wireless men, myself among the number, was billeted for some weeks, before being split up and distributed over the several fronts. From our window it was fascinating to watch all the varied and novel life of the city. Here passed the peasants, their coarse furs mingling with unpicturesque rags, rich refugees from Moscow or Petrograd, striking a

note of distinction; quaint fur-clad children, their felt top boots reaching to the knees, or khaki-clad native police, conscious of their huge swords. All these together with the Russian, American, French and Italian soldiers presented a kaleidoscopic picture. Lumbering along the road would come the log-laden "droshky," while a swift running sleigh would pass it like a flash, with a musical jingle of bells. Often a touch of excitement was added to the scene, when the fire brigade was called out. As the sleighs, with their three ponies abreast, dashed out, the men leaped to their places with incredible agility, two men in particular, one on each side of the driver, leaning out with almost acrobatic skill, brandishing aloft a flaming torch as the animals galloped along.

In marked contrast to this kind of flaming vengeance, was the solemn pomp of the funeral cortege. First came a little white clad girl, carrying an ikon, followed immediately by the priest, gently swaying his censer. Then

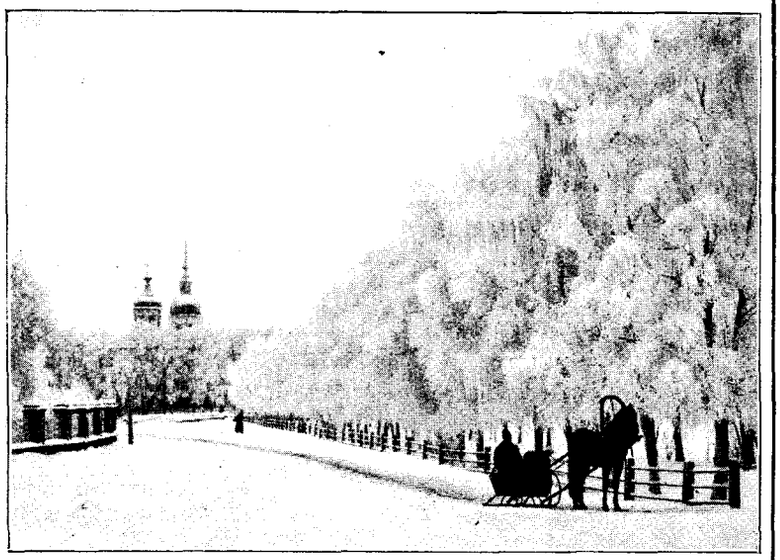

FIG. 1.—A LONE STREET IN ARCHANGEL.

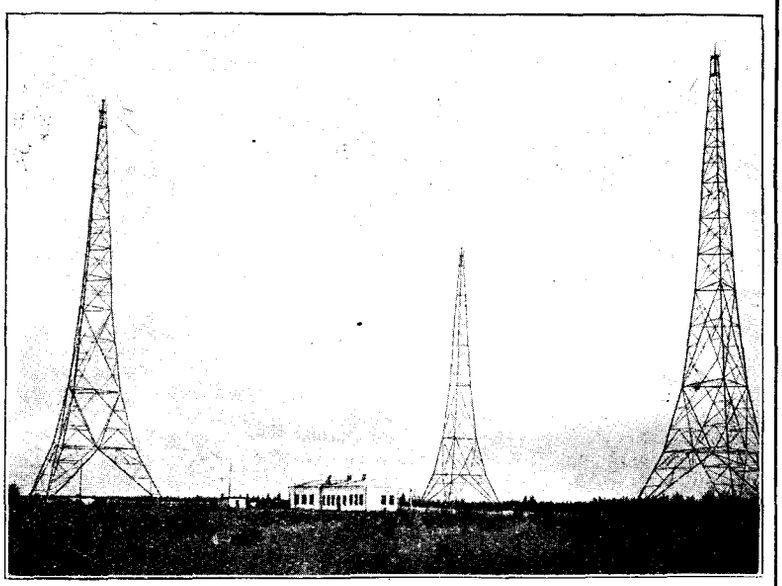

FIG. 2.—ISAKO GORKO WIRELESS STATION.

most odd, two mourners bearing the coffin-lid, leaving the partially exposed corpse on its elaborately carved hearse, to follow behind. The procession ended by the remainder of the mourners, always on foot. Before passing any building with which the deceased had been connected, a halt was made, in order that a hymn might be sung.

Such were some of the sights that excited my interest before I received orders to proceed to Isako Gorko, a few weeks after my arrival. This village is situated across the river, and as it was some few miles inland, I had my first taste of Russian railway travel. Each carriage was of great size, heated by a stove in onecorner, and the whole train could be traversed from end to end. Such was the comfort of the atmosphere however, that English fresh air fiends preferred to sit on the outside steps! This mode of travel presented no great risk, or even exhilaration, for the trains rarely travelled more than a few miles an hour. There was little to see when Isako Gorko was reached but large engine sheds and depressing heaps of debris. The Bolos had thoughtfully collided and smashed engines, lest they should be used by our people. The wireless station on which I was to work, was quite the most imposing structure in this district, with its three massive 315 ft. steel towers and elaborate "umbrella" aerial. There was a fairly efficient 25 K.W. spark set, but none of the latest triumphs of wireless. The Russian operators were not a little impressed by the Marconi receiver with valve amplifier which we introduced. Apart from the work however, the seclusion and monotony of life in this village was terrible, as can be imagined when men walked many miles over the railway sleepers from outlying posts for the sheer joy of joining in the weekly village dances.

FIG. 3.—THE CATHEDRAL.

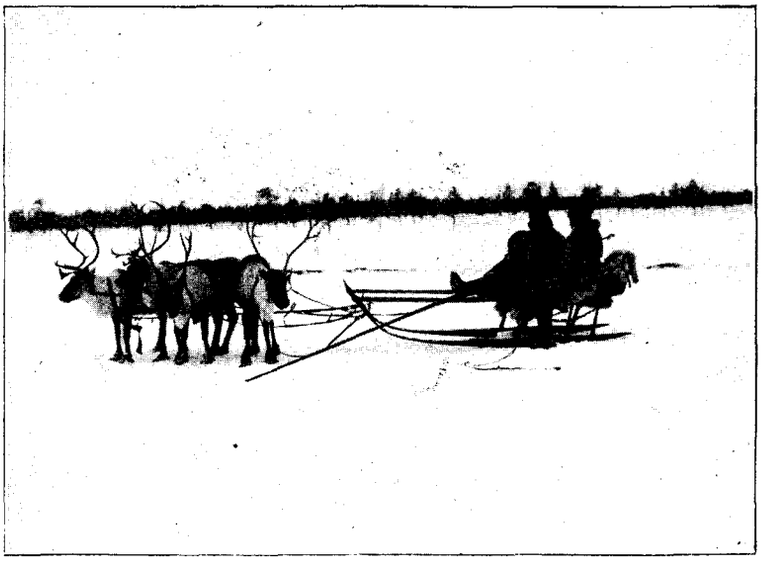

FIG. 4.—SAMOYADS PAY US A VISIT.

These were held in a hall which bore a striking resemblance to the dancing saloons shown in Cinema pictures of the Wild and Woolley West, whilst the small brass band made more blatant noise than I should have deemed possible. The dancing however, was wonderful.

The round dances with their intricate steps and swift motion tried us severely, and the "Barishnas" laughed heartily at our earnest efforts. Fortunately for our *amour propre* we did not understand all their criticisms, for at this period we were still wrestling with the hieroglyphics of their alphabet. Sometimes at these dances a Cossack would favour us with some fine solo work. The Russian Ballet, during its London season, has familiarised us with the regulation Cossack uniform, and I can truthfully say it was no less

picturesque, nor was the dancing less stirring, as I saw it in its crude village setting. The village dancer was perhaps more formidable than his stage prototype.

As the band struck up the first chords of the dance, in he dashed like a whirlwind, cutting a wide circle in the midst of the spectators, who cheered him on wildly. Rapidly he executed the intricacies of the dance, becoming more frenzied every moment, till teaching the climax, he whipped out his revolvers and fired into the roof and floor. I was well satisfied with the view I obtained from the outside edge of the circle; Jazzing seemed to me a hesitation waltz in comparison.

Despite this attraction I was not sorry to be recalled to Archangel after a few weeks for the arctic winter had set in and corresponding hardships commenced. Water for instance, was unobtainable, except by thawing

FIG. 5.—THE SAMOYAD AT HOME.

FIG. 6.—A SAMOYAD FAMILY.

snow; and anyone who has been dependent on snow as a permanent water supply will realise the heart-rending feeling upon finding that a large bucketful, dissolved into but a mere cupful of muddy fluid.

As the Dvina had now frozen, I made the journey back, in an ice-breaker. We were getting but a few hours of daylight, and it was now I witnessed for the first time, the marvels of the *Aurora Borealis*.

The heavens were aglow with a canopy of rich colours, whilst feathery streaks of dissolving hues radiated from the centre to the horizon. Our vessel resembled a phantom ship, in the unearthly light, being encrusted with thick frost. As she ground her way through the resisting ice, the sound was like the booming of heavy artillery and the ship quivered from stem to stern with the shock.

So irresistible was Nature's force, however, that scarcely had we crashed through, before the gaping track was again frozen over, and shortly afterwards sleighs were running over the scarred ice.

The ice-breaker service was abandoned a few weeks later for so thick did the ice become that the railway and also the electric tramway was extended across the river. The great danger now was frostbite. Special instructions were issued in order that the symptoms might be recognised, and the necessary prompt treatment applied. One instance of the native resource in this respect, struck me as decidedly funny. I was walking along the Troitsky Prospekt one day, when a Russian suddenly pointed in horror to my companion's nose, and crying, "Oh, mister, mister," scooped up a handful of snow and vigorously rubbed the affected organ to restore circulation.

On the whole, little personal inconvenience was caused by the intense cold, owing to the perfectly dry atmosphere. Sometimes the air was so keen however, that it was uncomfortable to breathe, unless a woollen muffler covered the nose and mouth, while coloured glasses were supplied for the prevention of snow blindness.

During this season, Prasniks (holidays) seem more frequent than work days. At Christmastide, no work was done (soldiers excepted!) for a fortnight, and during the ensuing months, holidays occurred almost weekly. This Christmas saw much misery and want, and there were few happy faces in Archangel, for Russia was not included in the Armistice. Efforts to provide seasonable little gifts for the children were pitiful. I saw one elderly lady of the upper class present her daughter of sixteen with a pair of soldier's grey socks, that they might be unravelled and re-made for the girl's own wear!

FIG. 7.—THE DVINA ICE BREAKS UP.

On Christmas Eve great activity centres round the Cathedral. This, an imposing edifice standing in the main street, was typically Russian in style, surmounted by five great gilded domes and with two large sacred pictures painted on the façade. The structure of the interior was curious indeed; for there were two floors, services being conducted on each. Such accommodation in fact seemed necessary if all the worshippers that thronged to the cathedral doors were to find room. As it was, when I entered at 11.30 p.m., both floors were packed, leaving a surging crowd outside, but as the service was continued well on into the hours of Christmas morning, there was perhaps, some hope of the late-comers joining the celebration before it closed.

The orthodox church of Russia is the Greek Church, and it does not sanction instrumental music in its churches, while all prayers are recited standing. No seats are provided therefore, and the musical part of the service depends entirely on its fine male choir. Carved images, or sculptured representations of holy subjects are also prohibited; but as paintings (Ikons) of Christ, the Virgin and Saints, are permitted, the walls were literally lined with these works of art, in their lavishly jewelled and gilded frames. They flashed and gleamed richly in the mellow light, for each worshipper held a lighted candle, and the whole made a strange effect in this crypt-like place with its low roof resting on many arches. Facing the people, stood the priest, gaunt and impressive, his great shock of long black hair standing out from beneath his high jewelled head-dress. By his side was a bowl of consecrated oil, and from this he anointed those who came to him, making the sign of the cross on the forehead with a small brush, and embracing each individual. At intervals, some people would kneel to touch the stone floor with their foreheads. This seemed a special form of abasement to me, not being familiar with the ritual of the Russian Church.

It was apparently a matter of great moment to carry home one's candle still alight. This fact was impressed upon me as I watched one frail old lady, shielding her light with a paper bag. The cruel wind however soon extinguished the feeble flame, and as it died, she dropped down by the roadside to cross herself reverently in prayer.

But oh ! Those Christmas bells ! For two whole weeks they were clanging unmercifully, as volunteers came readily forward to keep up the torturing din. When at last they did cease, a strange quiet seemed to pervade the land, and only then did we fully appreciate the message, " Peace on Earth, goodwill to all men."

Few of those who spent the winter 1918-19 in Archangel, will be likely to forget the experience. It was a veritable entombment we endured behind those ice-bound waters, with danger around and about us. We were a mere handful of men in a great community, where it was difficult to know who was friend, or who foe. Even the so-called " Loyal " Russian troops caused much anxiety, keeping us on tenterhooks with their spasmodic outbreaks of mutiny. Many were the nights when all guards had to be doubled, and even men of the Signal Service who had been working long hours under most trying conditions had to be called out at short notice to protect important official buildings.

These disturbances however, did not stop the yearly winter visits of the Samoyads, a people akin to the Laplander, who began to make their picturesque appearance about this time. Every morning from my hut on the banks of the Dvina, I used to see them coming over the ice. Their sleighs were wondrously light, drawn by the graceful reindeer ; and I was fascinated in watching the driver, who, without any reins, controlled his animals by gently tapping their necks with a very long wooden rod. Needless to add, when these quaint folk mustered in the centre of the town, they were the objects of close attention. The Russian women in particular, loved to fondle the quaint babies, funny little creatures, looking like balls of fur and showing only two tiny slits of eyes.

Although these incidents were all matters of curiosity and interest for us, we in our turn, introduced much that was fresh in this barren land.

Amidst all the impedimenta that war brought in its train, not the least object of astonishment was the great aerodrome, finely equipped with the latest machines, and the correspondingly large wireless station adjoining.

These were erected at Kuznechika, on the outskirts of the town ; and for the interest of technical readers, I give the chief features of the station.

It was expressly constructed in order that we might establish communication with Omsk, the headquarters of Admiral Kolchak, and to keep us in touch with England in the event of a breakdown of the Peterhead-Alexandrovsk cable.

The wooden building, about 150 ft. long and 40 ft. wide, had an inner lining 6 ins. from the outer walls, double windows and storm door, in accordance with the necessities of the climate.

The two steel masts, standing 600 ft. apart and supporting a six-wire " Loop Aerial," were 315 ft. high, being erected section by section from a platform which could be raised as the work progressed. Huge flags were attached to the aerial to warn airmen against collision, but despite this precaution many aviators, thirsting for fresh stunts, used to fly deliberately through the great triangle of wires.

A 25 k.w. Marconi arc set was installed, and as a stand-by, a 25 k.w. Naval arc set. Power was obtained from a 30 k.w. D.C. generator, with an output of 600 volts, driven by a 50 h.p. Diesel engine to which it was belt-coupled. The Arc was run off a 600 amp. hour " Chloride " battery of 200 cells, but could if desired, be run direct off the generator. A separate motor generator provided 110 volts for the auxiliary circuits, and a " Lister " 3 k.w. set was used for charging small accumulators for the amplifiers, and also for lighting.

The two sets of receiving apparatus, long wave and short wave, consisted of aerial and tune circuits with reactances, together with a ten-valve amplifier on the long wave, and a two-valve amplifier on the short wave set. Further amplification was obtained by the addition of an army type amplifier using three " French " valves.

To prevent serious interference with other stations, transmitting was restricted to definite periods during the night, when very heavy traffic was handled for Omsk.

In the daytime, Press was intercepted from the big European stations, from which a *communiqué* was made, and published for the information of the troops.

During the summer months much trouble was experienced from " Atmospherics " which often, in the daytime, made reception hopeless.

The transition from winter to summer in this region was peculiarly rapid. The rigid season we had endured, led us to expect nothing like it. There was little or no spring. In what seemed but a few days, the ice split into great rents, and the huge floes began to move seawards.

The bare trees were suddenly covered with foliage, as though by magic, and the frozen country around thawed rapidly into a vast morass, its slime oozing up to the very houses in the side ways. This soon proved to be a breeding ground for myriads of mosquitos ; and we did not take long to find that their antagonism towards us was almost worse than that of the Bolos.

Clamorous were our appeals for mosquito nets, and obtaining them, we not only slept and took our meals beneath them, but also walked abroad more persistently veiled than any Eastern women.

These discomforts, however, could not quench the newborn hope we had of being released now that the thaw had opened up the waterways.

When at last, after months of anxious waiting, we saw the smoke from the first relief boat in June, our joy was absolutely childish in its manifestations. Our delirium soon subsided however and the next few months passed rapidly, as we made preparations for the final evacuation, which had to be delicately handled. The coming of the relief boats had broken up the brooding uncertainty of the months before, and everyone and everything seemed on the move.

Refugees began to crowd the harbour, loaded up with everything they could possibly carry, most of them making for Riga.

It was September, however, before I eventually got away. How different was the manner of our going from that of our arrival ! As our vessel slipped into the narrow estuary of the river, there was no cheering, no exhilarating sense of a task before us, only the knowledge of our wasted efforts.

As we passed through, the clear northern sunlight still lighted up the foliage of the forest, but we had little interest for this sight now, our thoughts were all of home.

Scarcely had we cleared the narrow channel and entered the White Sea, than a huge conflagration broke out in a great timber yard on the river side. Fortunate were we to have escaped in time, otherwise we should have been seriously delayed.

The last impression I had of Russia, was the glare of its burning, for, long after we had lost sight of land, its fiery glow lit the sky, as though to warn us against further interference in the affairs of that tragic land, with its passions and its terrors.

A LINE FAULT.

An accident which was remarkable for its effects occurred on the afternoon of Dec. 12 last. Owing to the breakage of the driving chains of a 3-ton lorry which was heavily laden with timber the driver lost control of his vehicle at the top of Shooter's Hill. Passing a tram which was standing at the cross roads at a speed estimated at 50 miles per hour the lorry collided first with another vehicle in the road and then with a pole on the Department's trunk route. The pole was broken in two places something like a letter " Z " and the head of the pole remained suspended in mid-air being held by about 10 of the line wires which were unbroken. A stay on one of the adjoining poles held well and by using the broken line wires as a stay on the other side further damage was prevented. The broken pole was 17-inches in diameter at the ground line and it carried 46 150-lb. wires. The driver was rescued from under a quantity of timber and was fortunate in having escaped serious injury. The accompanying photograph shows the scene of the collision after some of the debris had been cleared away.

THE BAUDOT.—IX.

BY J. J. T.

Erratum.—P. 117.—For Rule 10 read Rule 1.

LET us suppose that a first equilibrium of our incorrectly adjusted governor is established for the amplitude A^1M^1 (Fig. XXVIII) and that M^1E represents the value of the centrifugal force for that amplitude. If now A^1 *is* the zero point of the centrifugal force the line A^1L will represent the law of the increase of that centrifugal force; the point E will also be a point of the *tension* line since equilibrium is established. Remembering always that for a perfectly adjusted governor the speed should not change with varying amplitudes, let us further suppose that a second equilibrium has been established for the amplitude A^1M^{11}. But A^1L is the centrifugal force line for the speed of the governor with the amplitude A^1M^1 and therefore the *intensity* of the centrifugal force should be represented by the ordinate CF. According to our hypothetical case, however, for this very amplitude (see note *b*, p. 117) A^1C a *decrease* of speed has resulted; thus the centrifugal force is smaller than CF; let us say CF^1. Now as equilibrium is established the point F^1 will also be a point in the tension line which line will now be AR. The point A is, however, the zero point of the tension of the governor springs and should coincide with the point A^1. In effect instead of A being at the centre of rotation it is too near the adjusting-bar, *i.e.*, too far from the centre of rotation, which shows that the tension of the governor springs is too great.

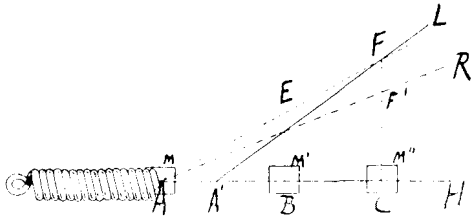

FIG. 28.

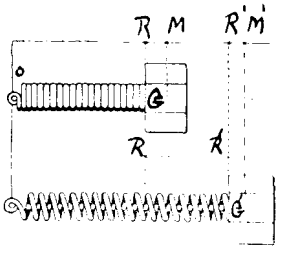

FIG. 29.

It should be readily deduced from this same line of reasoning that in the case where a *decreased* amplitude is followed by an *increased* speed, a similar result would have followed, and again the zero point of the governor springs would not have coincided with the centre of rotation.

Rule 2.—*If the speed varies inversely as the amplitude the tension of the springs is too great.* Lower the adjusting-bar.

Before leaving the study of the governor it should be clearly understood that for simplicity sake in studying first principles the centre of gravity of M (the movable *mass* or brass block of the govenor) has been treated as an unvarying and invariable point. From the very construction of the governor (Article VI) it will be seen (Fig. XXIX) that the centre of gravity of the whole (brass block weighing 36 grammes, springs, &c., about 10) will be found at G when at rest and when the springs are elongated by the rotatory movement this centre will be found at G^1 slightly nearer to the outer edge of the brass block. If, therefore, the elongation of the springs produced by a given speed extends the springs from R to R^1 the centre of gravity of the entire governor system will only be displaced from M to M^1. The proportion between the displacements of the centre of gravity and that of the extremities of the springs which are fixed in the brass weight is nevertheless maintained, and as there must certainly exist a speed x for which the *increases in the value of the centrifugal force* resulting from increased amplitudes follow the same law as the *increases* of the tension of the springs for that speed x, the desired equilibrium will establish itself.

It is further to be remarked that in all that has preceded it has been taken for granted that the governor axle is the real centre of rotation. This also is not strictly true. Actually the total weight of the governor is not perfectly balanced relatively to the axle except when the governor is at rest. As soon as the governor is started and the brass weight begins to pull against the springs there is a slight but natural strain upon the extended axle which tends to bend the latter and consequently to displace the centre of gravity of the entire governor and appurtenances in its relationship to the centre of rotation. The resulting pull causes the extended portion of the axle to bend as the comparatively lengthy extension of this axle is actually designed to do, the centrifugal force developed by the weighty governor exercising a certain pressure upon the bearing.

There is, therefore, an actual distortion of the axle outside the distributor, though this distortion of the axle is relatively a very small one, just sufficient in fact to have the very slightest braking effect upon the general speed.

The main adjustments and some practical hints thereon will, it is hoped, be possible of publication towards the close of these articles, but before quitting the theoretical study of the governor it is well to remember that:

Whatever may be the tension of the springs, sufficient or insufficient *there is always a certain amplitude for which the speed is uniform* and if that amplitude only varies within very small limits one might incorrectly conclude that the governor was perfectly adjusted. We should therefore assure ourselves of the correct adjustment by making tests with various amplitudes.

(To be continued.)

THE L.E.D. BENEVOLENT SOCIETY.

The writer was privileged to be present recently at the annual meeting of the London Engineering District Benevolent Society. This Society originated as the result of the constant appeals which were being made to the men to help fellow-workmen who were in financial distress through no fault of their own. A large number of the men volunteered to subscribe one penny per week to a common fund from which grants could be made in deserving cases. Each case is first investigated by a small committee of the applicant's colleagues, and then dealt with by a central committee which has been elected by the subscribers. During the past year grants amounting to £210 were made in sums from £1 5*s.* to £5, and 156 hospital letters, &c., were issued. The names of the recipients are not published and nothing is done to lower the self-respect of those who are in distress and are bravely trying to carry the burden.

The details of the cases were full of pathos, such as that of a consumptive wife in the Infirmary, the consequent necessity of paid assistance to look after a family of young children, and then a death. Workmen in the Department can hardly be blamed for not having accumulated sufficient reserve out of their wages to meet such contingencies, and a timely grant not only prevents recourse to the money-lender, but is a tangible expression of the sympathy of their colleagues.

With a view to increasing the grants in special cases and in order to enable other deserving cases to be dealt with, it has been necessary to increase the subscription to 2*d.* per week. If any reader would like to become a subscriber or would prefer to make a donation to this very worthy object, Mr. Keane, Denman Street, who is the Secretary, will be pleased to receive and acknowledge the same. Probably no similar fund is administered so cheaply and with such absolute certainty that every case will receive the fullest investigation.

REVIEWS.

The Baudot Printing Telegraph System. By H. W. Pendry. (Second edition revised.) Published by Sir Isaac Pitman & Sons Ltd., 1, Amen Corner, E.C.4. Price 5s.

A most useful and interesting work. The descriptions of the various types of Baudot circuits are very good, as are also the chapters on the distributor and governor, reed and phonic wheel, receiver and apparatus generally.

The second edition is certainly in advance of the first as it contains descriptions of more modern apparatus, &c., though much of the book is given up to descriptions of the older and less used types of circuit. Doubtless the author has in view possible developments and extensions of the system, over long distances, in the Colonies and elsewhere.

On page 135 we read, "All of the Inland Baudot installations of the British Post Office Telegraphs are permanently duplexed." From a students' point of view it might have been well to commence by giving a full description of the most common type of circuit—the quadruple duplex—with apparatus and battery connexions now in general use in this country, and relegate the variations to a later portion of the book. This would enable students to get a thorough grasp of the system before they turn their attention to the more complicated types of circuit.

The book should prove of value to those interested in the system. It has become very well known in the service and the issue of new editions enable it to be kept up-to-date.

LONDON ENGINEERING DISTRICT NOTES.

The Telegraph and Telephone Society.

THE Telegraph and Telephone Society held its last meeting this Session on Tuesday, April 20.

Officers for the ensuing Session were appointed, and it is gratifying to note that Mr. A. J. Stubbs, Assistant Engineer-in-Chief, was elected as Chairman. A vote of thanks was very rightly accorded the Committee for providing such an excellent programme of papers during the past months.

Officers of the Department who do not make a point of attending the meetings of this Society deprive themselves of much pleasure. Pleasure that can be obtained at so little cost is not lightly to be cast aside in these times.

After the conclusion of the business Mr. Shaughnessy, Staff Engineer of the Engineer-in-Chief's Office, gave a most interesting and instructive lecture on developments in wireless telegraphy and telephony. The lecture was given in a very breezy style and was illustrated by some very successful experiments. Those who have experienced the anxiety caused to a Lecturer by the possibility of apparatus failing to act at the critical moment will understand Mr. Shaughnessy's feelings of relief when the audience who were waiting in breathless silence for a distant wireless station to ring a signal bell in the Lecture Hall, were startled by the familiar sound of the bell of a passing L.C.C. Ambulance waggon. Fortunately it was not necessary to claim this as the transmitted signal, as the real one operated shortly afterwards.

Mr. Shaughnessy wisely abstained from worrying his audience with the mathematics of the subject and by his use of homely expressions made his subject understandable to all present. The lecture included some interesting information concerning directional wireless and how hostile aircraft was located and tracked when raids were in progress on this country. The audience was enabled to listen to a telephonic message sent by wireless means from a distant station and amplified in the Lecture Hall by means of thermionic valves. There was a certain amount of modesty on the part of the audience in discussing the subject afterwards. Mr. Shaughnessy was able to give satisfactory replies to the various questions raised, even to that relating to the possibility of communicating with Mars.

Clerkenwell Relief Exchange.

In connexion with the article on the new Clerkenwell Exchange in the last issue of this JOURNAL, the following details relating to the line work may be of interest.

Special cabling arrangements were necessary as the main development schemes for the Clerkenwell Exchange Area are not completed. New cables were run to various points where subscribers' lines could be intercepted. Full size cables were laid as they will subsequently form part of the main development lay-out. Details of the plant provided are as follows:—

Length of 800/10 pr. cable laid	4,714 yards.
„ spare 800/10 pr. cable brought into use...	2,939 „
„ single duct laid	2,979 „

The cables were teed to the working circuits and the tees cut away after the transfers had been made. This was accomplished without causing any faults. Approximately 926 tees were made.

Swimming.

Members of the late Metropolitan Central and Metropolitan South Districts will recollect the activities of the old "Metcen" and "Metso" Swimming Clubs.

Now that the District is again almost at full strength, interest in this glorious pastime is reviving, and advantage has been taken of the fact to form a club—"The Denman Swimming Club," containing the remaining available elements of the old clubs under the Presidency of the Superintending Engineer.

The Club entered upon an interesting programme of events arranged for the present season at the Lavington Street Baths on May 3, and the enthusiasm there displayed is a good augury for the success of the venture.

It may be stated that the programme includes league fixtures under the auspices of the Civil Service Amateur Swimming Association.

There are a few vacancies, and any members of the Staff wishing to join is requested to communicate with the Hon. Secretary, Mr. A. W. Kelly, at Denman Street, as early as possible.

Presentations.

On April 26 the Superintending Engineer made a presentation of the Imperial Service Medal to Mr. C. T. Heath, S.W.1, in the presence of his colleagues, on his retirement from the Service after having served 38 years in the Department.

Mr. Heath has been in the North External Section since the transfer in 1911 and has been in charge of the external fault desk.

In November last Mr. Heath, who was very popular with all the staff, was presented by his colleagues with a gold watch in recognition of the esteem in which he was held.

An aneroid barometer subscribed to by his friends and colleagues in the South Internal Section was presented to Mr. C. T. Head, Assistant Clerk, on the occasion of his marriage. Mr. A. Wright, Sectional Engineer, made the presentation.

Exchange Accommodation.

There is at present very great activity in the District in connexion with the provision of exchange plant. Extensions are in hand at—

Avenue, East, East Ham, Finchley, Hampstead, Hornsey, Lee Green, New Cross, Park, Streatham, Tottenham, Victoria, Wanstead, Willesden.

The new Waltham Cross Exchange is approaching completion. Work is due to start on the new Clerkenwell and Harrow Exchanges in June. Good progress has already been made with the relief exchanges, Langham and Gray's Inn, and the preliminaries in connexion with the relief Tower Exchange are in an advanced stage.

THE PLATT FOUGERE LIGHTHOUSE.

Platt Fougere Lighthouse, to the N.E. of Guernsey, is something unique in the lighthouse line. It consists of a concrete pillar set in the sea. No one lives on it, and it is worked by a submarine cable 1¼ mile in length.

Mr. E. O. Catford, in a paper read at Edinburgh recently, described some of the wonders of this automatic danger signal. They include:—

An acetylene light, turned on and off nightly by a clock.

A compressed air fog signal, with a microphone added, by which the blast rings a bell on shore, thus relieving the engine-room ashore of anxiety during fog.

A pressure gauge which gives warning ashore when only a fortnight's supply of acetylene remains.

A telephone, by which any pilot at sea can call up Guernsey free of charge. This is 50ft. up the ladder, and said to be the only telephone call-box out at sea.

A device which rings three alarm bells ashore if current is not sent every hour, thus preventing the danger of failure through illness or sleeping of the man ashore.

The original cable is made to perform all these various services. The cost of the automatic lighthouse, according to Mr. Catford, was £10,000, about one-eighth of the sum needed for a lighthouse to accommodate men and stores.

Another on the same lines is to be built by the Lighthouse Bureau of the United States of America.—*Star.*

TELEGRAPHIC MEMORABILIA.

JUST a recent flitting reference to "hobbies of telegraphists" has brought requests from correspondents that, after all, out-of-the-way hobbies might have been more fully mentioned, and that therefore their mention should not be wholly excluded.

One of these takes "house-decorating" as a profitable diversion from our craft. "Profitable," it is presumed, when the decorator is at the same time the landlord! Even then this can only so prove, in a monetary sense, when one has made careful studies of *quantities*. There is a standard tale of a telegraphist, who has now left the Service with honour, that being on the look out for bargains he once purchased a remnant stock of wall-paper to cover the four sides of a small room. The price was ridiculously cheap but something had evidently gone wrong with his calculations (he was *generally a very careful officer too!*), *for he found that in practice there was* only sufficient to cover three of the four walls! Judge further of his annoyance when he discovered that the pattern was out of stock and obsolete. There was therefore, no alternative but to purchase another pattern at current price and to fix it over the "bargain."

This may be an example of when a hobby is *not* a hobby. Another official, not many yards from the C.T.O., is always on the look out for odd pieces of metal, and it is said never passes a cast horse-shoe or an odd nail *in the street. He puts these oddments to excellent use however, and the* results may be seen in his little workshop at home in model turbine and other engines.

Yet another finds relief from office strain in the study of geology, combining the latter with lapidary work upon his litholic treasures with cabinet work for their organised and categoried reception. There is also the lover of mechanics, who, not content with holding watch and ward over machine-telegraphy on duty, must needs rig up a synchronising apparatus for all the clocks of his *own household, while another man proudly declares that he derives no small* amount of pleasure from working his wife's sewing-machine. So diverse may be diversions! The last example of hobbies shall be that of a telegraphist whose life interest appears to rest upon political geography. He will tell you the boundaries of new Poland and Old Russia, the peace terms limits of Lithuania, of Latvia (Lettuania), of Esthonia, or of the Corridor where the latest plebiscite is taking place, and the new spelling of Czecho-Slovakian towns. Altogether one of the most useful hobbies conceivable, from an official point of view anyway, and one much appreciated by his present departmental location, *where the new European geography, especially as applied to international* telegraphy, presents itself to the non-geographical enthusiast more or less as something of a jig-saw puzzle.

The Baudot simplex quadruple which recently worked between London and San Remo during the Peace Conference proved extremely useful and very considerably eased the pressure on the three normal direct Anglo-Italian circuits of Rome, Genoa and Milan. It is true that the continental lines were none too steady, and not infrequently broke down altogether for an hour or *two at a time, but as this was known to be due to the faulty conditions* (probably temporary wires) between Marseilles and San Remo, the best was made of matters at both ends of the line, and, considering these regrettable drawbacks, very satisfactory results were obtained both as regards Government and Press traffic.

Let me cite one more example of the difficulty of realising the exact meaning of words in another language and in the mind of another. Presuming that coastal towns on the French side had probably acquired a certain knowledge of our own strange tongue, one of ours boldly sent a note requesting a reply to our call but in the Inland colloquial form of "Attend please." The result was unlooked for, as the inattention continued. Upon finally obtaining the attention of our coastal colleague, explanations of the added delay in replying to the first call were requested when it was discovered that the latter had probably, and quite naturally interpreted the English word "attend" in the sense of his own verb "attendre" which was not exactly what was required.

The possibilties of the foreign telegraphs as a source of income, quite apart from their value as a national asset in their aid of foreign trade, may be gathered from the facts that the Great Northern Telegraph Company recently paid a dividend of over 20 per cent., that this dividend was a normal one to the late Submarine Telegraph Company, and that the traffic figures for 1913-14 between London (Government cables) and the continents were:—Outward 4,287,127. Inward 3,443,865 telegrams. In addition thereto, Liverpool contributed:—Outward 356,783. Inward 284,250, and Dover, a total of 1,284 during the same period.

More swiftly than had been conceived by many, yet by no means so quickly as a minority had hoped, the restoration towards normal telegraphic communication with the continent has come upon us. Troublesome, worrying *and difficult most of these restored circuits have proved, and therefore more* expensive from a staff point of view than in pre-war times, nevertheless the satisfactory point remains, that restoration is a growing fact. Whether all that might have been done has been done or is contemplated may be debateable. The writer is not in a position to judge. Certainly the foreign commercial interests of this country are largely wrapped up in the future efficiency of the foreign and colonial telegraph systems centring in the metropolis, and that is one's chief concern.

A list of the successive *post bellum* telegraphic restorations with the British Isles is herewith given in detail. New communications or increased traffic channels are marked with an asterisk. The war-time military circuit between London and Cologne *via* France and Belgium was handed over for civil use on April 15, 1919. Communication with Brussels was opened on April 17, that with Bruges and Ostend on May 14, The Hague* May 15, and Brussels (Baudot* Duplex) May 21. In August of the same year a four-core cable with Germany was restored, giving communication with Berlin, Emden, Hamburg, and Leipzig, and a Dusseldorf circuit was subsequently re-established after a second four-core cable had been replaced in service. The repair of the latter was followed by that of a third and a fourth would soon prove available if Germany were in a position to co-operate which at present does not appear to be the case. The Engineer-in-Chief's department has therefore been well alive to the need for full telegraphic facilities with our late opponents.

Coincident with these latter additions came that with Zurich and Berne* (the latter on Oct. 16, 1919), Geneva* following in November. On Dec. 16 Rotterdam Baudot* was opened and in April of the present year the quadruple simplex Baudot circuit with Paris Bourse was restored, thus again giving special facilities for Stock Exchange traffic and speedier delivery to the business centre of the French capital. In the same month special Press wires between London and Paris were again leased to British, American and French newspapers. On May 8 Baudot communication with Bale* was *opened by special request of the Swiss authorities.* This by the way it is interesting to note was arranged by means of a Double Baudot Duplex to Paris, the latter forking one receiving and one sending arm to Bale on to two arms of a Quadruple Simplex, Paris also utilising two arms of the Bale quadruple for his Franco-Swiss traffic and two arms of the London double duplex as an additional outlet for the Anglo-French traffic. The mere recitation of these restorations and developments is sufficient in itself to show the urgent need for an increased acceleration all round to meet the needs of British and foreign commerce. It is no secret that Czecho-Slovakia has for *some time been pressing for direct communication with London.* Some increase in the telegraph facilities between London and Prag cannot therefore long be denied. The heart searching queries which we should put to ourselves as an administration and which without doubt is now being posed in the highest quarters are:—Are *we* ready for new developments? Can *we* fully cope with present conditions? Is the staff sufficient? Have *we* enough *efficiently trained* telegraphists actually or in prospect? Have *we* attempted to break with mere tradition as regards the special staff recruitment for these specially difficult communications so vitally a part of the very life of our island?

Disappointments are part of one's ordinary routine in private life; and official life differs little from it in this direction. High hopes had risen in connexion with the Anglo-Continental Telegraph Service which have only been partially realised. The shortage of staff on the continent and a certain lowering of the telegraphic manipulative standard are two conditions which have shown considerable improvement as viewed from this side of the Channel. Alas! that it should appear that against the British side now rests the unfavourable balance.

Sickness, promotions, removals, retirements and practical stagnation in the direction of recruitment for the foreign circuits are undoubtedly at the back of the shortage of staff. The weariness of the flesh too which has provided an unbroken twenty-four hours' service for 365 days in the year has added its full quota. Apart from the heavy personal sick-list there are indirect causes which have militated and are still militating against the highest efficiency and that is the housing question and the ill-health of dependents of the staff. Wives who throughout the war bore the double burden of home responsibilities with the added anxiety of the absence of their nearest and dearest have physically collapsed now that the strain is over.

It is not difficult to find the link between these conditions and a degree of staff inefficiency. Supervision in such cases must above all be sympathetic without being fussy, helpful without undue interference.

Nevertheless we have to come back to the hard facts that at present the British side is less able to meet the continental than it was a few months ago. It is, however, known that the matter is causing no small amount of anxiety in high quarters. All therefore that can be done at present is to ask our continental friends to exercise that sympathetic patience which even during *more stressful periods than these, we upon this side of the water honestly* endeavoured to exercise towards our neighbours and allies. Hope is by no means lost that a NO-DELAY service may yet be established between London and certain cities on the continent, however unpromising the immediate prospect may appear; but it can no more be done without staff than bricks can be made without straw.

Readers of this journal who recently listened to Mr. H. Booker and, or, who read his specially interesting article on his visit to Paris, as well as the host of friends and colleagues he has left behind in the Cable Room will congratulate him upon his promotion to the Traffic Branch of the Secretary's Office. His departure though anticipated, was somewhat hurried at the last moment, but opportunity was taken to present Mr. Booker with quite a small library of interesting books as a souvenir of the occasion and as a token of the high esteem in which he has been and is still held. Mr. Wadley, the Assistant Controller, kindly made the presentation in a neat little speech lacking nothing of sincerity in the expression of personal regret in which so

many of us joined at H. B.'s departure. The latter replied in somewhat halting tones, quite alien to his normal free-flow of the King's English, but those who knew him best could best interpret the feelings which surged deep below and understood that sincerity of regret at the break in years of close friendship and of harmonious official co-operation was not all on the side of those who were to remain behind, still pursuing

"The daily round the common task."

It is but to voice the good wishes of the entire editorial committee to hope that the best results will follow the efforts of those who have recently sat for the Technical examinations (Departmental and "Outside") together with an expression of regret and sympathy for those who, here and there, through domestic or personal ill-health have fallen by the way. To such we realise your courage and feel sure that the same courage will not fail at the next attempt. May better fortune wait upon you.

An advisory commttee of the International Electrotechnical Commission recently met in Brussels and among other matters dealt with the standardisation and internationalising of electrical nomenclature. Regarding graphical symbols and nomenclature the committee affirm that it is most desirable that the national committee "should exercise in their respective countries a moral influence to prevent or to stop the formulation of electro-technical definitions and symbols which would ultimately present serious obstacles to international agreement." It is hoped that these very laudable aims will result in the more accurate settlement of some international standard of telegraphic and telephonic electrical efficiency. As the International Telegraph Convention at present stands the obligation to maintain international lines up to an efficient electrical standard is a mere innocuous expression of opinion and scarcely impresses the reader with its urgent importance.

The very heartiest congratulations to our friend and colleague, Monsieur P Mercy, *de la surveillance technique des installations Baudots à Paris*, upon the appearance of a further edition of his excellent book on the Baudot multiplex system. Already, a number of copies have been ordered and have been received by students in the London office who appear to be particularly pleased with the clearness of the diagrams and the preparatory paragraphs on mechanical and electrical principles. Additional interest was undoubtedly aroused by the personal pleasure of all those who had the honour of M. Mercy's company when he and his colleagues visited London last year.

It is interesting to place on record that the new State of Esthonia has opened over one hundred and twenty telegraph offices for national and international service. The *interieur* service appears to be provided entirely by Morse, but Hughes apparatus is worked on the Reval-Helsingfors and Reval-Riga lines. Communication with Lethonia is established *via* Riga and Libau. There does not appear to be any *direct* circuit between Lithuania and Esthonia, the State of Lethonia acting as a transiting agent.

As a sign of telegraph developments in British dependencies it is stated that a sum of no less than half a million pounds will be spent on telegraphs and telephones in Egypt during the next five years. This, it is understood, is over and above the normal expenditure under these headings.

Anent the alleged "Signals from Mars" and in confirmation of the view recently taken by Mr. Cottrell in the pages of the T. and T. JOURNAL an article in the *Telegraph and Telephone Age* of New York, takes up a similarly sceptical attitude with equally well-ordered logic, and asks, "Who is capable of forming a *universal celestial* code or language?" The writer of the scientific weekly articles in *Everyman* also submits certain discrediting evidences pointing out that Sir Oliver Lodge, Professor Bramley of the French Academy of Sciences, and Marconi himself have all suggested the possibilities of the "Signals" coming from the sun. "Atom," after accentuating the fact that Mars was not at the time at its nearest to the earth, the very moment which any really scientific Martian would have chosen for wireless experiments, and as they would surely have realised that their own planet is nearest to ours, when the former is in perihelion, playfully adds:—"We need not despair. In 1924 Mars will be nearly half as near again," *i.e.*, about 35,000,000 miles!

These columns are not usually open to the publication of remarks on the emoluments of ourselves or of other Civil Servants. Forgiveness, however, will surely be extended to an expression of satisfaction regarding the "necessitous cases of pre-war pensioners" of our own and other public services which have recently received some measure of relief due to the Report of the Committee appointed by the House of Commons. From personal experience many of us have known of the struggle which a number of our late colleagues have experienced, during these last five years' suffering, as was frequently the case from impaired health. To Sir Clement Kinloch-Cooke has been very largely due the success which after long and persistent efforts has crowned this gentleman's efforts on behalf of the weak, and in a number of cases, the helpless ex-Civil Servant. The outstanding feature of these efforts, indeed, has been the disinterestedness of Sir Clement, who spared no pains to bring about the desired result in the face of repeated discouragements.

Quite recently I had the unexpected pleasure of meeting a friend in London, late a member of our own Engineering Department, who is still deeply engaged with and interested in his old twin loves of telegraphy and telephony. He had just "dropped in" from the States and was enthusiastic over the developments of both these branches of Communications in the U.S.A. If my friend is not too sanguine we are far from having read or seen the last word in multiple telegraphy over long distances. On the other hand it was good to hear his high and unfeigned appreciation of the engineering researches during the war due to British Post Office officials. Passing from the greater to the less it was also encouraging to learn with what keenness the pages of the T. AND T. JOURNAL are read on the other side of the Atlantic. Our chat was all too short; a few kindly inquiries; a scientific reference or two touching on wireless developments and *infra-red ray signalling* and we had to quit. So signalling to one another yet a few more amenities we parted company like "ships that pass in the night."

J. J. T.

THE INSTITUTION OF POST OFFICE ELECTRICAL ENGINEERS.

THE concluding meeting for the present Session of the London Centre of the Institution of Post Office Electrical Engineers was held on Wednesday, May 5, at the Royal Society of Arts, and as is customary on this occasion was preceded by the annual business meeting of the Institution.

The chair was occupied by the President, Mr. W. Noble, Engineer-in-Chief, who was supported by Mr. J. A. Stubbs, Assistant Engineer-in-Chief Chairman of the Council, and Mr. J. Sinnott, Chairman of the London Centre. The Secretary's and Treasurer's reports were read and adopted. Commenting on these Major Purves, Assistant Engineer-in-Chief, and Mr. Atkinson as well as the Chairman congratulated the Institution on the steady progress which had been made, and upon the fact that so successful a Session has been carried through. Tribute was also paid to the Managing Editor of the Engineers' Journal, Mr. W. Cruickshank, for his efforts in maintaining its regular appearance in spite of serious difficulties and to the high position which the Institution and its publications held in the Engineering world. A vote of thanks was passed to the retiring members of the Council and the names of the new Council were announced. In addition to the members of the Council and the officers of the London Centre, several Chairmen and Vice-Chairmen of provincial centres were present, including Messrs. Medlyn, Gomersall, J. D. Taylor, Eldridge, Lamb, Turner and Weaver. The business part of the meeting was concluded by the very pleasant ceremony of the presentation of the Institution medals by Mr. Noble. The awards were as follows:—

Senior Silver Medal to Mr. J. G. Hill for his paper, "Phantom Working on Telephone Circuits."

Senior Bronze Medal to Captain B. S. Cohen for his paper on "Telephonometry."

Junior Silver Medal to Mr. J. Hedley for his paper on "The Western Electric Semi-Automatic System."

Junior Bronze Medal to Mr. S. C. Bartholomew for his paper on "Power Interferences."

Mr. A. C. Greening of the London Engineering District then read a paper entitled "Some Notes and Views upon Telephone Fitting Work." Some idea of the magnitude of the fitting operations which form only one portion of the work of the London Engineering District, is shown by the following figures quoted by the Author. The figures cover the year ending Dec. 31, 1919.

Total fitting works comprising exchange lines, private wires, extensions, recoveries, alterations and removals of all kinds	150,018
The labour bill, excluding the cost of supervision, is approximately	£44,000

A considerable amount of other work not included in the above is carried out by the fitting staff, such as re-wiring for maintenance purposes, that due to transfers from overhouse to underground, and the block wiring of large buildings. Interesting details were given of the organisation and control of a Fitting Office and some useful statistics on the subject of the delivery of apparatus to subscribers' premises by motor transport, which is now being tried experimentally in the London District. In this connexion the author described some trials of a similar nature which were carried out by the National Telephone Company 14 years ago.

On the methods of wiring and fitting Mr. Greening had a great deal to say and he is to be complimented on the skill with which he dealt with this portion of his subject. The information which was given was based upon a long experience and should prove of great value to those engaged on this class of work.

In the concluding part of the paper the author pointed out the great importance which should be paid to the training of the prospective fitter, a policy which is well recognised in the Engineering Department of the British Post Office.

The importance of the environment of the worker and a more generous treatment so far as premises and accommodation are concerned was also urged as conducive to better work and feeling among the staff. This last point was frequently referred to by other speakers, some of whom gave amusing personal experiences of engineering accommodation both at Headquarters and elsewhere. One distinguished Superintending Engineer referred to his habitation at one period of his official career in a disused underground wine and spirit vault, the licence of which (the speaker regretted) had been taken away, and where on occasions people would call on the Engineers and ask for "two of gin." The discussion which followed the reading of the paper was full of interest and those present agreed with the Chairman and others in the tributes paid to the author for such a valuable contribution to the work of the Institution.

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Managing Editor - - - W. H. GUNSTON.

NOTICES.

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

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THE ROMANCE OF TELEGRAPHY.

PROBABLY most of us who have lived our lives in telegraphy have failed to realise its romance. It may be that the environment does not lend itself to the sense of romance. Climatic conditions in England, until the appearance of the underground system, tended to provide their own excitements in the way of line interruptions, but we had something to do other than to see the romance which surrounded them. In certain continental administrations there is rather a pleasing idea of putting photographs of the distant office on the wall near to each wire in order that telegraphists may visualise the distant point to which they are signalling. It is one of the curiosities of the telegraphist's work that once he has become accustomed to it he does not realise that his efforts are being reproduced some hundreds of miles away. To him "G W" is a certain amount of apparatus on a certain table in a certain position of a certain large room and not a delightful city sylvanly placed on the Clyde with a rich Buchanan Street and a more or less picturesque Broomielaw Bridge. It is the penalty of our calling. It is the penalty of use and wont. The practical mind would rather have it so. It rather sniffs at the idealist, not without good reason, but it may be that there is something to be said for the idealist and that we need to find a synthesis between the practical mind and the mind of dreams.

Similarly, too, in our relation to the service which we are giving do the public it may be that use and wont operate here also. We to not realise that the telegram announcing death is a messenger of sorrow to someone. All is fish that comes into our particularly wide-spread net and the difference between the code time and the time signalled is our gauge of the work that we do. Here again the practical mind can say something for itself. It can say that it is our business to carry the messages and to keep from undue inquisitiveness as to what the messages contain. An interest which may seem to be sentimental is not regarded as practical. On the other hand the earliest students of the economics of telegraphy were intensely interested in the scientific study of the nature of telegrams; an old book by one Lardner, which may be purchased for a few coppers at a bookstall, gives very precise figures for the year 1855 with a division of telegrams into social, business, sport and other categories. It would be intensely interesting to be able to compare similar divisions year by year and to reach some well-founded conclusion as to the exact influence which telephone rivalry has exercised, and the exact influence of reductions or of increases in the tariff both as regards local and long distance telegrams.

These ruminations, leading nowhere in particular, are not without point when we are back again at the shilling tariff. The increases in the charges which are about to be introduced will have some influence on the traffic, but it would be a hardy prophet who would estimate what that particular influence will be. It may be that a shilling has long ceased to be a shilling. It may be that a penny a word will encourage the useful art of abbreviation—a useful art indeed, but a particularly unwelcome art if it abbreviates the address so much as to add difficulties in delivery. It would be an interesting conjecture whether telegrams occasioned by casual social events will feel that the breaking strain lies somewhere between ninepence and a shilling, or if the commercial world will discover some means of reducing its use of the telegram. The new Sunday tariff may have developments of its own and may do something to safeguard the dominical day. All this may seem to be not very exact prophecy; frankly it does not pretend to be prophecy at all. It is only exact in that it shows that none of us can foresee the influence of the new tariff, but that all of us see very good reason to keep our hearts up.

HIC ET UBIQUE.

IN order to meet the estimated deficit of 2½ milliards of marks in the German Postal budget it is proposed, according to the *Berliner Tageblatt* of April 18, to raise the cost of postage, telegrams and telephone service. A distinction will be made between local and long distance telegrams and the minimum charge will be 2 marks (2*s.* in pre-war currency) for 20 words. Telephone rates are to be raised 100 per cent. and possibly more in the larger systems; in addition a capital charge will be made to all telephone subscribers of 1,000 marks (£50) for every main line, and 200 marks (£10) for every extension. This charge will take the form of a loan to the Government which is repayable when the subscriber discontinues the telephone. The Bavarian and Württemberg postal and telegraph systems which were independent of the old Imperial postal administration have been ceded to the State, and the former receives 620 millions (marks) and the latter 250 millions in return.

TELEPHONIC communication between France and Germany was established on May 1.

ON Saturday, April 24, the first Cup Final since 1916 took place on the ground of the Chelsea Football Club at Stamford Bridge. The telegraph arrangements for dealing with the message traffic consisted of 1 Wheatstone Duplex circuit to T.S. and 3 Y.Q.

circuits. Direct communication was provided to the following places :—Bristol, Newport, Cardiff, Birmingham, Preston, Manchester, Liverpool, Huddersfield, and Glasgow. The whole of the operating staff was supplied by the South-Western Postal District of the London Postal Service. This is a new departure so far as these events are concerned and was made possible because so many of the staff acquired Wheatstone experience during the war. The working of all stations was good; no faults occurred and everything passed off satisfactorily.

THE *Daily Express* reports a new "Telephone Horror" and the *Evening Standard* a "Telephone Terror." The former refers to an order given by the Postal Administration in Berlin for 200 sets of a new apparatus by which sixteen different conversations can be carried on at the same time on one wire. We have no details of this particular apparatus but no doubt it is similar to other multiplex arrangements which, if found satisfactory and economical on a large scale should effect a notable saving in line plant. We imagine that our contemporary has in view some arrangement by which the telephonic conversations of opticians and undertakers, lovers and laundresses, fishmongers and philatelists, stockbrokers and Sunday School superintendents are hopelessly and humorously confused.

THE *Evening Standard*, however, refers to an American device to economise labour. Every important man in a certain shipyard, for instance, was given a code number. If not in his office when the telephone operator calls him up, the code number is sounded by a "Klatometer." Horns, bells and alarms are automatically set in motion. Amidst the pandemonium the wanted man, we are told, rushes to the nearest telephone. This does sound rather dreadful. From a Klaxometer is but a step to a "Klaxophone," and this at once reminds one of those music hall artists who sit on the stage surrounded by a battery of fearful and novel instruments to which the audience have to listen knowing that not by any chance will the artist leave the stage until he has performed on them all.

MOCIMBOA TO PORT AMELIA, 1918.

(*Notes from a Diary by* W. M. KNIGHT.)

THE following notes from Mr. Knight's diary contain a report of a trek of 180 miles in Portuguese East Africa during the rainy season of 1918 for the purpose of making good the Portuguese telegraph route. They contain many interesting outlines of extraordinary difficulties overcome and of the progress made. It will be seen that lions, zebras and hippopotami enlivened those swampy solitudes :—

April 15th.

Left Mocimboa 9 a.m.
Material, G.I. 400 lb.; miscellaneous bolts; hop poles.
Twin line to point 4 miles out. One line terminated at edge of large basin swamp.
Dense bush to this point. Cutting trees whole distance.
Line through sea swamp, fairly substantial.
River 18 feet wide—water bad—mud a foot deep and very difficult.
Mile 5½ leave swamp, and resume in bush.
Lusoma, first halt, approximately 9 miles. Line quite clear from 5½ mile point.
Trees cut for poles, 6.
Good water at this "village."

April 16th.

Line in close proximity to overflow of sea—fairly clear.
Name of district, Hooloo.
So far poles set in wet sandy soil.
Replaced many insulators—reset poles—and fixed stays.
Wet sandy swamp from Lusoma—passing unknown village, approximately 15 miles.
2 p.m., exchanged sigs. with Mocimboa. H.Q.—Good!
Still wet sandy soil—and sea swamp.
Arrived Luceta; and camped for night.
Small river—water brackish—very salt flavour.
Road absolutely impossible for transport, owing to sea swamp.
Telegraph line still close proximity to sea, much evidence of corrosion, due to sea atmosphere, iron binders eaten through.
When not a "track"—merely a swamp. No drinking water here.

April 17th.

Still in swamp (Luceta).
Left camp 7.15 a.m.
About ¾ miles heavy swamp—then bush, which was fairly clear, about 15 feet each side of line up to mile 21. Country then more open—then swamp, swamp, swamp, till reached small river, about mile 21½; very difficult crossing, water fairly good, might be better.
Low-lying sandy swamp, distinct signs of sea-shore—plenty of brushwood washed up—small submerged bush between line and sea.
Very difficult for Safari (trekking), men much exhausted before reaching Marere—approximately miles 29.
So far line set in sandy soil, and poles water-logged.
At mile 28, gauge alters from 400 G.I. to 80 lbs.
Jumbi (head man) reports sea 2 miles away.
Lineman's post for Native, might be at Luceta—no water there for European.

April 18th.

From Marere to half a mile, very difficult swamp crossing—15 feet wide—about 5 feet deep, water bad—then two miles waterlogged.
Dense bush in two hours, reaching Msalu River, which was crossed in native "punt," taking 8 porters and load—very strong current. River 45 to 50 feet wide.
Then mud swamps, and wet sandy soil to 1½ miles from Kwiterajo.
Most of day practically under water.
Grass 16 feet high, with 2 feet water underfoot.
Two other rivers crossed to-day—not on our map.
Trekking very hard work.
Approximately reached 38½ miles.
Kwiterajo on main line—switch system, on Inker Sounder.
M.B. and P.A. direct.
Up to middle in water, when not up to neck, most of day.
No place for white man between Mocimboa and Kwiterajo.
For several miles no track beneath line.
Most poles waterlogged—made good.
Line Mocimboa—Kwiterajo made good—test "all clear."
Kwiterajo, on non-polarised, intermediate Inker Sounder, (Automatic Tel. Co., Liverpool), makers.
R. Msalu has half-a-dozen mouths, all about same width, and extremely difficult. Many hippopotami here.
Kwiterajo—a Portuguese trading station.

April 19th.

Leaving Kwiterajo, at "sun-up"—line through bush fairly open, sandy soil—many poles re-set for 2 miles—then low stretches swampy bush, about 3½ miles out.
Gauge of wire, again 400.
Line now through extensive bush swamps, tall grass, very difficult travelling. Water averaging 3½ feet deep—and bad.
Now varied by occasional soft sandy tracks.
Line practically set in canal for 7 miles—knee deep.
River good water about 3 miles back from Ingoane (not on map)
Approximately 50 miles.
Place alive with mosquitoes and other insects.
Many animals at night in bush. Lion close up.

April 20th.

First two hours in a deluge—worse than usual.
Bush swamp for approximately 2 miles.
Reached small village, on shore, Utango.
Small Island in view.
Another 3 miles of bush swamp.
Telegraph line set in swamp for approximately 5 miles.
Line now through bush country, very dense, alternatively with small stretches of grass swamp.
Crossed several small rivers with good water.
Reached Mcojo after Safari of 7 hours.
Approximately 60 miles.
Mcojo, stands high.
Instruments—Inker-Sounder—and a small commutator.

April 21st.

Rested at Mcojo. Considerable fatigue of natives.
Day given to washing, &c., and re-adjustment of loads.

April 22nd.

Left Mcojo. Country very thick bush for 10 miles—no swamp—much clearing necessary—poles reset, and cut. Bases eaten away by ants. Many insulators replaced, date. Tree cutting the whole distance.
Approximately 10 miles from Mcojo, reached swamp and river, apparently a mouth of the R. Quirinacona.
Unable to cross, being 12 to 16 feet deep. Strong current flowing. Made several attempts to swim across—failed!
Returned ½ mile out of swamp to make raft and camp for night.
Unable to gain either Station—Portuguese working, and line O.K.

April 23rd.

Endeavoured to improvise raft, and wire span across river.
Made two rafts, which sunk, wood had no buoyancy.
Succeeded in swimming across with wire. Heard from natives of an "English planter, 3 miles on other side of river."
Lineman sent to him for boat, that also useless, owing to the many lengthy channels forming huge Delta, with swamps between.
Channels very deep.

Later.

Obtained from this planter, two native guides, who arrived at 4.30 p.m.
Too late to move off to-day.
Guide from Mcojo, absolutely useless.
Trying an alternate route to-morrow.
Water from rivers fairly good.

April 24th

Forced to make detour of 4 or 5 miles, and reached Mgobi, and another river, viz., Mangomara. Continued detour for another 3 miles and reached Mpande (Planter's place), water all the way underfoot, and raining in torrents.
Working party returned along telegraph line, proceeding light for swimming—had to swim 4 rivers—made line good and returned.
Safari moved off in direction of Kisanga at 2.30 p.m.
Many poles re-set in sandy soil, much tree cutting, and insulators renewed
Country from Mpande, wooded escarpments, alternatively with high tide sand swamps.
Line fairly close to coast.
Made camp approximately 6 miles from Mpande River—water good
All men greatly fatigued.
Many zebra this district.

April 25th.

Left camp 6.30 a.m.
Much tree cutting for 1½ miles, then huge swamp to approximately 7½ miles from Mpande. Here another very difficult swamp crossing, 3 to 4 feet of mud.
Later, country same as yesterday. Much more tree and bush cutting, reaching another swamp Memba, 4 or 5 feet of mud So far the worst swamp for Safari.
Mud swamp still on, 10 miles from Mpande.
Swamp finished, now in extremely dense bush, much tree cutting, reaching another swamp, which unable to cross, owing to depth of river channels.
Swamp here apparently subject to high tides.
Had to secure assistance from local native and make big detour, eventually picking up line approximately 12 miles from Mpande.
Working party sent back on line, made good in swamp, and proceeded in direction of Kisanga.
At approximately mile 12 from Mpande, telegraph line on wooded plateau, travelling now good, but much tree cutting, re-setting and cutting of poles.
Insulators now finished.
5.45 p.m., made camp at Kisanga.
No hospitality here from Portuguese official—not even a glass of water or cigarette offered.
Apparatus :
1 B.O. (Island)—Kisanga, Inker. Also Inker, intermediate P.A.—M.B. line. IBO—Kisanga can be brought in cct. on a commutator, on P.A—M.B. line.
Telephone from Office to Bungalow of Chief of Fort.
Earlier in the day 2 hours were occupied in extricating whole party from mud into which we had sunk nearly up to armpits.

April 26th.

Left Kisanga, line through thick bush for 4 miles, then across high tide sand swamp, and occasional deep mud swamp.
Much tree cutting, but Safari progress good.
Arrived Mahati, and picked up 11 bags of beans from Portuguese store, for porters.
Approximately 7 miles from Kisanga reached river, made fair crossing, 5 feet deep, 20 yards wide, named Montepusi, good water here.
Many Siemens' poles and bases and brackets with clip, similar to "Buller" type.
Made camp 9 miles from Kisanga.
At night found many mosquitoes and ants making sleep impossible.

April 27th.

Left camp Nmanyi, which was very unhealthy and swampy. Water bad, this extends for 6 miles with one large river about 1 mile after leaving Nmanyi, which we swam across and erected a wire span for non-swimming natives. Much water here, necessitating big detour. Also much mud, 5 feet deep, which extended about 8 miles. Then entered low lying wooded country, more or less under water.
Much tree and tall grass cutting.
In this section, Kisanga-Arimboa, many Siemens' poles, as before described. Not sufficient indication to show whether iron route or merely to strengthen route by iron poles.
Reached Arimboa. Long stretch of tidal sand swamp, with much evidence that this section has been an iron pole route, but owing to inroads of the sea, poles have corroded and been eaten through, only the bases remaining. Replaced by wooden poles. Occasionally a good iron pole still standing.
Made camp approximately 4 miles beyond Arimboa. Apparently no good water near line, till this point. Good drinking water here, probably rain-water.

April 28th.

Much deep mud *en route* to-day.
Left camp, 6.30 a.m.
Progress for all, good.
Re-setting poles and much tree and bush cutting.
Line through wooded escarpments and inland tidal sand swamps.
Mixed route—iron and wood line.
Approximately 10½ miles from Arimboa line through wooded country only.
Mostly tree attachments—very few poles.
Much tall grass and tree cutting.
Also regulated wire in large spans, from escarpment to escarpment.
Made camp approximately 16½ miles from Arimboa.
Last 9 miles, no drinking water and none in camp.
Camp situated near sea shore.

April 29th.

Left camp, sun-up.
Country similar to that of yesterday.
Line with tree attachments.
Tree and grass cutting.
Good water still scarce, approximately 20 miles from Arimboa and still no good water.
About ½ mile forward we found a small rain pool good enough to drink, but a decidedly "salty" flavour.
Left escarpments for tidal sand swamps.
Line approximately 1½ miles from Bandari, iorn route till near latter station, then continued on fairly heavy wooden route, carrying "local" lines to Mtuje office.
Many insulators Kisanga—Mtuje require replacing.
Made approximately 17 miles in the day.
Several very trying wet patches *en route.*
Safari greatly exhausted and several sick.
Maps are useless as an indication of telegraph line distance.
Large amount of rations ruined by frequent immersion in sea water.
Arrived Mtuje for Port Amelia.
No place suitable for white lineman *en route.* Quite possible to place a reliable native lineman.

April 30th.

Mustered the Safari prior to marching back to Mocimboa.
Special praise due to Sapper Mullins who accompanied me, and to Corp. A. Bunker who took us in hand on arrival at Mtuje.

PRESENTATION OF IMPERIAL SERVICE MEDALS.

Members of the Engineering Testing Branch (Instruments), Studd Street and Holloway, met on April 23 to honour Messrs. Coleman and Franklin on their being presented with the Imperial Service Medal.

The occasion was an eventful one as it was the first time the Imperial Medal had been bestowed on a member attached to this Section, and full advantage was taken to show the appreciation which the bestowal of the medal gave.

Mr. Henley, in making the presentation, spoke highly of the past services of the recipients and, in wishing them a long life and good health to enjoy it, referred to the fact that only to those who have a record of 25 years' unblemished established service was given the decoration. The two officers receiving it that day had well exceeded the limit, Mr. Coleman having spent 33 years, and Mr. Franklin 31 years in the Departments' service.

"Faithful" was inscribed on the medal and he was sure that the word was a fit and proper one to use in connexion with their past work. During their service many changes had taken place, but their efficiency and expert knowledge had enabled them to keep abreast of the times. They had always taken great interest in their work, and were retiring into a well earned rest, accompanied by the good wishes of all.

Messrs. Chapman, Barker and Hook expressed the good wishes of the staff and opportunity was taken to point out the cheery optimism of the recipients of the medals during the anxious times of the last few years.

Mr. Coleman, in reply, after thanking them for their kindness, said he would always remember his time with them, and the good things that had been said of his past career.

Mr. Franklin also expressed his thanks.

THE IMPERIAL CABLE.

THE OTHER END.

BY P. O. MOLLAND.

HALIFAX, Nova Scotia, is beautifully situated on the western shore of the third best harbour in the world. The main streets of the town run parallel with the harbour, Barrington Street being the principal thoroughfare.

At the mouth of the harbour lies Macnabb's Island, which is about two miles long and half a mile in width, dividing the entrance into two channels. This island, with its fortifications, offered ample protection to vessels entering and leaving Halifax during the war.

After running inland in a northerly direction for about two and a half miles, the harbour opens out into what is known as Bedford Basin. This magnificent stretch of water is roughly eleven miles long and five miles wide at the widest point. It is very deep, subject to very little tide, and offers a splendid anchorage to all classes of shipping, being capable of holding at any one time the combined fleets of the world.

During the war the Basin was of utmost importance, as all vessels sailing from America to Europe were obliged to come into Halifax for naval escort.

At a point about half a mile from the entrance to Bedford Basin, the harbour narrows down somewhat, but is sufficiently wide for the largest ships in the world to pass each other. It was at this point (the Narrows), however, that the collision between the French munition ship *Mont Blanc* and the Belgian relief ship, the *Imo*, took place, with the consequent terrible explosion, which caused so much loss of life, destruction to property, and misery to the citizens of Halifax.

Fortunately none of the Post Office staff at Halifax were seriously hurt. Some of them, however, suffered pecuniary loss, but no mention was made of that fact, as we all thought we were extremely lucky to come through the ordeal unscathed.

The writer will now venture a brief description of this terrible affair.

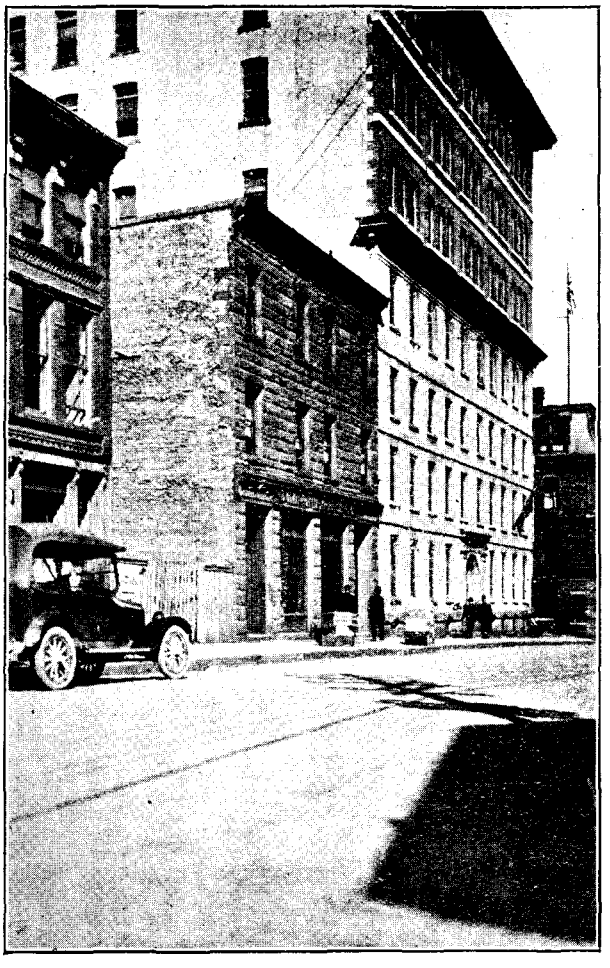
It was a beautiful sunny morning, December 6th, 1917, 9.5 a.m. All was peaceful and many people were at their respective offices, whilst others were on their way to perform their daily work when the explosion occurred.

The munition ship had collided with the Belgian relief ship at about 8.45 a.m. The former at once caught fire. The crew, knowing their peril, drove the ship toward the shore and summoned the fire brigade, who were innocent as to their danger. In less than five minutes the firemen were at work. Hundreds of people whose homes overlooked the harbour were at their windows—in many cases with their children—watching the 'ship on fire.' Others made for the spot out of idle curiosity, when, without the slightest warning, the catastrophe occurred, and it is safe to say that not one of these innocent onlookers escaped with their lives.

The confusion, the uproar, the abject terror of the population baffles description. Shortly after the explosion occurred, orders were issued by the military authorities for everybody to evacuate the town, as the munition dump was in danger of catching fire. This order alone cost many lives, as those poor unfortunate individuals who were trapped in their homes through falling beams and the like were left to be burnt alive, whereas they might have been rescued.

Sailors from American ships in the harbour, however, immediately came ashore and did wonderful work, regardless of their safety.

The scenes after the military order to evacuate the town reminded the writer of Lord Lytton's book, "The Last Days of Pompeii," wherein we read of the panic-stricken population running away from the boiling lava of Vesuvius.



THE HALIFAX N.S. CABLE BUILDING.

In Hollis Street especially (a main thoroughfare), women and children, maimed and covered with blood, were rushing along in abject fear, not knowing whither they were going.

In the evening of this eventful day (which will be riveted in the memories of all people who went through this terrible affair) came the blizzard. Thirty thousand people were homeless. The hospitals, churches, music halls, and every available building were full of sufferers. All these buildings were more or less damaged. The gale blew down most of the temporary boards that had been placed in the windows, and in came the snow. It was a fine, powdery snow, quite common in Canada, and difficult to keep out in ordinary circumstances. The snow made its way into the various buildings, making rescue and medical work most difficult. As to the homeless, many were under canvas on the common. Others were housed in military establishments, but these were inadequate for the needs. What an awful night for these poor homeless people! In the hospitals, even under these trying conditions, operations were performed, in many cases without chloroform, as in a few hours all medical necessities were exhausted, and there was no hope of relief for days. Then the danger of famine threatened. All shops were smashed, and no business was being done. The only thing was to hope for the best. Fortunately at Boston (Massachusetts) the people acted with great promptitude. Even before they knew actually what had happened at Halifax, they were preparing a relief train—they knew it must be serious. Nurses, medical necessities, food, and clothing were on the train, which had actually started on its way to Halifax before the details of the affair were known to them.

It was forty-eight hours before this train arrived.

The blizzard itself was responsible for many lives being lost, and it certainly did seem as though some evil power was trying to add to the agony and sufferings of the poor innocent victims.

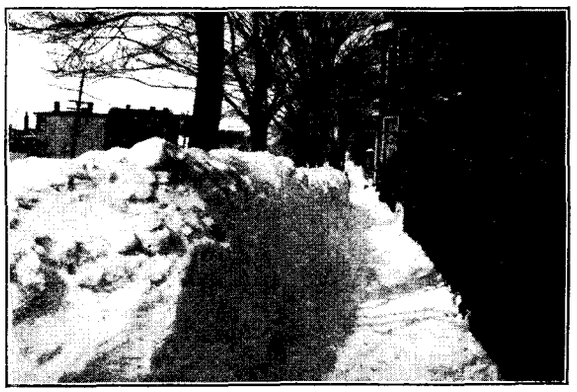
The writer could give many instances of bravery, many instances of fortitude in agony, and many cases of people who helped their neighbours at the expense of their own lives.

To crown all, the funeral supplies were inadequate, and there were no gravediggers, which meant that the bereaved relatives had to dig the graves (assisted by as many volunteers as were available) of their own relatives. Much could be said here of the good work of the military in this respect, and many others. We will not dwell any longer on the explosion.

Hitherto the writer has not mentioned what is known locally as the North West Arm. This is a stretch of water—an inlet of the sea—having the appearance of a river.

It runs at an acute angle to the harbour, the two comprising a letter V. The "Arm" varies in width from two hundred yards to half a mile. Any part of this waterway can be reached from the town in a few minutes. The town is, however, hidden by an abundance of woods, which abound on both shores.

It is about three miles in length and offers many attractions to those who care for aquatic amusements. It boasts five boat clubs.



NEAR THE CABLE STATION.

The woods offer many attractions for picnic parties, the rambler, and even the hunter. The numerous lakes near by the town offer attractions for the angler, who can have as much fresh and salt water fishing as he requires, there being no restrictions.

The town at one time was a popular holiday resort, but the roads and lack of development in the town itself now keep many visitors away.

It is at the mouth of the North West Arm that the Imperial Cable lands.

Now and again a glimpse of the cable hut can be obtained from the water, but it is almost surrounded by fir trees, which abound in this part of the town. The hut is actually situated in what is known as Point Pleasant Park—a beautiful natural park—about which at one time the best residences of the town were situated.

During the last few years, however, the Halifax ocean terminals have been under construction, and consequently this part of the town has been spoilt from a residential point of view.

The cable hut itself is roughly two miles from the office, which is situated in the Dennis Building, a fine seven-storey stone building considered by many to be the best in the town. The cable is brought underground from the hut to the Dennis Building. The office is on the first floor. On the ground floor are two of the connecting administrations, viz., the Bermuda Cable Company and the Canadian Pacific Railway Telegraphs. The latter company, with the Western Union, control practically all landline telegraphs in Canada and the United States.

The "All Red" route to Australia and New Zealand is now common knowledge, as the Imperial Cable is the last link in the system of state cables to the South.

It is not generally known, however, that the Imperial Cable was formerly the German-owned Emden-New York Cable.

The writer will not dwell on the events which led to this latter cable being brought in to Penzance and Halifax respectively, and

NORTH WEST ARM, HALIFAX, N.S.

the construction of the landline from Halifax to Montreal. The latter town being at that time the terminal station of the Pacific Cable Board's system.

At Montreal, in these days, the work for the United Kingdom was handed to the Atlantic companies.

Now, in conclusion, we will briefly allude to the working of the "Imperial Cable." The first thing one must endeavour to do in a cable office is to try and forget one's landline experience.

The working is different; the system is different; and many things happen which take place in a landline office but are dealt with in an entirely different way. The great thing that one has

IN WINTER.

to remember is that a cable is a thing of utmost importance to the sender and receiver. It is highly-paid traffic. Accuracy is the main factor, as most of the traffic is in code, and is retransmitted many times. The efficiency of a cable service depends entirely upon this factor. The working, however, of a cable is slow compared with landline telegraphs, and errors can be reduced to a minimum.

When the cable was first opened many difficulties were encountered, but gradually these were overcome, so much so that to-day the Imperial Cable service is one of the most efficient in the world, and, what is more, it is entirely British.

Photograph by W. A. Sullivan, Leytonstone.

REGENT EXCHANGE FANCY DRESS DANCE.

an old English part song. These items also met with the enthusiastic appreciation of the audience.

On the business and artistic sides respectively the concert was a personal triumph for Messrs. Pounds and Marleyn.

Accounts Branch.

Miss Kirkaldy, Woman Clerk, Class II, after having spent 10 years in the L.T.S. has resigned and sailed to Australia where her marriage will take place. During the major partion of her period of service she worked in the Directory Section and during the War was attached to the Controller's personal staff. She was popular with everyone and as a parting gift she was presented with a case of Treasury notes value £9 and an autograph album containing numerous signatures including that of the Controller.

Contract Branch.

We regret to announce the death of Mr. S. Christie of the Contract Branch which came as a shock to most of his colleagues. He failed to resume duty after a week's leave on April 12, and died on the 1st ultimo. Mr. Christie was 47 years of age and entered the London Telephone Service as a temporary clerk on June 2, 1913, and was appointed Contract Officer, Class II (unestablished) on Sept. 13, 1914. He had previously served for thirteen years with the Royal Artillery where he attained the rank of sergeant and obtained an Army schoolmaster's certificate. The deceased was an energetic worker and an expert on private wire work and he will be missed by all who came into contact with him. The funeral took place on the 7th ultimo and was attended by Mr. W. Glenny from Headquarters and Mr. W. S. Gilmour from the Western Contract Office.

Many readers will be surprised to learn that the growth of the London system during the last financial year was unprecedented even when the figures of those far off years of peace are taken into account. The Contract Branch during the year negotiated agreements for 56,140 stations and issued disconnexion orders for 15,414 stations leaving a net gain of 40,726. The number of removal orders dealt with amounted to 19,371. During the year 14,351 applications for lines, external extensions or private wires were refused owing to shortage of exchange equipment or external plant. It is certain, therefore, that if there had been no restriction on development the net growth would have exceeded 50,000 stations. These figures, do not include lines provided for other Government Departments. During the four weeks ended April 24 last the Contract Branch negotiated agreements for 4,487 stations and issued disconnexion orders for 1,248 stations, leaving a net gain of 3,239. These figures certainly justify a feeling of satisfaction, inasmuch as a record growth has been achieved in spite of unprecedented difficulties in connexion with plant and equipment.

East Exchange.

With the permission of the Controller a sale was held at the Exchange on May 3 which was opened by Mr. Benham, a former chief of the Exchange, and the useful character of the articles was appreciated.

By the courtesy and assistance of the engineers the visitors were shown over the apparatus and power rooms. All were keenly interested and special stewards explained the working. Only three weeks were spent in preparation and the sum of £110 realised tesifies to the energy of all concerned. The Exchange trades people and one unknown subscriber contributed generously. The proceeds went to the War Seals Foundation. The sum of £4 4*s.* has also been collected among the staff and sent to the "Save the Children Fund."

Gerrard Exchange.

On April 14 the Gerrard and Regent Sports Club held a fancy dress dance. Over 200 members and their friends attended. Mr. P. Keightly of the Gerrard Engineering Staff was responsible for the excellent band.

Prizes were awarded to Miss E. A. Moore, Gerrard (a casement window); Miss G. Dixon, Regent (willow pattern china); and Miss E. Burgiss, Gerrard ("Bridge.") The gentleman's prize was awarded to Mr. Preston, Gerrard Engineering Staff, who represented "Bindle." The proceeds go towards the hire of a tennis ground which has been obtained at Tottenham.

Hammersmith.

A contribution of £2 10*s.* 6*d.* has been forwarded to the War Seals Secretary from the staff of the above exchange.

Hop Exchange.

An enjoyable hour was spent in the Hop Exchange dining room on April 28, when representatives from the Exchanges in the South District and the South Traffic Office welcomed Mr. and Mrs. Arrowsmith and endeavoured to convey to Mr. Arrowsmith, who has gone to the North East District, their appreciation of his help and support during his too short stay amongst them. Prior to tea Miss Ashmead on behalf of the staff presented Mr. Arrowsmith with an epergne, a dozen silver tea knives, pipes and tobacco pouch, and Mrs. Arrowsmith with a bunch of carnations.

Mr. Beaumont honoured the Social Club by being present at a social held on April 21. Miss Ashmead was unfortunately prevented from attending, but Miss Liddell combined the offices of president and vice-president admirably. Mr. Thirkell took the presonsibilities of M.C. in his usual capable manner. Mr. R. Groves gave two well rendered solos and conducted the choir, which proved itself worthy of its reputation. Mrs. and Miss Mead were the accompanists.

The sketch produced by the Exchange surpassed all expectations. Miss Cook took the part of the "Rev. Cuthbert Hardup" perfectly, while Miss Butler made "Miss Angelina Youngmaiden" seem quite real, and Miss Rayment displayed talent in conducting "Miss Agelina Youngmaiden's La Posh Orchestra." Miss Boniface and Miss Sherrall both took their parts splendidly.

Lee Green Exchange.

The staff added another success to their efforts on behalf of wounded and disabled soldiers on May 5, when they held a whist drive in aid of the War Seals Foundation. During the evening they were favoured with a visit from the Mayor of Lewisham and the Secretary of the War Seals Foundation also attended. The latter explained the worthiness of the cause and expressed appreciation of the work of the London Telephone Exchanges in contributing about £1,400 to the funds of the Foundation. The whist drive realised £28 12*s.* 6*d.* and Miss Johnson and her helpers are to be heartily congratulated.

Park Exchange.

Another splendid effort in aid of that deserving institution, the War Seals Foundation, has been successfully organised—this time by the Park Exchange staff, headed by their chief, Miss E. A. Epps. The event took the form of a concert, given on April 16, which realised the sum of £25. The staff are to be congratulated on the excellence of the programme arranged by the Misses C. M. Smith and E. M. Ayres, the latter also acting as accompanist. Among the artistes (all of whom gave their services) were the Misses D. Roe, D. Rutter, L. M. Davies, E. A. Pope and M. Chetwood, members of the staff, each of whom gave delightful musical items, also Messrs. Collins, Hinshelwood and Burke, and Miss Irene Burville, a charming child dancer. As one sat and listened to each item, one was reminded of Tennyson's words, "There is sweet music here,—that softer falls than petals from blown roses on the grass." The programme ended with a very amusing "Sketch," all the characters of which were portrayed by members of the staff. Mr. W. Roberts, Secretary of the War Seals Foundation, was present, and gave a very appealing and stirring speech, on behalf of the deserving cause, of which he was the representative. He offered for sale silk hand-bags, which had been made and given by the programme sellers and which realised £2 8*s*.

Miss W. Dibben designed the pretty programme cover and also painted several others which realised a considerable sum, towards the proceeds. Another member, Miss Pointer, by her own individual effort raised the sum of £2 17*s*.

Regent Exchange.

A very pleasant evening was spent at a fancy dress dance held by the staff on March 19. The prize for originality was won by Miss E. Down, robed in cabbage leaves, held in place by safety pins, as an example of what might happen in future if high prices continue. The first ladies' and first gentlemen's prize went to Mr. and Mrs. Harris, who were arranged in old world costumes.

On Saturday, April 10, another visit was paid to the disabled soldiers at Roehampton. A whist drive was arranged for the early part of the afternoon, and after tea, which was provided by the visitors, the men entertained their guests with musical items.

A whist drive given by Regent was held on April 13, and as on previous occasions a large number of the staff and their friends were present. The evening was a very enjoyable one and concluded a season of very successful entertainments.

Streatham Exchange.

The staff organised a concert and dance on April 13 in aid of the War Seals Foundation. The concert items were contributed by the Misses V. Bennett, Anne Charlesworth, M. Hedderley, and R. Watson and Messrs. T. A. Beck and J. Hinshelwood. Members of the staff provided the refreshments which were A.1. and everybody present spent a most enjoyable evening. The net proceeds amounted to just over £25.

Wimbledon Exchange.

A social afternoon was arranged recently for the benefit of the Hospital Saturday Fund. A bran tub, victory wheel and fortune telling, together with home-made cakes, made the afternoon a great success and the proceeds amounted to £7 15*s*.

Walthamstow Exchange.

A most enjoyable whist drive and social evening was held on April 22. The programme was arranged by the Misses Meikle, Sidey, Bell and Forder, members of the committee and staff of the Walthamstow Exchange, who are to be congratulated on the success of the evening. Many visitors from other exchanges were given a cordial reception. Military whist was played; Canada succeeded in taking 1st prize, Wales 2nd, and Holland the "booby." The supervisor of the Walthamstow Exchange, Miss Hutt, presented the prizes, and was herself the recipient of a bouquet from the members of the staff as a token of their appreciation of her unfailing kindness. After the refreshment interval, dancing and musical items occupied the rest of the evening. Miss Brain caused much amusement with her recitation entitled "No followers allowed," and Mr. Gilyatt's cornet solo was very much appreciated.

THE RETIREMENT OF MISS M. E. BARNFIELD FROM THE CENTRAL TELEGRAPH OFFICE.

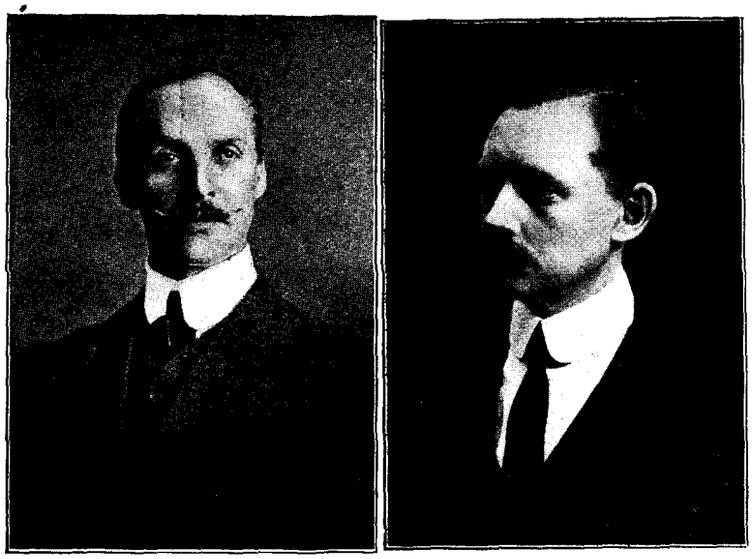
To the senior women of the Central Telegraph Office the retirement of Miss Barnfield from their midst is the closing of an epoch in which she figures as a foremost personality. To the juniors it is the passing of a Supervisor unrivalled in kindness, tact, and judgment, one to whom they instinctively and confidently turned in the many crises which arose in the course of their official work or career. Both these elements were strongly represented at the farewell social arranged in Miss Barnfield's honour on May 4 when makers of the past, present, and future history of the Central Telegraph Office assembled to show their affectionate appreciation and respect. She was presented with a magnificent shower bouquet of pink carnations, and the formal presentation of the numerous gifts, of which she had been the recipient on her last day of service, was made by the Chief Supervisor—Miss A. Moore. Musical, vocal, and elocutionary items were rendered by various old and present members of the "G" Division staff, and the programme was interspersed with dances. A novel feature of the evening was the "Golden Ballot" in which by a happy stroke of fortune Miss Barnfield was herself a prize winner. Speeches were made by the Controller, Deputy Controller and the Chief Supervisor, all of whom paid high tribute to Miss Barnfield's devoted and disinterested work. The keynote of her reply—women's contribution to the efficiency of the service, was characteristic of the inspiration she has always been and will continue to be to the women of the Central Telegraph Office.

MISS BARNFIELD.

J. E. C.

The retirement of Miss Barnfield from the Central Telegraph Office on April 30 was made the occasion of a manifestation of esteem and respect on the part of her fellow Supervisors and staff which was remarkable for its enthusiasm and spontaneity. On the last date of her service the table of the historic "G" Division was laid out with a beautiful array of presents and the actual moment of retirement was signalised by an expression of feeling which was not to be restrained. On the following Tuesday in the Sunday School Union building in Old Bailey a large meeting of women connected with the Central Telegraph Office took place for the formal presentation. Miss Moore, the Chief Supervisor, was present and made a speech which was both glowing in humour and tender in its personal reference. So far as I could count there seemed to be about a couple of hundred present and as the proceedings went on two solitary males, the Controller and Deputy Controller, were led in. A number of women Supervisors who had retired, I do not know how many years ago, were present, looking wonderfully fit and healthy and betraying an affectionate interest, which we all welcomed, in their old office. The remarkable feature of the gathering was the admirable manner in which the women Supervisors of the Central Telegraph Office shewed themselves to be able to mingle freely with their staff, to keep on terms of tender association with them, and yet to surrender not a whit of their dignity or of their authority. It is a lesson to us all as to the attitude which modern supervision can take when enlightened by insight and clear vision. Miss Barnfield leaves the office with more than the respect of us all. It is almost an impertinence to describe her as one of the most efficient women who ever took up the post of leadership. I have called the "G" Division "historic." It is historic in the sense that it is a Division controlled by women and that it includes modern long distance telegraphy in its latest phases. There may be vexed questions before us as regards the position of women in industry, especially in the management of industry, but those problems would be much less acute if the control of industry generally included women with the strength of personality, the expert knowledge and the exquisiteness of consideration always shown by Miss Barnfield.

J. L.



MR. CHAS. CROMPTON, O.B.E. MR. S. A. POLLOCK, O.B.E.
THE MOST EXCELLENT ORDER OF THE BRITISH EMPIRE.

Mr. H. J. MACLURE, M.B.E., should have been described as of "Contract Branch," Ministry of Munitions and not Surplus Stores Dept., in our May issue.

PERSONALIA.

HEADQUARTERS TELEGRAPH AND TELEPHONE TRAFFIC SECTION.

FOLLOWING the recent re-organisation of the Headquarters Telegraph and Telephone Section, the following appointments have been made:—

Mr. H. G. TRAYFOOT, Assistant Inspector, Class I, to be Inspector.

Mr. H. F. E. DEANE, Assistant Inspector, Class I, to be Inspector.

Mr. P. G. HEAD, Assistant Inspector, Class II, to be Assistant Inspector, Class I.

Mr. C. H. TOMS, Assistant Inspector, Class II, to be Assistant Inspector, Class I.

Major A. A. JAYNE, D.S.O., O.B.E., M.C., Assistant Inspector, Class II, to be Assistant Inspector, Class I.

Mr. G. T. ARCHIBALD, Assistant Inspector, Class II, to be Assistant Inspector, Class I.

Mr. G. W. Gomm, Assistant Inspector, Class III, to be Assistant Inspector, Class II.

Mr. D. H. THOMSON, Assistant Inspector, Class III, to be Assistant Inspector, Class II.

Mr. C. R. FRIGHT, Assistant Inspector, Class III, to be Assistant Inspectort Class II.

Mr. G. F. SAFFREY, Assistant Inspector, Class III, to be Assistan Inspector, Class II.

Mr. S. THORPE, Assistant Inspector, Class III, to be Assistant Inspector, Class II.

Mr. L. B. LUGET, Assistant Inspector, Class III, to be Assistant Inspector Class II.

Mr. A. J. WADEY, Assistant Inspector, Class III, to be Assistant Inspector, Class II.

Captain C. A. ROBERTSON, Assistant Inspector, Class III, to be Assistant Inspector, Class II.

Mr. J. F. DARBY, Assistant Inspector, Class III, to be Assistant Inspector, Class II.

Mr. H. W. PENDRY, Overseer, Central Telegraph Office to be Assistant Inspector, Class II.

Mr. H. J. E. STILL, Assistant Traffic Superintendent, Class II (P), to be Assistant Inspector, Class II.

Mr. J. MAGNALL, Assistant Traffic Superintendent, Class II (P), to be Assistant Inspector, Class II.

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Mr. J. F. MURRAY, Assistant Traffic Superintendent, Class II (P), to be Assistant Inspector, Class II

Mr. W. H. TAYLOR, Assistant Traffic Superintendent, Class II (P), to be Assistant Inspector, Class II.

Mr. A. WAKELEY, Assistant Traffic Superintendent, Class III, London Telephone Service, to be Assistant Inspector, Class II.

Mr. H. BOOKER, Telegraphist, Central Telegraph Office, to be Assistant Inspector, Class II.

LONDON TELEPHONE SERVICE.

Promotions.

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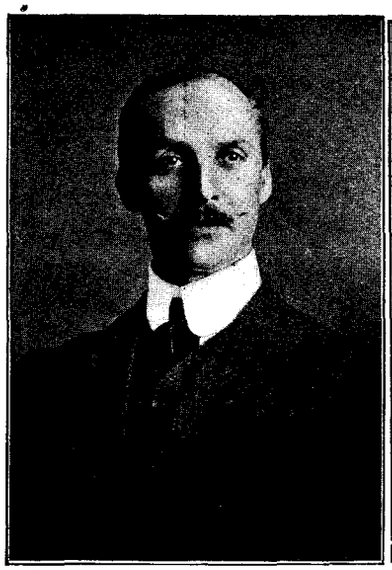


MR. CHAS. CROMPTON, O.B.E. MR. S. A. POLLOCK, O.B.E.
THE MOST EXCELLENT ORDER OF THE BRITISH EMPIRE.

Mr. H. J. MACLURE, M.B.E., should have been described as of "Contract Branch," Ministry of Munitions and not Surplus Stores Dept., in our May issue.

PERSONALIA.

HEADQUARTERS TELEGRAPH AND TELEPHONE TRAFFIC SECTION.

FOLLOWING the recent re-organisation of the Headquarters Telegraph and Telephone Section, the following appointments have been made:—

Mr. H. G. TRAYFOOT, Assistant Inspector, Class I, to be Inspector.

Mr. H. F. E. DEANE, Assistant Inspector, Class I, to be Inspector.

Mr. P. G. HEAD, Assistant Inspector, Class II, to be Assistant Inspector, Class I.

Mr. C. H. TOMS, Assistant Inspector, Class II, to be Assistant Inspector, Class I.

Major A. A. JAYNE, D.S.O., O.B.E., M.C., Assistant Inspector, Class II, to be Assistant Inspector, Class I.

Mr. G. T. ARCHIBALD, Assistant Inspector, Class II, to be Assistant Inspector, Class I.

Mr. G. W. Gomm, Assistant Inspector, Class III, to be Assistant Inspector, Class II.

Mr. D. H. THOMSON, Assistant Inspector, Class III, to be Assistant Inspector, Class II.

Mr. C. R. FRIGHT, Assistant Inspector, Class III, to be Assistant Inspectort Class II.

Mr. G. F. SAFFREY, Assistant Inspector, Class III, to be Assistan Inspector, Class II.

Mr. S. THORPE, Assistant Inspector, Class III, to be Assistant Inspector, Class II.

Mr. L. B. LUGET, Assistant Inspector, Class III, to be Assistant Inspector Class II.

Mr. A. J. WADEY, Assistant Inspector, Class III, to be Assistant Inspector, Class II.

Captain C. A. ROBERTSON, Assistant Inspector, Class III, to be Assistant Inspector, Class II.

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Miss SPENDLEY, Telephonist.

Miss MCDOWELL, Telephonist.

Miss M. HILL, Telephonist, of Dalston Exchange.

Miss M. E. NEWTH, Telephonist, of Central Exchange.

Miss L. OSMAN, Telephonist, of London Wall Exchange.

Miss C. BLYTH, Telephonist, of London Wall Exchange.

Miss W. R. GREENSTREET, Telephonist, of Holborn Exchange.

Miss E. J. DEVESON, Telephonist, of Avenue Exchange.

Miss D. M. GRIGGS, Telephonist, of Victoria Exchange.

Miss G. GARRATT, Telephonist, of Dartford Exchange.

Miss E. M. PINK, Telephonist, of Merstham Exchange.

PROVINCIAL STAFF.

On Feb. 10 Mr. E. J. JOHNSON, Traffic Superintendent, left Sheffield in order to take over similar duties in Glasgow. Members of all sections of the service were pleased to learn of Mr. Johnson's promotion. This feeling found expression in a representative gathering of the staff on Saturday, Feb. 8, called for the double purpose of saying "farewell" and presenting their departing colleague with a tangible token of their regard. The presentation of an electro-plate "cream and sugar" and tray was made by the District Manager, Mr. J. W. Swithinbank on behalf of the staff. In a happily worded speech Mr. Swithinbank referred to Mr. Johnson's long service and record of good work in Sheffield and wished him success in his new position. Mr. Johnson, who was deeply moved, suitably responded.

Miss G. G. WEALE, Telephonist, Plymouth, who resigned to-day on account of marriage, was presented with a set of stainless cutlery.

On her resignation with a view to marriage, Miss A. MUSTY, Female Clerical Assistant in the District Manager's Office, Canterbury, was presented by the staff with a set of stainless table knives, and a silver-plated sugar basin and tongs.

The District Office staff at Aberdeen held a party in the Imperial Hotel on the evening of Wednesday, April 28 last, to bid farewell to Miss MARY ANDERSON, Female Clerical Assistant who has resigned in view of her approaching marriage. A very pleasant evening was spent with games, music and dancing, and during an interval tea was served, after which Mr. Storrie, District Manager, in a few well chosen words, presented Miss Anderson with a pair of solid silver candlesticks, Mr. Clow, Chief Clerk, suitably replied on behalf of Miss Anderson.

Photograph by Weston (1916).

London superintendents and staff of the Anglo-Ruman cable. The laying of this cable was one of the great war achievements of the P.O. Engineering Department in co-operation with the Admiralty. It was opened for traffic on January 28 1915 and is worked by means of Creed apparatus at the London end, the Fraser auto-*transformer* (signal converter) at Peterhead, and hand transcription from cable slip at the Russian terminal. During the year 1917 no less than fourteen millions of chargeable words passed over this cable and were dealt with by means of the apparatus above mentioned.

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THE

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CONTENTS.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street London, E.C.4.*

CALL OFFICE DISCREPANCIES AND THEIR ORIGIN.

BY G. D. BATEMAN.

"If a man will begin with certainties, he shall end in doubts; but if he will be content to begin with doubts, he shall end in certainties."—*Bacon.*

A FEW years ago a colleague deposited a suspicious looking bundle of papers in my "In" tray, gave me a sympathetic look and disappeared. Attached to the bundle was the note, "For special investigation and report." After perusing the conflicting evidence and the tales of mystery told therein, I decided to transfer it at once to my "Out" tray. But second thoughts convinced me that such misuse of the Department's organisation would be unavailing, so I made the best of a bad job and settled down to my first investigation of Call Office discrepancies. It soon became evident that I had begun with doubts; doubts as to the reality of the Department's "unearned increment" on the one hand and its heavy loss of revenue on the other. Would I end in certainties and prove those alleged losses and gains to be mythical? The answer to this question was not an unqualified one, as will be seen.

Many readers of the JOURNAL are more familiar with Call Office discrepancies than they desire to be, but for those who are not it may be stated at once that a Call Office discrepancy is the difference between the exchange record and the amount collected. That may be regarded as the official definition. The unofficial definition is quite as accurate but would not look well in print. However, to get back to that bundle. It contained monthly lists of the Call Offices in the District whose collections differed from the relative exchange records by more than the allowable percentage. The differences ran into hundreds of pence and the usual inquiries had produced the usual stereotyped replies but precious little improvement. In short, the correspondence method had failed and a better one was wanted to replace it, so after thoughtfully chewing the end of my official pencil until the words "Made in Bavaria" were almost unrecognisable, I decided on a plan of campaign. Office records were scrutinised, Call Offices and exchanges visited, and other possible sources of error explored. Supervisors were interrogated with varying success. One of them was quite prepared to admit that at other exchanges telephonists might over or under record, but hers—Never! An attendant offered to stake his War Bonus (the last one) on the accuracy of his account. An engineering officer guaranteed that coin-box faults were cleared at a speed that was positively dangerous, and, in a menacing voice, required to know if my inquiries implied any reflections on his veracity. Owing to this misunderstanding I left feeling hurt, but probably not so much as if I had remained. A rural sub-postmaster on being informed that there was a hiatus in his Call Office account big enough for a Tank to crawl through instructed his assistant to "show the young man the nearest way out." After all this I felt that my Assurance Company would cease to regard me as a first class life if they discovered my latest occupation.

At last the necessary data was collected and a careful analysis revealed many interesting and useful facts. These showed that while some leakages existed involving a loss of revenue many "discrepancies" were more apparent than real. Since then, as a result of similar investigations in different parts of the country I have noted many more discrepancy-producing errors and omissions, and have embodied them all in the subjoined list. Their variety is rather striking. The sections into which the list is classified are those where the irregularities originated—namely, Engineers, Call Office Attendants, the Public, Exchanges, District Office Collectors:—

ENGINEERS.

Register Meters.—(1) These sometimes fail to act. Coin-box is reported over in collection.

(2) A meter occasionally "jumps." Coin-box is reported short in collection.

(3) After getting a telephonist to make some test registrations the meter was reversed until the former reading appeared. Meanwhile the telephonist had followed the normal course and prepared credit tickets. Result coin-box "over in collection."

Routine Meter Test.—This used to be carried out quarterly by engineering staff (Form T.E. 575), but owing to the War the duty was temporarily allotted to telephonists. As faults were formerly discovered and cleared during these tests it follows that a certain amount of error was prevented. There appears to be no reason why the original practice should not be generally resumed.

Coin-Box Faults.—At some Call Offices when a caller says he has placed the fee in the box and the buzzer is apparently out of order, the supervisor, using her discretion, may in certain circumstances allow a couple of calls. Therefore delay in clearing this class of fault increases the risk of discrepancies.

CALL OFFICE ATTENDANTS.

Recording Calls.—Calls are not always entered on the Account Form (T. No. 196) before they are passed, as they should be. Consequently some escape record.

Delay in Collecting Fees.—Attendants at certain small exchanges were found to be making a practice of collecting the fees after the calls were finished. That they occasionally forgot to do so was inevitable in these circumstances, and explains why they were frequently short in collection.

Wrong Column used (Form T. No. 196).—(1) Junction calls entered in Trunk column and *vice versâ*.

(2) "Call Office" fees in respect of trunk calls entered in "Local and Junction" column.

Such errors as these have been known to escape check and duly appear as discrepancies.

Incorrect Junction Charges.—An attendant was found to be charging too little for certain junction calls. The amount collected was therefore less than the value of the exchange record. Errors of this nature are usually discovered during the District Office check.

Exchange Obtained Indirectly via *P.O.*—Rural Call Offices in some cases call the exchange *via* a concentrator at the distant Post Office and the phonogram circuit. If the attendant in these circumstances does not announce his

office by name the telephonist may assume the call is an ordinary telephone-telegram call from the P. st Office at which the concentrator is situated, and it would thus escape record. Result—collection is greater than the exchange record.

Telegrams from "Joint" Call Offices.—"Joint" Call Offices are those at telegraph offices and are for Service as well as public use. This circumstance is a fruitful source of confusion in the recording of calls at the exchange. The chief cause of this is that the attendant when using the Call Office for the purpose of forwarding a telegram received over the counter neglects to pass the call as a "Telegram Service" one. This omission leaves the telephonist to infer that the call is a chargeable one, *i.e.*, a phonogram or express Message dictated by a member of the public, and a chargeable ticket instead of a non-chargeable one is prepared. Hence "collection short."

Two Phonograms during one call.—It often happens that two phonograms are dictated by a caller during one three-minute call but attendants have been known to collect a local or junction fee in respect of each. These calls,unlike trunk calls, are not exactly timed, and the telephonist usually prepares one ticket. When the Call Office account is compared with the exchange record the latter appears to be short. The mistake probably arises from the fact that a "Call Office" fee is charged for each portion of a "double," *i.e.* six-minute, trunk call.

THE PUBLIC.

Non-Payment of Fees.—Some people, otherwise honest, apparently do not think it dishonest to seize the opportunity of a free tram ride or avoid payment of the legitimate railway fare. Was it not a famous preacher who was found dead in a first class carriage with a third class ticket in his pocket? But perhaps he was shor-tsighted. The Telephone Service is another one in point. If the telephonist fails to ask for the fee the average caller does not think he is under any obligation to pay for the service rendered, and so the box is short in collection. Free calls are also obtained with metal discs or foreign coins. A refined method of evading payment used to be practised by "Bookies'" clients. Having secured connexion to the "Bookie," and while the telephonist was asking for the fee, they just called out their own name and that of the fancied winner. That was all the conversation they required, for the bet was on, so they left without paying the fee, and the box in due course was reported short. A cure for this was soon found, *i.e.*, the establishment of the through connexion was withheld until the fee was inserted in the box.

Imitation of Buzzer.—Callers have been known to use a very ingenious device for imitating the sound of the buzzer. Box short in collection.

Premature Payment of Fees.—In matters non-telephonic the public is singularly free from this indiscretion, but, as is often the case, loses its head when using a telephone. The caller does not read the instruction on the box and inserts the fee before calling the exchange or before the telephonist asks for it. When he is asked to place the pennies in the box he asserts he has already done so and if there is no reason to doubt his word it is taken, the call being allowed. But if his *bonâ fides* is doubtful the supervisor does not take his word and he has to pay again or lose the call. In the latter case "over in collection" results and gives rise to a fear that ordinary subscriber's calls are not all being recorded.

A case is remembered of a caller on a magneto exchange who placed the fee in the box and lifted the receiver, thinking that was the way to call the exchange. He repeated this performance six times until all his coppers were gone. Then he read the Instruction Card and called the exchange correctly. One can admire this man's optimism more than his powers of observation. In due course the box was reported "over in collection," so I expect it included those excess fees.

Abandoned Calls.—Having paid for a local or junction call at an office where there is no coin-box, callers do not always wait for a delayed call to be "returned" but sometimes leave the office without getting the fee refunded. This also causes the inference to be made that there is general under-recording at the exchange.

Educating the Public.—Such errors as the foregoing will probably continue until an outbreak of common sense occurs among the casual telephone-using public—which is unlikely—or until they are made proficient in the use of a Call Office. The only thing which would certainly have solved this problem was the end of the world last December: but, as usual, we were disappointed.

The "Change" Difficulty.—The sad case of the caller who required a 3*d.* call from a kiosk is worth mentioning. He put 2*d.* in the box and then found he had not the other penny. As nobody had any authority to give him a 3*d.* call at the bargain rate of 2*d.* he left to get change but did not return, so the 2*d.* was forfeited and eventually became part of the excess in collection.

EXCHANGES.

Failure to Ask for Fees.—Many of us have had the experience of making calls from Call Offices without being asked for the pennies. This is generally the result of slackness and is inexcusable. Though such free calls represent only a small percentage of the total Call Office traffic the annual loss of revenue for the whole country is probably considerable.

Wrong Fees Requested.—Caretaker-operators, and sometimes telephonists, ask for the wrong fees for calls to certain exchanges. This is bound to produce discrepancies.

Failure to Prepare Tickets.—Several sub-postmasters in charge of small exchanges admitted they were unaware that tickets had to be prepared for coin-box calls. They thought that the collection of the pennies sufficed. Heavy "over in collection" discrepancies brought this fact to light.

Wrong Destination Recorded.—The code of the called exchange is sometimes incorrectly recorded and becomes the code of another exchange. Discrepancies result arising out of the difference in value of calls to the respective exchanges.

Failure to use "Block" Letters.—When recording the code of the called exchange the letters are sometimes badly formed, so that district office staff in valuing tickets misread the codes for those of other exchanges. If the fees are different discrepancies are inevitable. The use of "Block" letters in accordance with instructions is the cure for this.

Phonograms from "Joint" Call Offices.—At some exchanges local tickets in respect of Phonograms dictated by the public from Call Offices were being marked with a diagonal line, thus classifying them as non-chargeable. Hence "excess in collection." "Telegram Service" tickets are sometimes prepared in error for the above calls with the same result.

"Telegram Service" Calls.—Many cases came under notice where chargeable local tickets were prepared for these calls originated at "Joint" Call Offices. The fault is generally the attendant's. He omits to say "Telegram Service" when passing the calls, but the telephonist can often detect the omission, and should endeavour to do so. It also occasionally happens that chargeable tickets are prepared even when the attendant passes the calls correctly, and at Register Exchanges credit tickets are sometimes omitted.

Phonograms over a Junction.—The normal route for subscribers' phonograms is sometimes over a fee junction, but when Call Office users (as distinct from subscribers) dictate a phonogram over that junction, a junction fee is chargeable. Instances, however, occurred where tickets were prepared incorrectly as for local calls, thus causing the value of the exchange record to be less than the collection.

Registering Ineffective Calls.—Great care should, of course, be taken to avoid the inadvertent registration of ineffective calls on the "effective" register. This is generally well understood, but the point is worth mentioning in view of "collection short" reports.

Incorrect Ticket Symbol.—Register exchange telephonists have been known to complete tickets for Service junction calls with the effective instead of the credit symbol. Hence "collection short."

Delayed Calls made Effective.—At certain exchanges some tickets for these calls were being marked with a diagonal line (neither debit nor credit). The tickets were therefore included among the ineffectives, and the coin-box was alleged to be over in collection.

Credit Tickets Omitted.—Wrong number, free, service and test calls at register exchanges may occasionally be made without the corresponding credit ticket being prepared. This causes the box to be reported short in collection.

Credit Tickets Prepared in Error.—Credit tickets for non-controlled trunk calls have on a few occasions been prepared in error at register exchanges.

Learners' Errors, &c.—It has been observed that magneto exchanges with a good reputation as regards Call Office discrepancies lose and never regain it after conversion to C. B. The period of heaviest discrepancies at a certain C. B. exchange coincided with the period in which some magneto telephonists were being trained there in C. B. working. Failure to prepare credit tickets or faulty manipulation of the register keys was probably the cause. Where no Operating School is available a certain amount of error is inevitable in these circumstances.

Relief Telephonists' Errors.—Unfamiliarity with the various fees prevailing at the exchange where relief is being given sometimes results in incorrect fees being asked. The utilisation of Postal staff for short operating duties at the smaller exchanges has been known to produce the same result for the same reason.

Misreading of Register Meters.—Meters are occasionally misread. A case came under notice where the first meter in the rack was entered on the Register Reading Form as that of No. 1—a busy Call Office, whereas it was No. 0—the Test Clerk's circuit. A big discrepancy was duly submitted for investigation.

Compiling Forms T. No. 1029.—Errors in copying the register readings on to the form, though certainly not numerous, do creep in occasionally.

Advice of Collection.—Officers in charge of exchanges sometimes neglect to advise the District Manager of the times of collections (Form T. No. 138) or delays of a week and more occur. Therefore the call tickets for the day concerned cannot be properly apportioned and discrepancies are more likely to occur.

Two Offices on one Circuit.—Where two Call Offices are on the same circuit one can usually ring the other without the assistance of the exchange where a calling signal is received simultaneously. Unless the telephonist enters the circuit in time to record such calls they will escape record. Result—"excess in collection."

DISTRICT OFFICE.

Confusion of Telephone Nos.—Owing to a clerical error tickets for a subscriber No. 1Y were counted in with those of No. 1, which was a Call Office. Result—"collection short" alleged.

Free Calls.—Early in the War period a collection shortage of 354 pence was reported. All except 10 were proved to be in respect of O.H.M.S. calls by military officers. These calls, duly recorded, should of course have been deducted before arriving at the discrepancy.

Discrepancy "Brought Forward."—The fact that a certain "discrepancy" was exactly the same one month as in the previous month raised a doubt as to its authenticity. Inquiry revealed the interesting fact that it had been treated like an outstanding account and duly brought forward.

Discrepancies Incorrectly Reported.—Owing to continual discrepancies which could not be explained special records of calls were kept covering the period between two collections; also particulars of the actual amounts collected. When the discrepancy lists arrived the "exchange record" figures in many cases differed considerably from the special records kept at the exchange of tickets actually sent to the office. In some instances there were slight differences between these special records and the amounts collected, but the relative discrepancies which appeared on the monthly list were very big ones. There were still other cases where the special records coincided with the amounts actually collected, but considerable discrepancies were reported nevertheless. Such cases suggest errors in calculating, reporting or recording discrepancies.

Errors in Posting Call Register.—Calls made from one Call Office were found to have been entered against another. Hence "over" in one case and "under" in the other. Examples are quoted under "COLLECTORS."

"Call Office" Fees, &c.—No allowance was made in a number of cases for the fact that "Call Office" fees in respect of trunks, and local or junction fees in respect of phonograms are not to be found in the coin-boxes but are brought to account on the Call Office sheet. The boxes were reported short in collection in consequence.

Collection Dates Misread.—The date of collection as shown in the Collecting Book was misread in some instances, so that the wrong number of days tickets were reckoned as the "exchange record" corresponding to the period covered by the collection. "Discrepancies," of course, resulted.

Tickets not Received.—The week's tickets from certain small exchanges had not arrived, but no approximate addition was made to the exchange record in respect of the overdue tickets. Discrepancy figures were therefore entirely unreliable.

Tickets Astray in Post.—Tickets were known to be astray in the post on one occasion, but the "exchange records" of the Call Offices involved were reported to be less than the relative collections, nevertheless.

Silver Coins in Coin-Boxes.—This does not always occur by accident, as is generally believed. A shortage of 4*s.* was reported for the usual inquiry, no mention being made of the fact that two florins had formed part of the collection. It transpired that the sub-postmaster, being short of coppers, had placed the silver in the box by way of exchange. Even if the two florins had been accidentally inserted the shortage reported should have been 3*s.* 10*d.*, not 4*s.*, the florins ranking as pence for this purpose.

Metal Discs and Foreign Coins.—These are sometimes found in coin boxes and should be regarded as pence for the purpose of comparison with the exchange records, but it was found this was not being done and "discrepancies" resulted. If the telephone were also a telescope the telephonist could be fairly blamed for such discrepancies, but at present she is "not guilty."

Improbable Discrepancies.—A clean record for many months and then a big discrepancy is alleged. The facts show no change in the operating staff and no great traffic fluctuation. In these circumstances there is therefore good reason to presume an incorrect calculation or report.

Apportionment of Tickets.—Certain small exchanges send their tickets in weekly, and if a mid-week collection has been made the relative Call Office tickets have to be apportioned between the pre-collection and post-collection periods. This apportionment takes the form of one-sixth of the week's tickets for each day, but such a fraction is, of course, approximate and ignores what often happens, *i.e.*, that as many calls are made on market day as are made during the remainder of the week. It follows therefore that errors in calculating discrepancies are very likely to be made and differences should not be referred for investigation until it is proved that one month's excess is not neutralised by the shortage on the next or *vice versâ*. Such discrepancies, however, have been reported, this feature having been overlooked.

Value of Tickets.—In apportioning tickets into the two periods it was found in one or two cases that they were all treated as if of equal value, whereas the various values of junction and local calls should have been taken into consideration.

Coin-Box Valued Sheet.—The pence figures on this (Form No. 1493ZZ) are so small and close together that the usual triangular date marker, when quickly or carelessly used, covers two figures instead of one. It is therefore possible when posting for the next reckoning to exclude the figure covered in error, and the exchange record as per valued sheet can be made to appear up to about 26 pence more than the ticket record. Such errors have been traced.

COLLECTORS.

Collection Book Errors.—Two collections—one from a railway station and the other from a kiosk bearing the same district name as the railway station—were transposed. The result was a big shortage reported in the one case and a big excess in the other. Actually, neither of those so-called discrepancies existed. A similar mistake occurred recently in the case of two Call Offices standing alongside each other in the same office. The collection from the first was entered against the No. of the second, and *vice versâ*. A shortage of about 600 pence was alleged against the first, and an excess of about the same amount against the second.

Advice of Collection.—Care should be taken to advise the exchange when a collection has been made.

In view of the number of errors shown to be possible one wonders not why there are so many discrepancies but why there is so much accuracy. It will be seen that, contrary to a widespread belief, the telephonist is not the only offender and should be allotted no more than her fair share of the blame.

PREVENTIVE MEASURES.

The foregoing list of errors indicate their own remedies, but others are suggested by the following:—

Non-Coin-Box Office at Exchange.—Where the exchange is operated by the sub-postmaster or his assistant, persistent discrepancies may be traced by comparing the tickets daily for a month with the relative entries on the Call Office sheet. This comparison should show whether the leakage is in the amounts collected or the calls recorded, and steps can then be taken to stop it.

"Attendant" Offices: No Coin-Box.—At such Call Offices, where a written record of all calls is kept, it was observed that the amounts recorded were hardly ever in excess of the exchange record, but nearly always short of it. The inference therefore was made that calls were not being entered before they were passed and that some of these omissions were not subsequently rectified. Written records of all calls originated at the Call Offices concerned were taken for a week, and as they coincided with the respective register meter readings it was clear that the exchange records were accurate. These written records, showing the date and destination of each call, were compared with their relative Call Office account sheets at the Sub-Post Offices concerned and the sheets were proved to be short by several items. It was explained that as these omissions had occurred in one week about four times as many could be reasonably expected to occur in a month, and thus account for most of the discrepancies which were being continually reported. The hard facts had the desired and expected effect of practically wiping out actual discrepancies at these offices.

Tariff Cards: Non-Coin-Box Offices.—These cards are, of course, of vital importance and care should be taken to see that the correct fees are shown thereon, so that attendants shall ask callers for the right fees.

Instruction Book.—The present book for the use of Call Office attendants was published in 1909 and, like the tramp in the soap advertisement, "since then they have used no other." Its numerous amendments and general obsolescence entitle it to a place on the retired list. (A revised edition is about to be issued.—EDITOR, *T. & T. J.*)

Service Testing, &c.—Service observation and out-door testing are, perhaps, the best preventives. They enable credit to be given to the exchange staffs who deserve it and attention to be concentrated on the exchanges that need it.

Visits to Exchanges.—By examining tickets taken at random from the holders, and general observation during visits to exchanges traffic officers can discover causes of discrepancies which cannot be traced by volumes of correspondence.

Time given to the systematic tracing of Call Office discrepancies is well spent, as it discloses any weakness there may be in the general ticket recording the prevention of which safeguards the revenue from subscribers traffic. As guardian of that revenue the Traffic Department should, therefore, never relax its efforts to trace errors to their source, but to me this seems certain; that while a high degree of accuracy is sometimes attained, *e.g.*, Plymouth Exchange recently had only two cases for inquiry, the figures periodically submitted to the Traffic Department as "Call Office Discrepancies" are too hypothetical to be taken at their face value, so, like Tennyson's Brook, they will run on for ever.

REVIEWS.

Wireless Transmission of Photographs. By Marcus J. Martin. The Wireless Press Ltd., 12-13, Henrietta Street, Strand, W.C.2.—This second edition, which has been revised and enlarged, deals with the progress which has been made towards a commercial system of transmitting photographs by telegraph, wireless or otherwise. It is a useful book for those interested in the subject and contains much information which so far as we are aware has not previously been published. Its appendices dealing with selenium cells, the preparation of metals points and lenses are excellent.

THE BAUDOT—X.

BY J. J. T.

AN endeavour has been made to deal all but exhaustively with the distributor and its governor, and readers by this time should have a fairly clear idea of (*a*) the distinct function of the latter, *i.e.*, to maintain a definite and fixed speed, and (*b*) of that of the *correcting* system which is to maintain accurate *phasing* of the terminal distributors. While, however, the two functions cannot be dis-associated entirely the one from the other, they are nevertheless distinct in their action. If the writer be thought somewhat too insistent upon emphasising what to some may appear to be the obvious, it is considered better in this case to err on the side of redundancy in explanation rather than to leave open to doubt a basic principle, the misconception of which, as experience has proved, has provided unfortunate pitfalls for the novice.

There are at present in use in the British service three or four types of Baudot keyboard, but their differences are not fundamental, and it is safe to take the following description as a basis upon which all the latest types have been designed. This design is based upon the French *accrochage mechanique* (mechanical clutch) keyboard and is supplanting, if it has not already completely supplanted, all previous types.

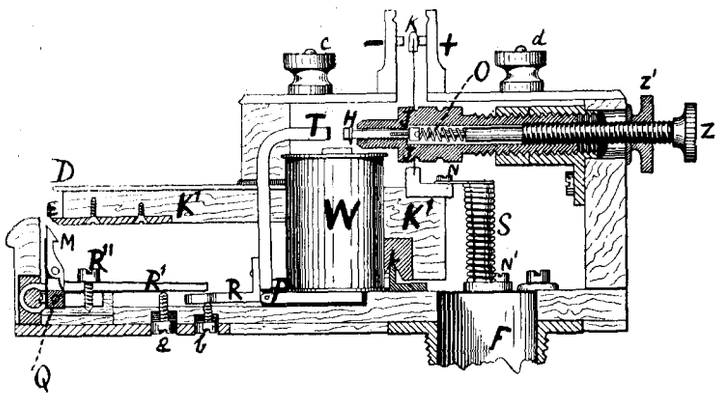


FIG. XXX.

Fig. XXX gives a sectional view showing one of the five keys K^1K^1, the spacing (+) and marking (—) plates and the screws *c* and *d* for keeping the latter in position, &c., &c.

Fig. XXXI gives a ground plan in which the marking and spacing plates, four of the keys, and the dust plate of the switch B are removed.

The keys are balanced on a knife-edge bearing L (Fig. XXX), S, a soft, spiral spring, being fixed at N and N^1 giving the necessary tension for replacement of K^1K^1 after its depression by the operator at the free end D. K is a steel spring fitted with a double platinum contact tip which plays between the spacing (+) and marking (—) plates or stops. Electrical connexion from K is made through N to the spring S, N^1 and thence by a metal strip to the terminals 1—5 (Fig. XXXI). From thence the several connexions are made, by cabling, together with the remaining necessary leads of the keyboard to the various points of the apparatus by means of a distribution or connexion box to be described later. The ultimate connexions of the five keys are their respective segments on Ring II, thence by a pair of distributor brushes to Ring V and the line (see Fig. VII).

Presuming the keyboard now under examination to be that of No. 1 arm of our Baudot set then the five keys would be joined to the first five segments of Ring II, No. 2 keyboard following with the succeeding five segments and so on.

W is an electro-magnet through which, once during each revolution of the distributor brushes, a momentary current is automatically sent from Ring VI (served by a 40 volt local battery) by means of a brush pair connected with Ring III. The receipt of this local current is so timed for each keyboard as to energise the cadence coil W just one or two segemnts before the brushes of the keyboard and line rings (II and V) pass over the corresponding five segments, a time value varying from about one-tenth to one-twentieth of a second according to the type of installation. The action and purpose of this local current is twofold.

Each individual key, when depressed by the operator at the free end D, in its passage downwards pushes the steel under edge E (Fig. XXX) back against a spring clutch M (Figs. XXX and XXXI). Each of these clutches has independent gripping action as regards its respective key but all five clutches are controlled by the self-same *release*, being fixed to a steel axle Q. The axle Q is pivoted into the sides of the keyboard and is placed just under but in front of the five keys. Fixed to Q and projecting inwards at right angles is a steel lever R^1 (Figs. XXX and XXXI) looped at its fixed end so as to afford sufficient tension for adjustment by means of the screw R^{11} which opens or closes the loop and thus brings R^1 in correct relationship to the stop-screw *a* and the lever R. The latter lever is an attachment of the curved armature T. The screws *a* and *b* are also capable of adjustment from underneath the keyboard but once adjusted they need seldom be touched.

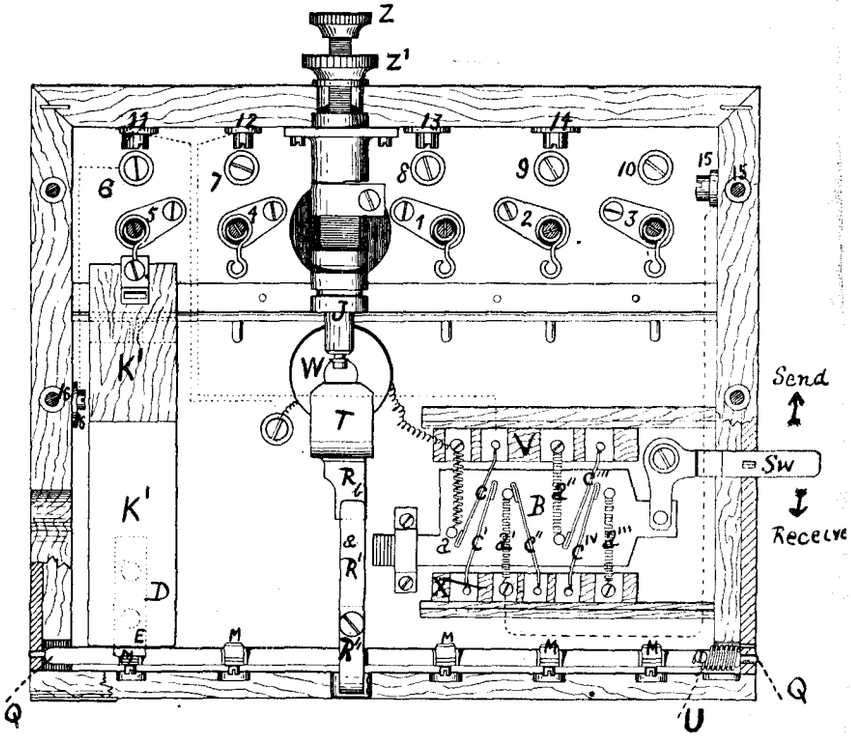


FIG. XXXI.

T, with its attachment R, is pivoted at P and its curved end serves as an armature to the core of the coils W.

Let us suppose that the letter G has been signalled, that is to say Keys 2 and 4 have been depressed. Then, although the operator's fingers may have been instantly removed ready to form the next combination the clutches would continue to hold the two keys down and against the marking plate for practically one entire revolution of the brushes. The keys 1, 3 and 5 would also be held against the spacing plate by their springs and thus the entire permutation would be well maintained while the line brushes were passing over the five respective segments. Meanwhile the brushes of Rings III and VI are travelling towards the local segment of the keyboard through which upon arrival there they transmit the *cadence* current. This, passing through W, energises the coil and attracts the armature T, which, tilting towards the plunger H raises the armature attachment R which throws up R^1 and thus gives a slight throw-back to the axle Q of which the five spring

clutches M actually form a part. This action releases any or all of the keys that may have been clutched, each tension spring S bringing its key back to spacing position against the plate +. A small spiral spring U (Fig. XXXI) attached to the axle Q assists in bringing back the latter with its clutches and their individual springs to the normal position, R falling back on to *b* by gravitative force so soon as the coil W becomes de-energised and ceases to attract T. When T tilts forward as above, it strikes the plunger H and in so doing, coincidently with releasing the clutches, emits a metallic sound which acts as a cadence to the operator and thus gives him the rhythmic cue to make the next combination of keys, and so on at the rate of three letters per second for each keyboard. The plunger is enclosed in the metal cylinder J and is there imprisoned by a screw being also cushioned against the spiral spring O (Fig. XXX). A thumb screw Z with a locking screw Z^1 are available for adjustment of the plunger spring O, but in practice these also, as the screws *a* and *b*, once set should seldom need to be altered. F (Fig. XXX) is a metal tube which passing through an aperture in the table fixes the keyboard in position by a pair of lock-nuts. In the latest type of keyboard this has been removed, the connexions are led out at the back of the keyboard on to flat springs which engage with a strip-connexion fitted to flexible leads and of the requisite number of stud points. The base of the keyboard is covered with green baize and the keyboard remains, by its own weight in any position which may best suit the comfort of the operator.

(*To be continued.*)

RETIREMENT OF MR. J. W. SULLIVAN.

On May 31, 1920, Mr. John William Sullivan, the senior Assistant Superintending Engineer of the North Western District, retired from the service under the age regulation. Those of his colleagues in London and elsewhere who have lost touch with him in recent years will readily recognise the photograph we publish, and will rejoice to know that the hand of time has touched him but lightly. In all essentials, he remains the genial J.W.S. who won the hearts of all he came in contact with throughout his career.

Mr. Sullivan commenced his service in the Post Office as telegraphist at Waterford at the age of fifteen, and was soon after transferred to Cork. In 1877 he joined the "K" Company of the Royal Engineers in which he went through the Egyptian Campaign of 1880-2.

Resuming civil life in 1889 Mr. Sullivan took duty in the Central Telegraph Office, London, where his technical qualifications were quickly recognised. At the trunk transfer he was selected with others for joining up switch sections, and the training of operators in the provinces.

MR. J. W. SULLIVAN.

In December, 1896, Mr. Sullivan was offered and accepted a second class engineership at Bolton. In 1901 he was promoted to first class engineer and transferred to London where he was one of the pioneers of the Post Office telephone service. He was promoted to Assistant Superintending Engineer at Birmingham in May, 1910, and was transferred to Preston in the following year, on the formation of the present North Western District, where he remained until his retirement.

Mr. Sullivan has been vice-chairman of the North Western Centre of the Institution of Post Office Engineers from its inception in 1911, and throughout has taken a lively interest in its proceedings.

A typical son of the Emerald Isle, kindly and lovable, generous to a fault, fluent of speech and versatile of thought, ever ready to advise the less experienced, and to give practical help to those in difficulty, Mr. Sullivan leaves a gap in the service which will take long in filling. That he may live long and continue to brighten the lives of his fellow men is the wish of all who have come under his influence in the North Western District.

At a well attended smoking concert held on May 17 with Mr. T. E. P. Stretche, Superintending Engineer, in the chair, supported by the Engineer-in-Chief, Sir Wm. Noble, Mr. Sullivan was presented with a gold watch and chain subscribed for by the District staff.

Mr. Sullivan was also presented personally by the superintending engineer with a pearl and gold tie pin, and by the clerical staff with a beautifully illustrated *edition de luxe* of the Rubaiyat of Omar Khayyam, containing autographs of the subscribers, while the mechanics expressed their good wishes by a separate presentation which will doubtless afford him some solace during the time of his retirement.

W.J.R.

ALICE IN NUMBERLAND,

BY J. M. MCMILLAN (*London Telephone Service*).

ALICE had got very tired of sitting by her sister on the bank. The patches of sunlight seen through the trees dazzled her eyes, and the faint whir of drowsy insects, the far-off sounds of sleepy birds, and the drone of honey-laden bees, made her feel so sleepy that her head sank lower and lower, till finally her eyes closed altogether, and she slept. What was it that awakened her! She sat up suddenly. Her sister had disappeared, but a voice was ringing in her ears, and the words "Career for Girls" seemed to be vibrant in the air. Why, that was what her father had been talking about last night. She looked round her quickly, but no one was in sight except a white rabbit, and at this moment he scuttled down a hole. "Well," said Alice, "I can't sit here alone any longer. I shall follow him." So without further words, she hurried after the rabbit, and flung herself breathlessly down the hole.

After floating steadily downwards for a few minutes, she found herself standing at a tall door, the handle of which was quite out of her reach. She looked through the window, and saw a number of girls sitting happily together, with such pleasant faces that lonely little Alice stretched out her arms to them; but they did not seem to see her. "May I go in there?" she said timidly to the rabbit, but he only grunted out something which sounded like "Five feet in height without shoes" "Oh, dear," thought Alice, "how vague everything seems to me, and yet I am sure there is a meaning in it somewhere. But I do feel so hungry." "Have a biscuit," said the rabbit, holding out several to her. Alice noticed that they were numbered 13, 14, 15 and 16. She took them gratefully, as she finished each one the rabbit muttering "Thirteen years of age, fourteen years of age, fifteen years of age"; then, when she had eaten the fourth, he said briskly, "That's right. You are now sixteen, and the right height to go through the door. Is your enunciation good," he asked, sharply, as her fingers touched the handle. "I haven't any," she said timidly; and then, with a frightened look at the heavy frown with which her answer was received, she hurriedly turned the handle, and entered.

A hum of many voices smote upon her ears. Strange words floated towards her. "Opal codes; answering jacks; subscribers' multiple"—"What *can* it mean?" said perplexed little Alice. But before she had time to wonder long, several of the girls shouted out "Are you calling?" "Why, of course I am," said Alice indignantly, "but you should say 'How do you do,' when anyone makes a call." This answer was greeted with loud groans and cries of "Ring off." "Certainly not," said Alice, "father gave me this ring for my birthday." At this moment a lion came up to her. "Give the password," he said sharply. Alice answered hurriedly, "Number, please?" and was astonished to see a look of approval on the lion's face. Why she had said these words she could not think, but they were apparently the right ones, and she was told to step forward, and see whether she could recite. Try "'Tis the voice of the sluggard," said the lion briskly. Alice felt rather nervous, as by this time all the girls were looking at her,

but she began at once, though the words sounded strange in her own ears :—

'Tis the voice of the sub., and I heard him complain,
"You have given me sev'ral wrong numbers again.
I know I said '4' when I really meant '2'
But my thoughts should be clearly transparent to you."

At this juncture the lion showed marked annoyance, so Alice continued hurriedly :—

As one in a fury, so he on the line,
In accents of thunder his lot does repine ;
But when to Exchanges they pilot him round,
His voice has a timid and tremulous sound.

"Dear, dear" growled the lion, "this will never do. You will never be allowed to stop here if you say things like that, —although there seems to be a certain amount of sense in it,"— he added, thoughtfully. "However," he said more kindly, as he saw how crestfallen Alice looked, "try 'Will you walk a little faster, said the whiting to the snail.'" Alice felt her memory was not all that it should be, but she began bravely enough :—

"Will you work a little faster," said the sub. to the teleph.
"I've asked you twice for Hop Exchange ; you really must be deaf.
I'm sure you must have seen my little indicator drop ;
Will, you, won't you, will you, won't you, will you give me Hop.
Will you, won't you, will you, won't you, *won't* you give me Hop."

"You're not the only sub," the little maid soliloquised,
She dared not say it loudly, as it wasn't authorised.
"What number did you call," she asked,—the sub. without a stop,
Said, "Will you, won't you, will you, won't you, will you give me Hop ;
Will you, won't you, will you, won't you, *won't* you give me Hop."

The lion was now extremely angry. "You really ought to leave here at once," he said severely, "but you shall have one more chance. Every child should know that beautiful ballad, 'I'll tell thee all ; I can no more.' Let us hear you say it now." Alice dared not disobey, as the lion looked so fierce, and everyone was waiting for her to begin. She started tremblingly, her voice gathering strength as she proceeded :—

I'll tell thee everything I know,
There's little to relate.
I saw a youthful journalist,
A-sitting on a gate.
"Come, tell me, Truthful James," I said,
"How is it that you live ?"
And his answer trickled through my head,
Like water through a sieve.

He said, "I gather subs.' complaints,
And headlines vivid quite,
And work them into lurid *columns*
In the silent night.
And as we only print one side,
It matters not a bit,
If someone writes to say we're wrong,
We do not publish it."

But I was thinking of a way,
To get the *public ear*,
And teach them to co-operate,
And keep their judgment clear.
I shook him well from side to side,
Until his face was blue,
"Come, tell me, Truthful James," I said,
"What is it that you do ?"

He said "If evidence *comes in*
That proves the service good,
I quickly show that white is black,
As any pressman would.
And if it can't be twisted round
As most I would desire,
Why, isn't it an easy thing,
To throw it on the fire ?"

I heard him then, for I had just
Completed a design,
For getting all offending subs.
To pay a heavy fine.
I thanked him much for making clear,
Just how he wrote his news,
But most of all for giving me
Such *fair, unbiassed views.*

And now when I a paper see,
It is my simple creed,
To get a lot of table salt,
And sprinkle all I read.
And when between the paragraphs,
I find the Hymn of Hate,
I weep salt tears of bitterness,
For once again I see him, yes,
That agent from the yellow press
In *modest, unassuming* dress,
And hear his tones of tenderness,
Which seemed to breathe a fond caress,
As his black deeds he did confess,
Full twenty years ago, I guess,—
A-sitting on a gate.

There was much unseemly applause from the girls at the conclusion of this effort, which was too much for the lion. "Your time is up," he said fiercely, and then, as Alice turned to go, a voice said "Trunk call for Alice," and she saw, waiting outside the door, an elephant. She ran out, and he put his trunk fondly round her waist. "This way," he said, kindly, and Alice felt herself led along a path until she reached a large building, to which many coloured threads were running. At the door of the building she saw, in letters of gold, the words :—

"To these, in vision clear,
The aspiring heads of future things appear,
Like mountain-tops whose mists have rolled away."

They seemed to burn and gleam in the soft air, and suddenly Alice felt that here, and here only, would she get at the real meaning of all these puzzling things. She turned to the elephant. "What does it mean," she said softly ; "may I go in there ?" "One day," he said gently, "not yet ; but you may look through the window." He lifted her until she could see in the room. There were a number of girls sitting holding in their hands what were apparently the other ends of the threads which Alice had seen outside the building. They were gold, and blue, and silver, and many other beautiful shades. "These girls are supervisors," murmured her guide, "they have *super* vision—a vision far superior to that of ordinary mankind. By it they are enabled to see right into the minds of those who work for them, so straightening out all kinds of little human difficulties. Sometimes a girl comes looking cross and dispirited ; sometimes disillusionment is plainly shown, or anxiety of mind—all fatal to good working. Sometimes on a hot day, or when a sudden rush of work comes, when to highly strung minds the tension is greatest, the sudden thought of this *super* vision comes gratefully to harassed minds, and changes the blackest thread of thought to a radiant one, and the calls seem not so numerous after all, and the callers less tiresome. For thought is a force, little Alice," he went on gravely, "no one has yet fathomed the effect of mind on mind. Is our influence benevolent—or sinister ? Could we follow the unseen influence of our thoughts, should we smile—or shudder !" The elephant now appeared to be looking into the only dark corner of the room. Alice followed his gaze. There, huddled together, were a few girls. These also were holding threads, but in their slack hands they seemed to be sombre and lifeless, some of them tangled, many of them broken and useless. "What are those," said Alice softly. "They are those," he said, "who have not yet learned 'to overcome by other ways than steel.'" Then, seeing the tears in Alice's eyes, he said, "They are very few now, and will gradually disappear. Now, come," he said more briskly, "I will ask the Gryphon to recite to you before you go." Alice thought she had heard quite enough for one day, but she did not like to refuse, so she listened as patiently as she could. The Gryphon started at once. "The title of it," he announced, "is out of print at present." And this was the rhyme :—

The moon was shining cheerily,
Shining with all its might.
It did its very best to make
The London streets look bright.
Which wasn't odd, because, you see,
It was a Friday night.

The girls in the Exchanges grim,
Their voices soft and low,
So musical and sweetly pitched,

Were sitting in a row.
And no one knew, when work was done,
Just where those girls would go.

The President and Treasurer,
Were walking hand in hand.
They wept like anything to see
Such talent in the land.
"*If we could have a mammoth choir,*"
They said, "it would be grand."

"If we should hire," the President
Remarked, "a hall quite near,
Do you suppose, from all of those,
That twenty would appear?"
"I doubt it," said the Treasurer,
And shed a bitter tear.

"I weep for you," the President
Observed, "and sympathise.
But I shall hire a hall myself,
And watch the numbers rise."
The Treasurer said nothing, but,
"I fear it's hardly wise."

But soon four candidates appeared,
And then another four,
And thick and fast they came at last,
And more and more and more.
All hurrying to Rangers' Hall,
Their spirits brimming o'er.

They came so fast, this gath'ring vast,
Their numbers grew apace.
First trebles, altos, tenors, then
A modicum of bass.
"I told you so," the President
Exclaimed, with smiling face.

"The time has come," the Treasurer said,
"To talk of many things.
Of what our humble aim shall be,
And if, when fame it brings,
We'll take the Albert Hall, and seek
The patronage of kings.

And when our name has spread abroad,
To hear us men will thirst,
And then on an astonished world,
Like meteors we'll burst."
The President said nothing but
"We'd better teach them first."

"Do you suppose," the Treasurer said,
"That such a one there'll be,
Who'll offer to conduct the choir,
Foregoing any fee?"
"I know one," said the President,
"Monsieur Marleyn,—'tis he."
The Secretary, shy, *petite*,
Her eyes with fervour lit,
Said, "If there's much hard work to do,
I'll gladly welcome it."
The President said nothing but
"I do admire your grit."

So everyone in gladsome mood,
About a thousand strong,
Came regularly, week by week,
For practice short or long,
Which wasn't odd, because, you see,
'Twas "Hiawatha's Song."

The President and Treasurer
Were standing side by side,
They looked upon the choristers,
And both were satisfied;
And the conductor smiled, and viewed
His work with honest pride.

"Oh, Choristers," they all exclaimed,
"Your fame is spreading still.
Will you go on from height to height,
And climb from hill to hill?"
The choristers said nothing but
"We will, we will, WE WILL!"

At the conclusion of this recitation, Alice again felt herself lifted up gently. The motion was so pleasant that she closed her eyes, and then, as the movement ceased, she opened them again—to find that she was again sitting on the bank, with her head against her sister's shoulder. "*You have been asleep quite a long time,*" she said. Alice smiled wisely, saying, to the obvious amazement of her sister, "Anyway, I know what I am going to be directly I am five feet in height without shoes!"

EDINBURGH CENTRAL EXCHANGE.

IN some respects Edinburgh Central Exchange is unique. It has 8631 subscribers' lines, and it is a completely combined local and trunk exchange. There are 67 "A" positions, of which 59 are staffed in the busy hour, 9 plug ended "B" positions, 8 jack ended junction positions, and six trunk signalling positions. The number of unvalued calls of all kinds handled daily is 56,625, and all these save 1.4 per cent. are completed by the "A" telephonists. Of the calls completed at the trunk signalling positions only 8 per cent. are liable to over ten minutes delay.

This may be considered as a satisfactory record, and it is due to two main causes. Primarily it is due to the concentration of all the Edinburgh telephone work in one exchange. This, of course, affords great advantages. It means that 87 per cent. of all the calls handled are purely local calls. Then, for ten years before the transfer of the local telephone system to the State, in 1912, a great deal of specialised study was given to trunk line development, with the result that the trunk facilities between Edinburgh and a large number of towns and villages in the East and West of Scotland were gradually improved, and at the outbreak of War a very

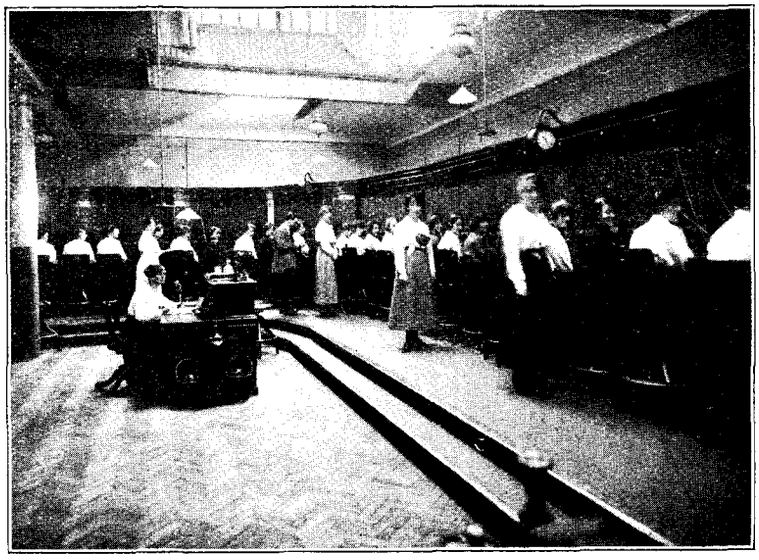
"A" POSITIONS.

efficient trunk system was available. During the war period many trunk lines were taken for emergency purposes, but they have all been restored now, and the advantage to the public of the restoration of these lines has been considerable.

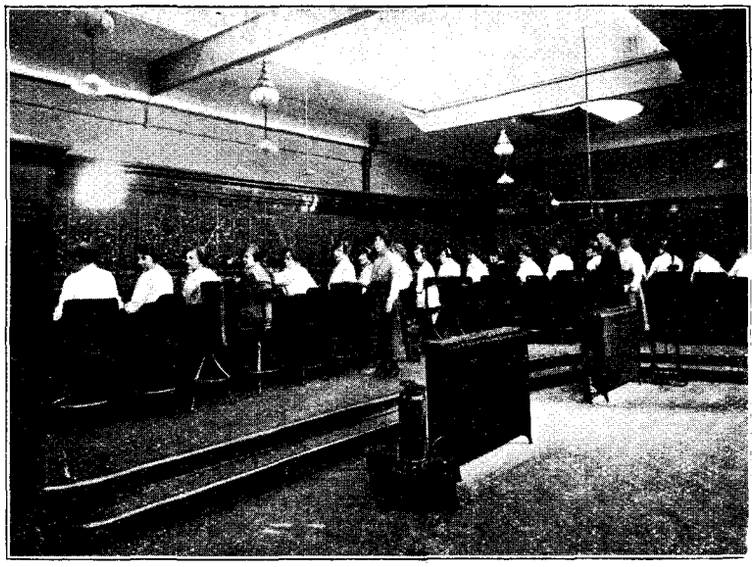
The Central switchboard itself is becoming old, and it cannot be said that it has any features which are specially advantageous. Indeed, it has very serious defects from a traffic point of view. The board is actually a converted common battery signalling (ring through system) board, and its multiple facilities are unusually unfavourable. There are no fewer than four multiples—an ordinary eight panel subscribers' multiple, a four panel junction multiple, a six panel bothway trunk and junction multiple, and a lower subscribers' multiple of eight hundreds, now partly converted to junction multiple. Ultimately the whole of the lower subscribers' multiple will be converted to junction multiple, and when that is done there will be three separate junction multiples. Another serious defect in the board is that there is too much space between the key-board and the base of the main subscribers' multiple. This makes the completion of calls in the higher reaches of the subscribers' multiple particularly difficult, except for tall telephonists, and it has been found necessary to insist on 5 feet 2 inches as the

minimum height for the Edinburgh staff. The information desk is equipped for four monitors, but two additional positions will be added shortly, and the addition will suffice while the exchange exists.

The outgoing junctions and the trunk lines equipped as junctions comprise 190 lines, 74 of which are served by straight and split order wires. A large number of the trunk lines equipped as junctions are both-way circuits and the incoming ends of these are terminated on jack ended junction positions. These positions are fully staffed, and used as special control positions in cases of emergency. The arrangements are such that special control can be resorted to on any group at a moment's notice. All that is necessary is to ask a monitor to instruct the "A" telephonists, on the instruction circuit, to discontinue the control of calls on any particular route. The tickets of calls which pass over the route to be specially controlled are then placed in receptacles fitted to the backs of the telephonists' chairs, from which they are conveyed to the special control positions. Special control on a route can, of course, be discontinued as quickly as it is introduced, through the monitor. This arrangement is very flexible, and it has proved a great success. Again, if any of the outside exchanges which control calls to the places reached over the multipled trunk lines experience difficulty in getting through, the call delayed is passed to what is designated "Delayed trunks," which is really the special control positions described, and the controlling exchange is put into communication with the distant exchange by the special control telephonist at Edinburgh. Thus periodical delays and difficulties are overcome without disadvantage to the ordinary business. Such a flexible special control arrangement might well be adopted generally when ordinary junction routes are temporarily congested.

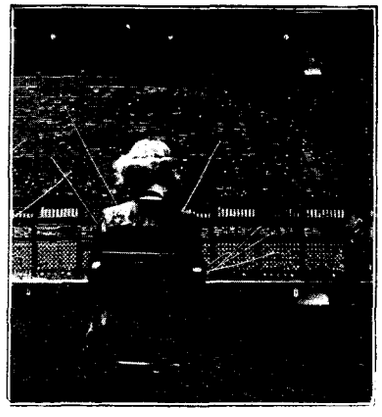


"A" POSITIONS AND SUPERVISOR'S DESK



"B" POSITIONS.

TRUNK SIGNALLING POSITIONS AND MONITOR'S WORK.



SECTIONS SHOWING SUBSCRIBERS' JUNCTION MULTIPLE.

The day staff attached to the Central Exchange is 12 supervising officers and 139 telephonists, and the night staff is seven full-time operators and 23 part time operators. The hours of the day staff extend from 7 a.m. to 8.30 p.m., but during the War the exchange was staffed night and day by female telephonists. The day staff volunteered for night duty, and the way they conducted the business of the exchange reflects great credit on them. The average time taken to plug in and answer a subscriber's call is 4.5 seconds, while the average time of disconnexion is 3.6 seconds, and the average time occupied in the total operation of a call 8.1 seconds.

The percentage of operating irregularities has always been low, and it still remains at approximately 3.5 per cent.

But there is another factor which operates favourably at Edinburgh, and must not be overlooked, and it is the exceptionable ability and zeal of Miss Johnson, the supervisor-in-charge, who has been the chief officer since the exchange was opened. The organisation of the exchange is immediately under the control of Mr. J. A. Matheson, formerly its exchange manager, who also displays great ability and enthusiasm in his work. He received that rare kind of training in engineering, as well as traffic, in early life, which the National Telephone Company was able to give its officers, and the benefit to the service of that wide knowledge is inestimable in so large and complex an exchange as Edinburgh Central.

The exchange has difficult traffic problems, and they will become more difficult as time goes on. When another exchange is opened in Edinburgh conditions will not be so favourable as they are now, and if the present standard of service is to be maintained even greater application on the part of the traffic officers will be necessary. Any serious congestion on the trunk lines equipped as junctions would have a serious effect on the service, and, therefore, it is of the greatest importance that the development of the trunk traffic should be studied with the greatest assiduity, in order that increase of work, calculated to congest routes, may be foreseen and provided for well in advance.

Mr. A. F. Dunn, of the District Office, kindly took some of the photographs illustrating the exchange.

TELEGRAPHIC DELAY DURING THE SUMMER PERIOD: CAN IT BE REMEDIED?

BY A. WILKINSON, Leeds.

As the subject of delay on ordinary telegrams during the summer period does not appear to have been raised as a separate matter at the last Superintending Officers' Conference it may perhaps be suitable for consideration in these columns. It is an old question and all that can be said about it must necessarily be a re-statement of facts quite familiar to Telegraph Supervisors; yet some practical result may possibly come from directing fresh attention to a matter common to all large offices, as well as to many smaller ones.

The delay to which it is intended to refer is that met with during the busiest period of each year—the period of what is called "Season pressure." *It has come to be generally regarded as unavoidable*, and the natural consequence of the irregular flow and volume of traffic peculiar to telegraph work at that time of the year. Still, if a satisfactory remedy for it can be found, a big step will have been taken towards re-establishing the credit of the telegraphs as an expeditious and dependable service. As regards delay generally, it must be admitted that we have much of the history of recent years to live down, although, in the circumstances, the public were being well served during the difficult times of the war period.

The nature of the Season traffic mainly contributing to periodical congestion is well known, but it may be permissible to restate it. Each of the largest centres has its share of some form of Season work due to various causes, such as the Jersey potato trade, fruit and vegetable growing, herring fishing, heavy holiday traffic, or tipsters' and betting telegrams. At certain periods of the day, usually between 10 a.m. and 2 p.m., rapid increases in volume are experienced often beyond the capacity of the channels and staff provided—staffing calculated for all circumstances that can be foreseen, but with an operator average standard in view. As far as the Leeds office is concerned, it may be said, the congested traffic is chiefly on the Morse key-worked circuits dealing with cross-country telegrams to other large provincial centres. The Leeds-London commercial traffic shows a fairly constant figure dealt with by the Baudot system at a low figure of average delay, and London, in this instance, may be left out of consideration.

The result of this sudden increase of traffic is heavily loaded circuits and serious delay, unless it can be promptly met by the provision of fresh channels and telegraphists to staff them. Frequently when one office is in a position to do this, another cannot comply quickly, and so unfavourable conditions at one office re-act upon another. Facilities for diversion of traffic through other channels, with an extra transmission, are frequently not easy to obtain, nor always advisable, for it is usually the case that all other large offices are experiencing similar pressure about the same time. The minor circuits have also their extra pressure to deal with, and when these happen to be worked from a concentrator position many incoming calls have to be answered by "MQ's," resulting later in complaints from the District Surveyor. This is just an indication of difficulties at no one particular office, but common to most in the period of pressure, and it is the situation understood when explanations are required afterwards and we say—"the delay was due to Season pressure and was unavoidable."

Is delay due to Season pressure unavoidable, and is it to be regarded as irremediable? There appears to be something defective in the telegraph system if it cannot prevent a good deal of it. The remedy is, of course, more channels and more staff at the right moment. Additional wires are not always immediately available and sometimes not to be obtained at all; but generally it is the extra staff that cannot be found, either to work the fresh lines, or existing systems—such as quadruplexes—up to their fullest capacity; and where is this extra staff to be found to meet an unexpected rise in traffic when the staffing, already provided to deal with all contingencies that could have been foreseen, has been absorbed? It may be that our staffing methods are too rigid to cope successfully with the "jumpiness" of telegraph traffic; and as the latter cannot be made to flow evenly it appears as though this liability to sudden increase should be regarded as emergency work, and emergency staff provided to deal with it, over and above the staff estimated for anticipated requirements. To do this it would be necessary to consider the matter from the point of view of low delay, and the operator-output standard of 24 per hour for the day would have to be subordinated to it within reasonable limits, that is, all offices, at which it was deemed advisable to adopt this practice, would be obliged to employ the necessary extra staff to keep circuit delay down to a definite standard, say, of 15 minutes maximum on the heavily loaded channels and 10 minutes maximum on the lighter ones—in short to work to a "low delay" standard. With a view to this being conformed to, an "Hourly Check of Delay" sheet might be kept showing the maximum delay each hour at the principal circuits, the concentrator and the phonogram positions. Such a return, causing little trouble to compile is used at the Leeds office between 10 a.m. and 6 p.m., and is found to be a valuable guide for the Floor Superintendent. From an operator-average point of view there would, of course, be some risk of wastage of staff, but instrument room superintending officers, with better opportunities of co-operation between office and office, could be relied upon to get the best results with the least possible loss.

The difficulty sometimes encountered of obtaining extra wires has been referred to, but this would be overcome in many cases if the necessary staff could be assured.

Improved systems capable of more rapid transmission will probably do much in the reduction of delay; the "split" or extended Baudôt holds out many possibilities of direct working between offices not now connected, or in the economical use of main lines and the release of lengths for other purposes. But in the meantime, something might be done towards making the present staffing arrangements in the large telegraph centres sufficiently *elastic to deal satisfactorily with irregular movements of traffic during* the next busy season, for, though not the sole cause of delay, inadequate staffing is usually the chief one. In any case the outstanding importance of effecting quicker telegraphic transmission by any method is recognised by everyone, for it will be of small consequence even if we succeed in reducing noise in instrument rooms, or in compelling proper attention to waste-paper baskets, if we are unable to devise remedies for the substantial reduction of delay on telegrams.

Briefly enumerated, therefore, the points recommended for consideration are:

(*a*) That in the summer period the standard of working which should be adopted is one of LOW DELAY not, as at present, the operator-average.

(*b*) That there should be close and systematised co-operation as between office and office, with the object of better attaining such standard.

(*c*) That controlling officers should be free in the summer period, to adjust the staff as their experience dictates without such restriction as is at present imposed by having to cater not only for the Season work, but at the same time for the operating-average.

With practically all the trained telegraphists back again in their old positions, and (it is hoped) more settled industrial conditions in the country, it may be that the year 1920 will present the first real opportunity for six years of providing an efficient and speedier service. To quote Mr. John Lee in speaking of the Telegraph Service—"Efficiency is its only advertisement." The time and the conditions then seem to be opportune for the trial of any plan likely to effect improvement and give the service all the publicity it needs in that direction. If such an obstacle to efficiency as "Season" delay cannot be removed to a substantial extent by the remedies just now suggested, and made purely from an instrument room supervisor's point of view—perhaps this short paper may have the effect of arousing a new interest in an old trouble and producing a better solution of the problem from another source.

The Telegraph and Telephone Journal.

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

Editing and Organising Committee - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - - W. H. GUNSTON.

NOTICES.

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

VOL. VI. JULY, 1920. No. 64.

TELEPHONE PROGRESS.

THE tables of telegraphic statistics published in the *Journal Télégraphique* for May are not very instructive owing to the absence of the figures for the principal European countries, which have not furnished any information since the beginning of the war. Nor for the same reason are the telephonic statistics when they are issued likely to be any more complete.

Whilst, therefore, we are unable at present to make any useful comparison between the development of this country and that of foreign states, we are nevertheless able in reviewing the telephone statistics of Great Britain for the beginning of the year 1920 to observe the enormous expansion of the service during the past twenty years. The total number of telephone stations in the country on Dec. 31 last, was about 910,700 or about 1 to every 51 inhabitants. They were distributed in the great towns as follows :—

London ...	...	311,350	or 1	to	every 23	inhabitants.
Glasgow	...	40,693	,,	,,	29	,,
Liverpool	...	38,493	,,	,,	30	,,
Manchester	...	37,748	,,	,,	33	,,
Birmingham	...	24,528	,,	,,	46	,,
Edinburgh	...	17,224	,,	,,	29	,,

In October 1893 (about the period when they had acquired all the more important subsidiary telephone companies) the National Telephone Company issued their first half-yearly list of exchanges and lines. On referring to this we find that there were in that year 64,041 subscribers' lines in the United Kingdom, to which should be added some thousand lines connected with the Post Office system. Of these 9,946 were in London, and Liverpool was a very good second with 5,926 lines. In 1899 the figures are first given in the form of telephone "stations," the general unit of comparison for telephone statistics, and the total for the Kingdom appears as 169,925, and for London as 35,697. By 1905 these figures had become 427,160 and 112,114 respectively, by which it will be seen that the London system had trebled itself in six years, a result largely due to the entry of the Post Office into the field and the introduction of the message rate in 1901. In 1911 the year of the transfer of the Company's system to the Post Office the total for the country was 701,400 stations and that for London 220,782, so that London had doubled the number of its telephones in that six years. Another six years brings us into the midst of the war (1917) but, notwithstanding three and a half years practical stagnation—(there was an actual decrease in 1916)—the British telephone system had increased to 828,175 and that of London to about 277,500; and two years later, as above shown, after one year of qualified Peace, the figures had reached 910,700 and 311,350.

Mr. Pike Pease was recently able to inform the House of Commons that the telephone system increased last year at the rate of 7.1 per cent., whilst the American system had increased in the same year at the rate of 5.5 per cent. The statement seemed to annoy some of the critics of the Post Office, but the comparison is useful as showing that telephone systems could not be expected to develop at a normal rate of increase in abnormal times either here or in America.

The development of the telephone system was gradual and somewhat slow from its inception in 1879 until the beginning of the present century. But between the years 1901 and 1914 rapid development took place, the grand total rising from 226,000 to 815,206 in the 14 years, an average rate of increase of nearly 42,100 stations a year. Yet upwards of 56,000 stations were added to the system in 1919, so that whilst, as we are well aware, the rate of growth (owing to lack of plant in various districts and the difficulty of obtaining prompt and adequate supplies of manufactured material) is far behind the requirements of the community, this is by no means a contemptible record.

HIC ET UBIQUE.

OUR new contemporary *The Indian Telegraph Magazine* has the following amusing story :—

The postmaster of a small combined office at a hill station was, one day, alarmed at a tiger peeping over the telegraph counter. Summoning up his courage, he quietly bolted the office door from inside, and flashed an XP message to his superintendent, "Infringement of Telegraph Act No. 23, situation serious, pray order prosecution," and received the prompt reply, "Arrest offender, apply police help if necessary." The striped beast had by this time grown weary of the telegraph office, and eventually had gone its own way into the jungle.

Further correspondence ensued, the postmaster maintaining that the arrest was postponed not on account of any dilatoriness on his own part, but for lack of sufficient evidence to establish the guilt in a court of law!

A SELECT Committee of the House of Commons has been appointed to examine the present charges made to the public for the use of the telephone service and to report in what respect these charges require revision in order to place the service on a remunerative basis. The Committee will consist of Sir Edward Coates (Lewisham), Sir Harry Britain (Acton), Mr. E. M. Archdale (Fermanagh), Capt. Sir Ian Hamilton Benn (Greenwich), Mr. Briant (Lambeth), Mr. Tyson Wilson (West Houghton), Mr. John Robertson (Bothwell), Mr. Carr (Carlisle) and Mr. Purchase (Kennington).

MANY additions to our ever increasing body of subscribers abroad have been made since the commencement of the current volume. New readers have been enrolled in Antwerp, Brussels, Christiania, Tvedestrand (Norway), Rotterdam, Cologne, Berlin, Vienna, Buda-Pest, Prague, Belgrade, Zurich, Rome, Oporto and Constantinople in Europe; in Peking, Hyderabad, Lahore, Calcutta and in Palestine (Asia); in Nairobi, St. Vincent (Cape Verde), Ebute Mette, Kaduna, Port Harcourt and Lagos (Nigeria), and Accra (Gold Coast) in Africa; and in Bogota, Para and Rosario (South America).

BELGIUM appears to have made a rapid recovery from the dismantling of its telephone system by the Germans during their occupation of the country. There were at the beginning of this year 30,383 subscribers' stations working, of which 10,813 were in Brussels, 5,348 in Antwerp, 2,606 in Liège, and 1,589 in Ghent.

RECENTLY a certain would-be client of the Post Office, after unsuccessful attempts from two London call offices to obtain communication with the party desired, vented his wrath on the unoffending apparatus, which he proceeded to destroy, severing the cord and putting the receiver in his pocket. An arrest was the natural outcome of this escapade, which cost the offender somewhat dearly in the police court.

Wild Ghazals.

I.

THE perfume of the wine-cup and the zest of it,
The nightingale, the rose, and all the rest of it—
The fair one's cheeks and hyacinthine curls—
These may I not sing here, but make the best of it
With poles like cedars tall which climb the hill,
Symmetrically spaced up to the crest of it:
Or copper wires gleaming like burnished gold.
Can magic not be found by those in quest of it?
Distance annihilated in a flash,
The eastern world in converse with the west of it,
What need have we of Djinns' unearthly power,
With telegraph and telephone possessed of it?
Hafiz! though slight the theme of this ghazal
So that it rhyme aright—be that the test of it.

II.

O Soul! War not with the Inanimáte, like him
They tell of lately; but if thou shouldst wait, like him,
Unheeded by some fair Slave of the Ring,
Call Allah's curse down, or intone a hate-like hymn;
But do not cut the silken cord of speech,
Nor the receiver try to sequestrate like him,
Lest for thy prank, before the Qádi haled,
The damage thou mayst have to liquidate like him.

W. H. GUNSTON.

THE LORD MAYOR AND CORPORATION AT THE C.T.O.

THE visit of the Lord Mayor and Corporation to the Central Telegraph Office arose out of a simple incident. It happened that at a civic luncheon at the Guildhall Sir William Noble was called upon to respond to a toast and I was called upon to respond to another. Both of us, in different ways, pointed out to the Lord Mayor, the Aldermen and Sheriffs that it was a curious fact that the great building at the end of Cheapside, which we knew to be the nerve centre of the Empire, possibly of the world, was not generally realised by the citizens of London as being more than a vast building which had stood there in inoffensive silence for half a century. The Germans knew it for what it was, and paid it the compliment of bombing. In this way the august leaders of the City of London were invited. We all set to work to prepare a careful organization for the historic event. The Office of Works laid a beautiful carpet in the great vestibule—the carpet on which the King and Queen stood at their Coronation. Guides were chosen from every grade of the telegraph staff and each had his (or her) itinerary—for among the guides was the due proportion of women. Provincial offices and continental offices co-operated and sent admirably-worded messages of greeting at what I suppose must be called the psychological moment. The visitors' book—a wonderful book, by the way, of which more must be said in the JOURNAL some day—was duly signed on a page which one of our brethren had exquisitely illuminated, including in his design the arms of the City of London.

And the man with the cinema was there. He was ready with his whirling mystery in that bad quarter of an hour when the Imperial Cable chose to be obstinate. I think I can honestly call it for us all a bad quarter of an hour. A message of greeting was on its way from Australia. It had left Sydney and come to Norfolk Island and Fiji, and Vancouver and Winnipeg and Montreal, and had reached Halifax, Nova Scotia. The Pacific Cable and the Canadian land-lines had done their work well and—the Imperial Cable failed us. However, we were immensely relieved when it "came right" in the nick of time and the message began to fashion itself on the siphon and then on the Creed printer, and Mr. Illingworth passed it to the Lord Mayor and the cinema man rejoiced to turn his handle and we all beamed through the traces of tears. If we had had tears to shed the bad quarter of an hour was the moment.

What did the visitors think of it all? They were profoundly impressed. They were amazed. The Lord Mayor left a delightful message which was posted up for the staff. One of the visitors told me that at first when I allotted him a woman guide he was disappointed, but at the end—he had learned something of the place a woman can take in organised industry. "I suppose it is a new venture," he added. New, indeed? It is half-a-century old—and in this very building. Somehow they were so interested and so friendly a gathering. The Lady Mayoress, as delightfully unconventional as she was charming, led the way in an intimacy which touched us all. These are the great magnates of the greatest city in the world and they came and we were friends and fellow-workers for the public good. That is what made the visit so memorable. It was not formal nor sedate nor chilled by dignity. We who work in the C.T.O. are lovers of it and are not ashamed of our love. Those of us who have come later have learned the same deep affection and we are not to be jealous or narrow about it, but determined to share it. Even the Imperial Cable, after a fit of disconnected obstinacy, was warmed into response. And the cinema man did his work well and made, of some of us, quite tolerable pictures, and of others—well, we knew ourselves, and that, with the material available, was an achievement on the part of the cinema man.

J. L.

WIRELESS IN WARFARE.

HOW THE AEROPLANE DIRECTED THE GUNS.

(By permission of the Air Ministry).

IT has been suggested that, as many P.O. Telegraphists joined the R.F.C. (now R.A.F.) to become wireless operators, an account of their work might be of interest to the readers of this JOURNAL. This is a subject which one approaches with considerable reluctance. A disillusioned world is weary of war topics. Whether we have served overseas, or whether we have shared the no less exacting *role* of the watchers at home, those

> "To whom no signal comes,
> Except the roll of distant drums"

whatever part Destiny may have called us to play. we have all been walking through a world dark with griefs and graves, and for most of us the supreme craving of the present hour is to forget.

But part of the history of those tragic days will never be forgotten. The story of our country's achievements is one that memory will carry proudly through the years. And that story would certainly not be complete without some reference to the way in which wireless contributed to victory.

It has not yet been finally decided which nation won the war. When passing through Boulogne last spring we noticed a chalk inscription in French on the railway station wall: "The war was won by the French." Another hand had added, in English, "And the Americans." While yet a third had scrawled underneath, "But the British did the fighting!"

Similarly, people argue that the war was won by one particular arm of the service. The infantryman ascribes it all to the rifle and bayonet, while the machine gunner extols the "coffee mill" as our French friends term the machine gun.

The fact, of course, was that victory was due to the splendid co-operation of all arms. The war could not have been won without "the other fellow." And no finer example of this truth can be found than in the system of co-operation between aeroplanes an artillery. As most people know, all our machines used on observation work were fitted with wireless. Four or five little accumulators, which could be held in one hand, supplied the electrical energy: the transmitter, not much larger than a cigar box, was tucked away behind one of the seats: an ordinary single current Morse key was fitted within easy reach of the observer's hand and about a couple of hundred feet of stranded copper wire, wound on a drum which closely resembled a big fishing reel, formed the aerial, one end of which carried a leaden weight.

A little trigger was provided for releasing the drum and allowing the aerial to trail below and behind the machine, whilst the engine and metal work served in place of an earth connexion. A range of ten or twelve miles was obtained with this miniature set.

The receiving station included a light 30 foot mast, built in 8 sections, an aerial about 120 feet long being stretched from this mast to a ten foot pole. Very often the mast was dispensed with and a tree or a house wall used instead. During a "strafe" an operator in an exposed position might have his aerial shot down half a dozen times in a day. Sites could not be selected haphazard. Woods and low-lying ground had to be avoided on account of their "screening" effect and the aerial had to be parallel with the line of fire of the guns, because an aerial of the type used had a strongly marked "directional" effect, which gave a much greater range in one direction than in any other. The final selection was, like most other things, a compromise.

A compact wooden chest called a "tuner" contained all the receiving apparatus and the complete station could be set up by a couple of smart men in ten minutes.

Each station was supplied with a pair of "earth mats" for making a good connexion to earth. These "mats" were of finely woven copper wire, about 10 feet by 2 feet and a pair of them made one of the most luxurious hammocks imaginable. So much so, that it was advisable to bury them at once. Otherwise they would mysteriously vanish. Not that anyone would *steal* them! So crude and harsh a word was never even named among us. Things were simply lost and won. The wireless operator lost a pair of earth mats and someone else, possibly a sergeant-major—won a deliciously "comfy" bed. Loss and gain: so runs the great law of life.

It was futile to approach the O.C. with "a lamentation and a tale of wrong." He would order you to pay for a new pair of mats and most likely "crime" you in addition for carelessness in losing the others.

The "tuner" was usually installed in, or near to, the Battery Commander's dug-out and range corrections were given by the observer in "clock code." The target was taken to be the centre of an imaginary clock face with the figures 12 and 6 coinciding with North and South.

A. B. C. D. E. and F. were imaginary rings, 50, 100, 200, 300, 400 and 500 yards respectively from the target. If, for example, a shot fell 200 yards from the target where 3 would come on a clock face the observer would signal, "C. 3." The Battery Commander would then work out the necessary correction for range and elevation and try again until "O.K." was signalled.

Before a pilot or an observer went overseas he had to pass a number of tests at a Training Squadron in England. Photography, machine-gunnery, bomb dropping and artillery observation were among the side lines which had to be learned in a few brief weeks. Down in Essex we had a large field set apart for instruction in "spotting" for artillery fire. A large white cross in the centre of the field represented the target and lengths of cable containing twin copper wires were led from an exploder to various spots at measured distances from the target, 100 yards, 400 yards, etc., in all directions. A detonator and a bag of gunpowder were attached to the free ends of each cable.

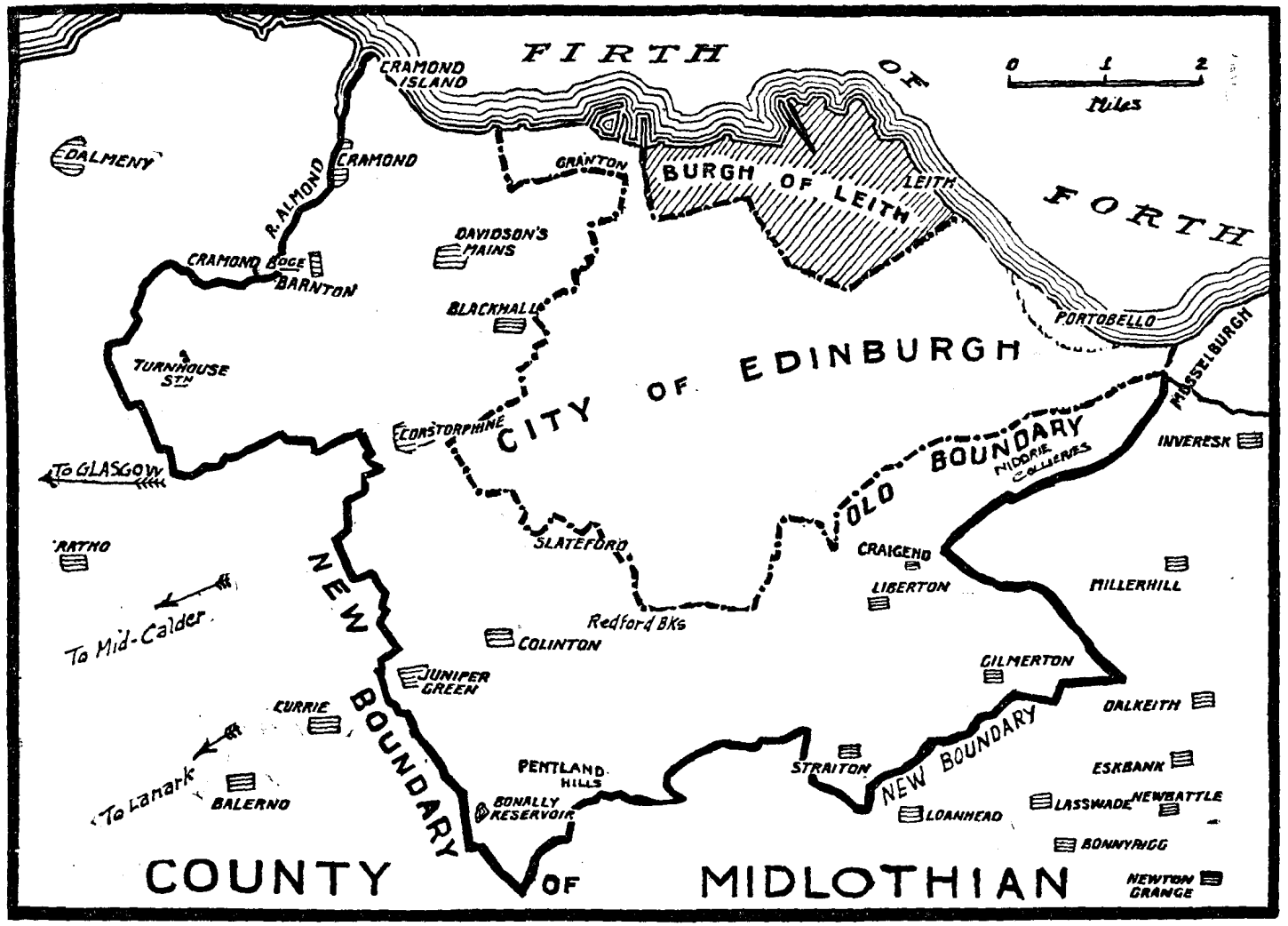
The observer under instruction (they were playfully described as "Huns" on account of the number and variety of things they destroyed) went up to 5,000 feet, let out his aerial—if he remembered—called up a little wireless station near the target, and the "shoot" was carried out as near as possible under active service conditions. Each bag of powder, as it was exploded, made a flash and a ball of smoke like a bursting shell, and the observer had to signal the distance from the target in clock code.

There were three of us attached to this Squadron as wireless operators. We had plenty of spare cable and gunpowder and, best of all, a real sport of an O.C., who loved to see people get the wind up. On our spare moments, on "dud" flying days and the like, we set before ourselves the praiseworthy ideal of relieving the dull monotony of military life on that aerodrome. This we did by laying cable and secreting a detonator and powder at strategic points, after which we "faded away" to our tent and waited a favourable moment to work the exploder. One of our victims jumped clean into a brook! There was quite a decent but harmless explosion beside him just as he was stooping to fill a water can. True, we had a reverse one day when a Staff Officer happened to be visiting the aerodrome unexpectedly—but that is another story.

Further practice in artillery observation was afforded on Salisbury Plain, where actual "shoots" were carried out in co-operation with 60-pounder batteries, so that by the time the observer arrived in France he had a good idea of the general nature of his work. In the early days of the war an aeroplane was told off to work with a specified battery and the target—an ammunition dump, a lorry park, a trench, an enemy battery, etc.—was frequently agreed upon beforehand.

GREATER EDINBURGH.

THE NEW CITY AREA.



As will be seen from the accompanying map, Greater Edinburgh comprises besides Leith a large suburban area, which includes Cramond, Barnton, Turnhouse, Juniper Green, part of the Pentland Hills, Straiton, Gilmerton, and Niddrie. Musselburgh and Inveresk remain outside. The total area is about 34,000 acres, with a population, according to the 1911 Census, of about 433,000, and a valuation roll of £4,200,000.

PARLIAMENT IN SESSION.

PEACE IN EUROPE.

MINES AND RAILWAY FARES AT HOME.

WESTMINSTER, Thursday.

It is a gift of the Prime Minister to breathe the suggestion of personal success and a vice of the present Opposition, even when all has gone as they would have wished, to convey the impression that they are defeated and disappointed. When Mr Lloyd George read the reply of the Boulogne Conference to the Soviet Note in relation to peace with Poland it was from the Opposition that all the outcry came, though in other circumstances complaint might have been heard from a section of the Government's own supporters. Instead the whole Coalition united in shouting at Commander Kenworthy and Captain Wedgwood Benn. The Prime Minister astutely prefaced his report of the Boulogne Conference with the expression of the hope that the House would not accept the statements of the sensational and inaccurate Press. Certainly the text of the Allies' reply to the Soviet Government on the proposed London Conference was a flat contradiction of many of those statements. The reply, agreed to by all the Allies, and the drafting mostly done by French hands, intimated that if the Allied Governments were to meet the delegates with any chance of success the delegates of the Polish Government and other border States must also be present. The Conference should have as its essential object the re-establishment of peace in Europe, and in the first place between Poland and Russia on conditions which would secure the independence of Poland and the legitimate interests of both countries. After a settlement of that and outstanding questions between the Soviet Government and the border States, the Conference would proceed to deal with matters in dispute between the Government of Soviet Russia and the Allies, and to re-establish [illegible] of normal [illegible]

POLISH FRONT.

HEAVY FIGHTING.

WARSAW, July 28.—The bulletin of the Polish Staff states:—

Heavy fighting is proceeding along the whole front.

The Poles are putting up a stiff resistance, and have repulsed numerous attacks along the River Rokolda and in the Baritza region.

The Bolsheviks entered Sokola, on the high road from Grodno.

The Poles evacuated Brody.

On the banks of the Dniester the Bolsheviks occupied Lubianca and Czarna Karcema.—Reuter.

MEETING BETWEEN MINISTERS AND ALLIED MISSIONS.

WARSAW, July 29.—An official bulletin announces that in the northern sector the Poles occupy the line Grajevo-Vsowiec-Kamienic-Litowski-Kobrynj.

The Polesian Armies have withdrawn their left wing further to the south-west in order to maintain contact with the Northern armies.

As the result of a meeting between the Polish Ministers and the British and French Missions, it was decided to act promptly in order to avoid delay in granting Allied assistance in the event of failure to conclude an armistice.—Reuter.

FRENCH MISSION IN WARSAW.

DIFFICULTIES WITH MARSHAL PILSUDSKI.

PARIS, July 29.—The *Matin* announces that the first report has been received from the French Mission in Warsaw, from which it would appear that some difficulty is being experienced in the negotiations with the Polish Chief of State, Marshal Pilsudski, who refuses to see the situation as it is. It was only after great difficulty, adds the newspaper, that Marshal Pilsudski was induced to allow Allied officers to play an effective rôle in the Polish Army. General Weygand, however, is not discouraged, and the situation is not irremediably compromised.

The Allies, the paper adds, have counselled Poland to sign an Armistice, but not to show any haste in entering into political pourparlers with the Soviet Government.—Reuter.

POSITION CAPABLE OF BEING RETRIEVED.

THE FAR EAST.

AMERICA AND JAPAN.

U.S. SECRETARY OF STATE CONFERS WITH BRITISH DIPLOMATISTS.

WASHINGTON, July 29.—The Government is paying close attention to relations between America and Japan, and to Japan's general policy in the Far East, in view of the effect of that policy on questions involved by withdrawal of the American troops from Siberia, the signing of the Consortium Loan Agreement, the assumption by the Japanese of control of the Chinese Eastern Railroad, and occupation of Northern Sakhalien.

Mr Colby, Secretary of State, has conferred with the British Ambassador to America and the British Minister to China.

British interests in China and Japan are regarded as running parallel to some extent to those of America, owing to the business transactions of those countries with Canada and Australia, and the common desire of the two Governments and of the American Pacific States to find a solution of the Oriental labour problem.

Both Britain and America are understood to desire the preservation of the international character of the Chinese Eastern Railroad, in order to ensure the maintenance of the open door.

The United States is reluctant to agree to the occupation of Northern Sakhalien by Japan.—Reuter.

EMPEROR OF JAPAN.

TOKIO, July 26.—It was announced in the House of Representatives to-day that the Emperor's health was improving, and that there was no cause for apprehension. His Majesty will start for Nikko on Tuesday.—Reuter.

MANDATES AND OILFIELDS.

AMERICAN DEMAND FOR EQUAL OPPORTUNITIES.

WASHINGTON, July 29.—It is learned at the State Department that representations have been made to Great Britain regarding equal opportunities for

The observer, after locating his target, would let out his aerial and call up the battery, giving his squadron call and the number of his machine followed by the code letter " B " (Are you receiving my signals ?) The operator down with the battery could not reply by wireless, but he was provided with " ground strips "—strips of white oilcloth about 12 feet by 1 foot—which were spread out on the ground to form letters or signs.

" K," for instance meant, " Yes."

" $\underline{\Delta}$ " meant " Am receiving your signals, but guns will not be ready to fire for another ten minutes."

These ground strip signals could be read from a great distance in clear weather, but they were for this reason a source of danger since they gave away the position of the battery to any prowling Boche machine. Even a track across the snow made by men walking to and fro after dark has been sufficient to cause the destruction of a battery next day. Hence a battery commander would only allow ground strips to be put out when absolutely necessary and for the shortest possible time.

Usually the observer flew over the target in a kind of figure of eight and a practised wireless operator could tell each time the aeroplane turned round by the difference in the strength of signals due to the altered direction of the aerial. The observer gave the signal to fire as he was coming into a good position to see the target and as soon as the shell had burst he gave the correction in clock code. This system under favourable conditions was equivalent to giving the gun a waving tentacle several miles long which saw the effect of each shot.

Such was the method employed in the earlier period and, as the batteries were strictly rationed in respect of shells, the life of a wireless operator was by comparison a fairly easy one. But as the war moved to its climax and the fighting took on a grimmer phase the use of wireless in conjunction with artillery was developed into an elaborate science and the work of an operator attached to a battery became correspondingly more complex and responsible. Normally two operators were detailed to a battery, but if casualties were numerous an operator often had to carry on by himself from dawn to dark.

As the number of aeroplanes multiplied, " jambing "—the great drawback of wireless—became more acute. " Jambing," as the name implies, refers to the general mix up which results from the reception of two or more sets of signals at once in the same instrument. Sometimes it was done deliberately by the enemy ; much of it was due to several machines sending simultaneously in the same locality and the R.E. ground stations contributed their share.

An ingenious scheme was introduced which ensured that each machine working in a given area should have a different length of aerial and consequently a different wave length. (It was found that, roughly speaking, 100 feet of aerial in flight gave a wave length of 100 metres). The nuisance could be further mitigated by " tuning " the receiver to the sharpest possible degree and every operator was trained to read through interference. But we could not legislate for the French 'planes, whose signals, sent out on a " plain " aerial, no operator could cut out, tune he never so delicately. He could only curse fervently and make the best of a bad job.

For military purposes the maps of the battle area were divided into sections each enclosing about 12 square miles. Each section was subdivided by means of letters and figures until a square containing 250 square yards, or in some cases 25 square yards, was reached. A target on one of these maps, *e.g.*, H.1.a. 27.39 was termed a pin-point.

Under the " Zone call," system a certain area was allotted to a squadron to patrol and certain batteries were told off to fire into that area, observers and battery commanders being supplied with exactly similar maps. The field guns, 18 and 60 pounders, in fours or sixes, generally came nearest to the line and behind them the heavier guns, 6 inch, 8 inch, 9.2 inch, up to monsters of 12 inch and 15 inch, some of which fired a shell weighing over half a ton. Each battery had its little wireless station and all the batteries were linked to headquarters by field telephone.

An elaborate, but efficient code of signals was evolved, by means of which any observer, whenever he saw a suitable target, could immediately call for fire from a battery of guns and howitzers combined. Certain prefixes indicated whether percussion, high explosive or time shrapnel was to be fired. Headquarters would then detail a battery or batteries by field telephone to engage the target.

Below is given a specimen of the operator's log, in which all zone calls had to be recorded. These calls were also taken down at the Squadron Central Wireless Station and when the number of lost calls was considered excessive the operator was " for the high jump."

EXAMPLE OF PAGE OF LOG BOOK FOR AREA CALLS.

23rd Bde. H.Q., X. Div. R.F.A. July 8th, 1917
Area Calls G.A. G.D. 2/a.m. G. Smith, 3879
2/a.m. J. Jones, 4212

Time.	Call.	Message.	Action taken.	Remarks
4.20 a.m.	G.A.	NF G14D 3. 2.	Reported to O.C. 40 rounds fired.	Signals strong.
4.25 a.m.	G.A.2	NF G 2 Cent.	Reported to O.C. No action taken.	Do.
4.30 a.m.	G.A.	MQ G8d4. 9.	Reported to O.C.	Battery stopped firing on this target.
5 a.m.	LL.GB	50 MT N G 6 Cent.	Reported to O.C.	No action taken. Out of range.
5.10 a.m.	G D	TNKS G 35Bo 3	Reported to O.C.	
5.50 a.m.	G D	NF G22a.4.9.	Reported to O.C. 50 rounds fired.	KP signals very loud, jambing heavy.
6 a.m.	LL GA	Col.5000 FAN S.W.G15a.3.2.	Reported to O.C. 200 rounds shrapnel fired.	Sigs. weak.
6.10 a.m.	G.A.	NF G 14d.4.9.	Reported to O.C. 40 rounds fired.	
6.25 a.m.	G.A.	MQ G8d4.9.	Reported to O.C.	
6.30 a.m.				Relieved by 2/A.M. Jones.

(Sgd) G. SMITH, 2/a.m.

" L L " was an emergency call used when the observer spotted an exceptionally important target or saw a sudden attack developing.

" L L Col. 5,000 FAN. SW. G. 15a 3.2." for example, denoted a column of hostile infantry 5,000 strong at the " pin point " named and moving in a S.W. direction. And if the pin point was correctly observed and signalled many of those 5,000 men were as good as dead when the wireless message left the plane. For " L L " was an imperative call for every available battery to range on the " L L " target immediately, whether it was in their zone or not.

The call was repeated several times and almost before the observer's fingers had ceased to tap the key scores of guns would be swinging and focussing on the new target, and tons of explosives would be whining towards that unhappy column of infantry. Words are inadequate to describe the result. If you were to cover this page with " L's " and stick an aspirate before each, that would not even feebly represent the reality. If not literally a calling down of " Fire from Heaven " upon our enemies it was certainly a most effective substitute. To so great a pitch of perfection was

the science of killing men developed. It is not a pleasant subject, but since the business had to be done there is a kind of satisfaction in knowing that we did it thoroughly.

No mention has been made of the Farnborough Military Wireless School, where many of the operators were trained. Those who were there will readily appreciate the omission.

Perhaps the Editor will allow me in conclusion a brief message to any old comrades of the Wireless Section who may chance to read this article. "Here's the best of luck to you. We had some good times together, and if occasionally in the course of our work we met some matchless fools, drest in brief authority, we must in common fairness admit that we were also privileged to meet some very gallant gentlemen."

A.D.C.

TELEGRAPHIC MEMORABILIA.

Bolshevism up to date! Whatever one may think of Bolshevism or the Bolshevist, however one may define the one or the other, certainly a discussion on these points would prove inappropriate to these pages. Quite another point of interest is obtained from information supplied by Ikbal Ali Shah, M.R.A.S., F.R.G.S., to a recent number of *Everyman* in the pages of which this distinguished representative of our Afghan ally gives the following interesting details of the thoroughly modern and scientific methods of the followers of Trotsky's Moscow Academy.

The dissemination of their economic and political propaganda is carried into the most remote districts. They utilise the whole of the railroads of Turkestan for their purposes, harnessing to their use "the entire railway system including the Orenburg-Tashkend, Transcaspian and the Turko-Chinese lines." The writer most definitely states that:—

"Each propaganda train consists of four compartments, the first of which is equipped with wireless apparatus, the second accommodates a printing press of compact dimensions, with type-founts in Russian and Turki characters, the third is a library and reading-room, and the last is used as a dormitory. News from Moscow is received by wireless, printed, and as soon as a train arrives at a wayside station, it is met by large crowds, who have been made aware of its coming by the local Bolshevist agent. Books, pamphlets and news-sheets are distributed in thousands to the Uzbeks, and trained lecturers address them on Bolshevist aims."

"Truly a noble knight" appears to be the general verdict of the honour conferred upon the much respected Engineer-in-Chief of the General Post Office. Though probably not one of the richest in the company of those upon whom the honour of knighthood has been conferred our "Chief Engineer" most certainly ranks amongst the most competent and does honour alike to our craft and to the gallant order to which Sir William Noble belongs:—

"A knight ther was, and that a worthy man."

The journal of the Franklin Institute reproduces certain notes regarding some of the methods used by the U.S. Army to detect men and other objects at a distance and at a higher temperature than their surroundings. This was done by placing a thermopile in the focus of a parabolic mirror. So sensitive could this apparatus be rendered that the engine of an aeroplane resting on the earth was easily located a few hundred feet above the ground, while from the earth itself by the same type of apparatus a flying aeroplane could be detected at an altitude of well over three thousand feet. It is further stated by the same reliable journal that a man lying in a depression could signal at a distance of four hundred feet by covering and uncovering his face, thus SPACING and MARKING *à la* Morse code, by the alternating temperatures thus exposed.

A soft answer! He was a nervous, easily excited operator and somewhat fastidious as to the mathematical accuracy of sounder signals. "Stop, stop," he rattled out, "I don't know which are the dots and which are the dashes." Then came the reply from an old and trained hand without sign of irritation at the inferred question of the sender's key proficiency, "Sorry, old man, the *little* ones are the dots!"

Electricity, our respected contemporary, is inclined to rail at the "lacquer and the ebonite coupled with mahogany and polish" which is general associated with commercial wireless amateur apparatus on sale. This periodical adds that there is "no real necessity for such over-elaboration, any more than there is justification for the traditional Post Office design and specification in commonplace apparatus for telegraphy through wires." We are sorry that among the many sins of which the Post Office is accused it should be guilty of just that tinge of aestheticism which makes life bearable in the midst of mere mechanism. Life without this touch of refinement, this touch of beauty in the office and the workshop would be mean indeed. Dare we disclose the fact that Post Office dining-rooms are relieved by a few choice prints, and at times a vase of flowers makes its appearance on a supervisor's desk? Is it not worth while to fashion the tools of our livelihood with some regard for the amenities of civilised life? We of the Post Office Telegraphs housed between solid masonry walls for one-third of our fourty years of service to the State, we at least are grateful that the Utilitarian spirit has not entered so deeply into the spirit of our administration as to ban colour and paint and polish from our daily working environment.

As was anticipated in these columns Anglo-Continental telegraphy is coming to the fore in the reconstruction of Europe. One is bound to a certain reserve in these matters but it is known that the Controller himself, in the midst of many of his multifarious calls and duties, is nevertheless interesting himself intensely in these matters. The results of this interest may not be known for some time, but some of the European States are certainly looking to this country for help and guidance in these and kindred communications, and we cannot stand aloof.

By the time this number is in the hands of our readers it is hoped that the first split Baudot duplex (triple type) will be an established fact between Liverpool, London and Havre, giving two traffic channels between the two extremes and four each between the two termini and the intermediate station.

It is both comforting and encouraging to see men leave the service with the fresh bloom of a sixty years' youth upon their cheeks! This was the case with both Mr. Henry E. Adams and Mr. W. Simmonds who retired in May of this year, having passed through all the stages to First and Second Class Assistant Superintendents (old style). Both were much respected and both found their chief recreation in the gardens that they loved. The roses which Adams produced, frequently became the envy of many an office amateur, and although we poor laymen in these matters listened intently at the dinner table to catch a few inspirations from the High Priest of Floricultur, we could never aspire even to that lesser height of bringing up one poor lonely bud in our buttonhole.

Simmonds, too, with that practical turn of mind which made him so enthusiastic, so ardent and so consistent a supporter of the Total Abstinence movement, how jealously we looked at an occasional sample of his "earth apples, his beans or his carrots! Well, good friends, happy indeed are ye to leave behind you both an atmosphere of sincerest good-fellowship, a record of a clean race well run.

From Canada comes the record of the smallest screw made which will surely interest our many readers who dabble in mechanics. It is made of brass and it takes 583,333 of these screws to turn the scale at 1 lb. Its length is 28-thousandths of an inch, diameter of head 26-thousandths, thread 12-thousandths. The number of threads per inch is 360.

Our friend, *Figaro*, writes once more from Paris where the telephone seems to provide him with excellent ground for what we

can only suppose is humorous exaggeration. Describing a newly-formed league for defending the interests of telephone subscribers in France, he follows on with :—

"The idea is admirable. Our interests need defending. We have to pay seven hundred francs (normally twenty-eight pounds) a year for an instrument which is an active agent for the propaganda of bad language and misunderstanding. If banding ourselves together will help us, by all means let us form a league, especially if it only costs ten francs a year. But what startles me about the prospectus is the fact that it has the temerity to give not only the name and address of the league—but adds a telephone number! Now in the name of bad faith, carelessness, discourtesy, and neglect, what attention can you expect from the exchange when you ask for the number of such a league as this, formed to combat everything the operator holds dear? The other day I spent seven hours trying to telephone to London. Each time I asked for the trunk exchange, my local operator said to herself or her familiar demon, or her neighbour: 'Oh, good Lord! Always asking for Trunk!' She then cut off."

The visit of the Lord Mayor of the City of London, the Lady Mayoress and about 150 specially invited visitors closely connected with the interests of the metropolis, to the C.T.O., on Friday, June 18, was one of the most successful functions in which this the largest telegraph office in the world has ever participated. The large company broke up into parties and simply roamed through the various departments accompanied by selected guides who all pay tribute to the thoroughly sympathetic and interested attention of the ladies and gentlemen whom it proved indeed a real pleasure to escort. The homeliness of the mayoral pair placed everyone at ease from the moment the party stepped along the carpeted way. Opportunity is here taken to thank those offices and officers of all ranks who so promptly contributed to the smooth working of each item when called upon, sometimes at a moment's notice. Special thanks are, however, due to the foreign and colonial stations, which under the disadvantageous circumstances of great distances and varying clock times, transmitted their respective and much appreciated greetings to the civic party. To the chiefs and staff at Paris, Antwerp, Brussels, Rome and Halifax N.S., London sends her very best thanks.

J. J. T.

LONDON TELEPHONE SERVICE NOTES.

THE Editor is pleased this month. Now that the weather is too hot for Christmas dinners and suppers, for children's teas and for dances, we do not want so much room for our "Notes." He is anxious to have the space and will no doubt fill it with interesting matter.

Accounts Branch.

A very pleasant social evening was spent on Thursday evening, April 20, when members of the cashier's staff assembled at Pinoli's Restaurant, Wardour Street, to do honour to Mr. Arthur DuVernet one of their old colleagues, who is retiring. The chair was occupied by Mr. Leslie, who was supported by Mr. F. J. Willard and Mr. Reimann. After a most enjoyable repast, an excellent musical programme was carried through. The variety of the talent can be judged when it is stated that it included a phrenological demonstration by "Professor" Fogarty who humorously "told" our bumps, a realistic imitation of "Mr. Cohen on the telephone" by Mr. C. F. Joyce, solos on the banjo by Mr. David Bolt, and humour and pathos by other members of the staff ably assisted by Mr. Newdick at the piano. The toast of the evening was suitably proposed by Mr. Leslie, who, in presenting a gold watch to Mr. DuVernet as a token of the esteem and friendship in which he was held by his colleagues, said that for 27 years Mr. DuVernet had endeared himself to all with whom he came in contact, by his genial manner and happy wit. He paid tribute to the conscientiousness and ability which Mr. DuVernet has displayed throughout all his service, and expressed a wish on behalf of his old friends that he might live to enjoy good health in his retirement for many years to come. Mr. DuVernet responded feelingly

Contract Branch.

In spite of the present plant difficulties the Contract Branch negotiated agreements for 5,960 stations during the five weeks which ended May 29. The number of stations recovered during the same period amounted to 1,473, leaving a net gain of 4,487 stations—an increase of 1,117 on the figures for the corresponding figure of last year.

The total net gain since March 27 last is 7,726 stations.

The Contract Branch furnished 83 new members to the Post Office Sanatorium Society during the last month.

Clerkenwell Exchange.

We are only a few weeks old but we succeeded in holding a dance and whist drive before the close of the season and next season we hope to join our older colleagues in their frivolous and philanthropic endeavours.

Ealing Exchange.

By means of a concert and sale of articles made by the staff £34 has been raised and forwarded to the War Seals Foundation. Hurrah!

Gerrard Exchange.

A challenge! An open diving and team race Competition will be held during the month of August. Let come who may, we fear none, but only are we feared. A pressing invitation is extended to all Exchanges to enter the competition, and will those who accept our challenge please communicate with the Hon. Secretary of the Swimming Club, Gerrard Exchange. The competition will be conducted under A.S.A. Rules.

Museum Exchange.

On Tuesday, May 18, a successful dance and social was held by the staff of the Museum Exchange in aid of the War Seals Foundation and as a result £25 was forwarded to the Secretary.

Many thanks are due to the artistes, and to Mr. E. A. Pounds, who acted as M.C.

Waste-paper Basket.

The *Sunday Pictorial* submits, "with profound respect," some further "Hints to Subscribers" for insertion in the Directory.

1. Don't tell the supervisor what you think of the system. She knows.
2. Should you by any chance get the required number at the first shot, don't be selfish—share it with someone else.
3. Roll the "R" in "three"—In other words, it may be bowled or pitched.
4. Pronounce "I" long in "nine"; but the "D" after "wrong number" should be as short as possible.
5. Subscribers should not engage the telephonist in conversation she may not be nearly as attractive as she sounds.
6. Be reasonable; Kensington *may* sound like "Hop."

It is suggested to our respectful contemporary that the following additions may prove helpful :—

1. Don't tell the supervisor what you think of the service. "The empty vessel makes the greatest sound."
2. Should you by any chance get the right number at the first attempt, it is a sign that your enunciation is improving.
3. "Men must be taught as if you taught them not
4. And things unknown proposed as things forgot."
5. "Such unlearned nothings in so strange a style
Amaze the unlearn'd and make the learned smile."
6. Be reasonable. "A noble mind disdains not to repent."

LONDON ENGINEERING DISTRICT NOTES.

The Denman Swimming Club.—On Monday June 7 a two-length team race took place at the Lavington Street Baths between the Denman Street Club and the St. Olive's Grammar School First Team, resulting in a victory for the former by 18 seconds. The service team consisted of Messrs. J. R. Williams (captain), A. W. Kelly, A. W. Hopkins, and C. E. Green. Matches are being arranged with the principal Government Departments in connexion with the Civil Service Amateur Swimming Association.

Retirement of Mr. J. W. Sullivan, Assistant Superintending Engineer, North West District.—An article on this subject appears in another column of this issue, but as Mr. Sullivan was associated for such a long time with the London Engineering District and took a prominent part in the telephoning of London, we desire on behalf of his many friends in the District to join with our colleagues in the North Western District in wishing him long life and every happiness in his retirement.

A Great Storm.—On Wednesday evening, May 28, a great thunderstorm accompanied by rain which was almost tropical in its severity occurred in the West of London. At Ealing there was a fall of 2.22 inches in 100 minutes. So far as is known this is a record. In many parts the water rushed along the streets with such force that the gulley holes were inadequate to receive it. The trams and electric railways were held up in Ealing and Chiswick. Notwithstanding the fact that the Department's plant in the neighbourhood affected is mainly underground very little trouble was experienced beyond the flooding of a number of manholes. In one case, however, there was a partial breakdown in the Chiswick exchange area where a defective cable distribution box admitted water and caused interruption to a number of subscribers' telephone circuits.

War Savings Associations.—It is interesting to recall the fact that Mr. E. F. Griffiths, of the Superintending Engineer's office, Denman Street, who initiated the War Savings Association in the North West Section in 1915, when he was attached to that section, was awarded a certificate similar to that described under these notes in the May issue. In addition to the certificate Mr. Griffiths received a badge endorsed, "For Service. National War Savings Committee."

West External Section.—The difficulties experienced in obtaining a mid-day meal satisfactory in quality and price in the outlying sections of the London Engineering District at the present time are very great, but thanks to the kindness of the ladies of the Park Exchange a satisfactory solution in the West External Section has been found and arrangements have been made for the engineers to have lunch in the Exchange dining room. The Staff desire to express their appreciation of the courtesy of the Staff of the L.T.S. in providing these facilities.

North External Section.—On Friday, May 7, a concert promoted by Messrs. G. H. Gillett, F. T. Baker, W. Matthews, and W. Lovell, was given at the Wortley Hall, Finsbury Park, in aid of Mr. David Thomas, who for some 22 years was a member of the outdoor staff, but who was recently retired on a small pension owing to ill health. The artistes - chiefly members of the staff—included several ladies from the North Exchange, Mesdames N. Williams, Hill, Irene Prior, L.R.A.M., B. K. Higgins, May Bass, and Mrs. Warwick, also Messrs. C. Hope, W. Sproat, Will Mathews, and J. Warwick, of the North External Section, whilst friends from outside, Messrs. F. S. C. Coe, W. Fair (late 39th Divisional Concert Party), F. Mould, C. Whitehead, W. Lovell, W. Matthews, and Arthur Spicer, came along to give their help. The various items on the programme were well rendered and greatly appreciated. The musical sketch "The Buskers," proved to be the *bonne bouche* of the evening, the vocalists in the company being literally bombarded with coins as each song was concluded. During the evening Mr. C. E. Tattersall, Sectional Engineer, thanked the audience for their attendance and support, and read a letter of thanks from Mr. David Thomas. The concert was a marked success in every way, the proceeds amounting to nearly £30.

The London Engineering District Benevolent Society held their 12th Annual General meeting on May 4. Mr. A. Moir, O.B.E., the President of the Society, occupied the chair, and a fair number of members were present. The Secretary reported that during the past year 59 grants amounting to £210 5*s.* had been made and that 156 letters of various kinds had been obtained from the Hospital Saturday Fund. The members returning from active service were re-joining the Society. Unfortunately the Society has had to follow the usual tendency in these days and it was unanimously agreed to increase the subscription from 1*d.* to 2*d.* per week.

Crystal Palace.—The installation described in the March number of this JOURNAL is already proving of considerable utility. The cables, distribution cases, and main frame were provided primarily in connexion with the British Industries Fair, but these features of the scheme were not recovered at the conclusion of the Fair.

Recently it has been necessary to provide 27 exchange lines and 12 extensions for the Crystal Palace Trustees and the various exhibitors in the Electrical, Gas and Oil Sections of the exhibition. Additional circuits have also been provided for the Imperial War Museum Authorities.

MISS HELEN ROSS.

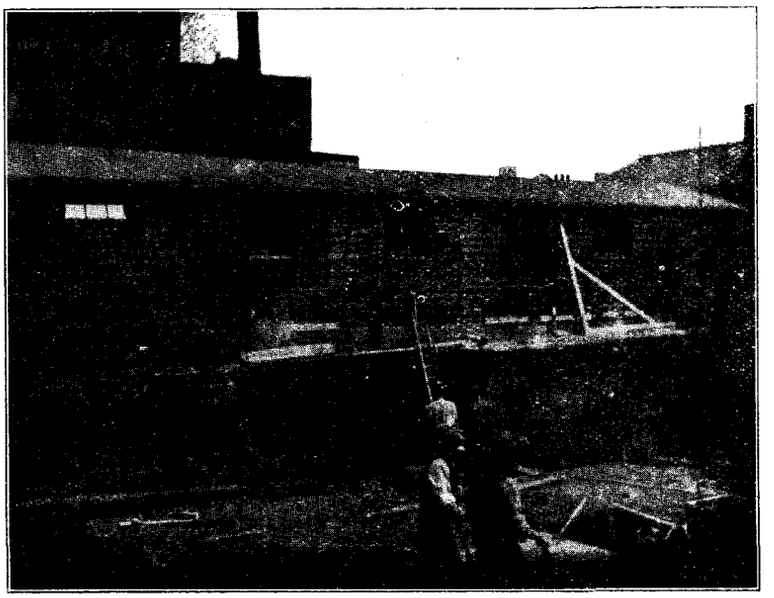
MISS HELEN ROSS, Telephonist, Central combined Exchange, Edinburgh, has been awarded the Medal of the Order of the British Empire (Military Division) in recognition of valuable services rendered in connexion with the Military operations in France and Flanders.

THE NEW BROADWAY EXCHANGE.

BY F. F. MEYER (*Traffic Dept.*)

THE rapidity with which the Eastern District of London developed in the decade preceding the war naturally made itself felt in the telephone world and with the mushroom growth of a large commercial and residential city on the further side of the Lea marshes, which stretch in a southern direction on both banks of that river from Tottenham to its confluence with the Thames near Bromley-by-Bow, the telephone facilities were soon found to meet but inadequately the increasing demands of the public. Possibly no district in this area felt this expansion to the East more than the borough of West Ham, where the present Stratford Exchange is situated, but, unfortunately from the Departmental point of view, the possibilities of extending the exchange, and thereby increasing its capacity, were strictly limited.

Stratford Exchange consists of two small cottages of which the two front bedrooms have been converted into a switchroom with ten boards for originating and five boards for incoming traffic. The type of exchange is magneto with hand-restoring indicators. No multiple exists over the "A" positions so that a large percentage of the local calls has to be completed by means of local transfer circuits.



BROADWAY EXCHANGE.

With the rapid influx of new subscribers, the position became somewhat difficult as the exhaustion of the capacity of the exchange brought about a heavy overloading of the positions with the inevitable result that the service suffered. Although eased temporarily by the bringing into use of another small room which allowed for the exchange equipment to be increased by one "A" and one "B" board, the increase of the number of subscribers' lines from 534 in October 1909 to 733 in February 1913 necessitated the selection of a site on which to build a larger and modern exchange. A site was obtained but the outbreak of war prevented the actual building operations from being put in hand, although at the commencement of hostilities the number of exchange lines had reached 861.

During the war military necessities and other reasons were the cause of the closing of several of the works and factories, which furnish the bulk of the subscribers on Stratford Exchange, with a consequent decrease in the calling rate and a corresponding increase in the relief afforded to the exchange staff, but, in common with the majority of the other exchanges in the London Telephone area, traffic after the signing of the Armistice showed a very marked upward tendency so that in October 1919 an average of 240 equated originating calls and 260 equated incoming calls were dealt with at each position during the busy hour.

The situation called for urgent remedies. The site for the new exchange was available, but building materials and equipment were lacking. This difficulty was overcome in a manner that is unique not only in the history of the London Telephone Service, but also in the annals of telephone exchanges in the United Kingdom. Probably none of us who tramped back to rest billets and camps in France or other theatres of war imagined that one of those same Army huts would be the building that would house one of the latest of the telephone exchanges of the Capital of the Empire. Such, however, is "Broadway," a temporary exchange designed for the relief of Stratford, and situated on a corner of the site where building operations have already commenced for the new exchange.

The whole of the exchange premises, consisting of a switchroom, test and power-room and female quarters are contained in the hut, whilst an eight

horse-power gas engine for re-charging the accumulators is located in a lean-to shed adjoining the test room. The actual measurements of the switchroom are 25 ft. by 14 ft. whilst the size of the test room is 12 ft. by 14 ft.

Broadway Exchange is of an improved C.B.9 type having a *negative clearing signal on the face of the keyboard*, in which respect it differs from other C.B.9 exchanges, such as Latchmere, East Ham and Tottenham, where the negative clearing indicators work on the face of the switchboard. The traffic capacity of the exchange is 500 lines and the number working on the date of opening was 222, all of which were transferred from Stratford; in addition five order wires and forty-four junctions were provided for outgoing traffic, and forty-five jack-ended junctions for incoming traffic, the whole being accommodated on six "A" and three "B" positions.

As it is not proposed to retain "*Broadway*" as an exchange after the opening of the new Stratford, some little difficulty was anticipated in securing the agreements of the subscribers to a change of number that must, inevitably,

BROADWAY EXCHANGE—SWITCHBOARD.

BROADWAY EXCHANGE—APPARATUS ROOM.

be of a temporary nature, but, after the bulk of the principal firms had been tactfully approached by traffic officers and the ultimate advantages that would accrue to them by the policy of the Department carefully pointed out, the anticipated objections proved to be mythical for the District Traffic Office was inundated with signed agreements, and the result was that within ten days of the posting of the notification of change of numbers only one recalcitrant subscriber had failed to return his form.

Thanks largely to the good work done by the engineers the exchange was successfully opened at 2.30 p.m. on Feb. 14, 1920, and, at the completion of the initial test on subscribers and junction circuits, it was found that one subscriber's line, one incoming and one outgoing junction were out of order All faults were cleared by 4.36 p.m. on the same day.

To deal with the work consequent upon the change of numbers, twenty special inquiry circuits were installed at Stratford. The traffic over these lines was at first very heavy but a steady decrease was soon noticeable, and with the issue of a new directory it was soon found possible to deal with this traffic at the usual inquiry position.

Some idea can be formed of the relief afforded to Stratford when it is mentioned that the traffic at that exchange is now approximately only two-thirds of the traffic that was being handled prior to the opening of the temporary exchange.

THE STORY OF THE PACIFIC CABLE.

THE following interesting account of the laying of the Pacific cable is taken from Mr. G. H. Scholefield's book "The Pacific: its past and future," published by John Murray.

A Scientific Fallacy.—By one of those inscrutable assumptions which science has permitted, it was supposed for many years that the great depth of the Pacific Ocean would preclude absolutely the laying of a submarine cable across it to connect Canada with the Australasian colonies. This belief was accepted implicitly at the Colonial Conference held in Sydney in June, 1877, to consider the improvement of telegraphic communication between Australia and the rest of the world.

Four main projects were then discussed. Three of them proposed to lay cables by way of Asia, and the fourth by way of the United States. The practicability of the schemes was considered by the Agents-General in London, and the route from New Zealand to Honolulu and thence to San Francisco was condemned as absolutely impracticable owing to the depth of water. Two years later, in 1879, Mr. (afterwards Sir) Sandford Fleming, chief engineer of the Canadian Pacific Railway, discussing the early completion of the overland telegraph from the Atlantic to the Pacific, suggested that "as a matter of imperial importance the British possessions to the west of the Pacific Ocean should be connected by submarine cable with the Canadian line. Great Britain will thus be brought into direct communication with all the greater colonies and dependencies without passing through foreign countries."—(Mr. Fleming to the Superintendent of the Telegraph and Signal Service, Ottawa, 11th June 1879).

In his report the following year, Fleming developed his idea, insisting that a trans-Pacific cable to Asia should have its American end on Canadian soil. He asked personally to be granted the exclusive privilege of landing such a cable in Canada, and urged that as the most favourable route to India, Australia, and New Zealand was via Japan, one of the Kurile islands should be transferred to the British Crown. The last proposal was dropped, but by the end of the year Japan had agreed to the landing of the cable at any suitable point in the island of Yezo. It is to the credit of the Canadian Government and the House of Commons that they took a pioneering interest in Fleming's proposals and granted him the desired charter.

Fleming was not disposed to accept the existing knowledge of the physical conditions of the Pacific as conclusive or the deductions as sound. He asked that one of Her Majesty's ships stationed at Esquimalt should undertake a detailed survey of the proposed route.

The Polynesian Route Proposed.—Five years elapsed without any headway being made. In 1885 Fleming published a pamphlet in London in which he boldly declared for the direct route from Canada to Australia through Polynesia, a route which has hitherto been condemned as impossible. He also suggested the payment of an annual joint subsidy of £100,000 by the Governments of Great Britain, Canada, Queensland, New South Wales, Victoria, Western Australia, Tasmania, and New Zealand.

The proposal to lay a cable from Australia, to the United States was discussed at some length in Australia, and Earl Stanhope took the hint and addressed a circular letter to the whole of the colonies, suggesting that the American terminus should be in Canada rather than in the United States. When the Colonial Conference met in London in 1887 Sir H. T. Holland was in the chair, and he expressed in a rather off-hand manner the Government's attitude to a proposal towards which it had shown nothing but impatience.

"A very strong case would have to be made out," he said, "to justify Her Majesty's Government in proposing to Parliament to provide a subsidy for maintaining a cable in competition with a telegraphic system which, at any rate, supplies the actual needs of the Imperial Government."

Sir Julius Vogel, Colonial Treasurer of New Zealand, suggested a joint ownership of the cable by the colonies and the Mother Country, but the discussion did not reach as far as this. The conference merely agreed on a resolution from Canada, urging the British Government "to set at rest by a thorough and exhaustive survey every doubt as to the practicability" of the Polynesian route.

The Admiralty would not agree to send a vessel specially for the purpose of taking soundings over the whole route, but promised to endeavour to arrange that soundings should be taken gradually during the next few years in the ordinary course of hydrographic surveying. This was in May, 1887. The Secretary of State excused the delay by the observation that there was

* For the history of the Pacific cable, *see* P.P., C. 7632, 9247, 9283, &c., and *The All Red Line*, ed. G. Johnson, Ottawa, 1903.

no prospect of sufficient funds being found for the maintenance of such a cable.—(Colonial Office to Governor-General, Canada, 1st September, 1887).

In a later despatch the Colonial Secretary said he could hold out no hope for the scheme being favourably received, and that the colonies themselves would have to provide the money for cost and maintenance. Nothing at all was done in regard to the survey, and when the Intercolonial Postal Conference met at Sydney in March, 1888, it could only pass similar resolutions afresh and offer to pay the cost of the survey.

The Survey Untouched.—The position was just the same when the Intercolonial Conference met at Ottawa in 1894, seven years after the Conference in London. Nothing at all had been done on the survey and again resolutions were passed praying the British Government to move its departments to assist. To show that they were in earnest, the colonies decided to call for commercial offers for laying the cable. As a result it was found that several firms were willing to survey the route and lay the cable at less than the estimated cost.

Once again it was the galvanic personality of Chamberlain that infused life into a drooping empire cause. In November 1895, the new Colonial Secretary decided that no further time should be lost, and on his suggestion there was a meeting of the Agents-General in London a week later. They unanimously recommended the setting up of an expert commission to report on the project, and a few months later this was done by Chamberlain himself.

When the report of the Imperial Pacific Cable Committee was signed on 5th January 1897, the Pacific cable was almost an accomplished fact as far as the main obstacle—official indifference—was concerned. Its practicability was endorsed. State-ownership was emphatically recommended. The route proposed was from Vancouver via Fanning Island, Fiji and Norfolk Island to New Zealand and Queensland. The interest of Chamberlain was a driving force in striking contrast to the obstinate and defiant indifference of the Colonial Office throughout the previous fifteen years.

"In any matter in which the colonies themselves are deeply interested," he said in opening the Colonial Conference of 1897, "they may count on the support and assistance of the Mother Country. . . . I think that one of the very first things to bind together the sister nations is to have the readiest and the easiest possible communication between the several units."

That conference itself did not advance the question, but before they next met it was accomplished, in spite of influences which kept the Committee's report back from the public for two years.

Construction of the Cable.—In 1899 H.M.S. *Egeria* surveyed the line from Vancouver to within 300 miles of Fanning Island. On 31st December, 1900, the contract was signed for the construction of the cable. Towards the end of 1902 the cable was completed. A few months later the American cable from California to Hawaii was opened.

During the protracted discussion over the project, extending over a quarter of a century, the prospects of various islands being used as landing stations were mooted, and the British Government did take steps from time to time to secure such as it thought desirable. In 1893, when Sir Mackenzie Bowell, Canadian Minister of Trade and Commerce, visited Australia in connexion with the scheme, he was much impressed by the situation of Neckar Island (latitude 23 deg. 35 min. N., longitude 164 deg. 39 min. W.) as a midway station. Lying 240 miles to the westward of Hawaii, it was then derelict and uninhabited, and Fleming had strongly recommended it as being on the most direct route from Vancouver to the coast of Queensland.

An Acquisitive Project.—Neckar was discovered by La Perouse in 1786, and was considered by him too insignificant to take possession of. While in Hawaii Mr. Bowell made a memorandum strongly recommending that steps be taken to bring it under the British flag. Hawaii itself was in the throes of a revolution and on the threshold of annexation, and Lord Ripon, then Colonial Secretary, held this to be a reason for delaying action "pending the establishment of the Government of Hawaii upon a more permanent footing.' When the new Government came into power it was composed almost entirely of Americans or persons of American sympathies. Month after month passed without any action being taken.

In May 1894, Lord Rosebery, who had come into office as Foreign Secretary, assured Canada that the British representatives at Honolulu would "watch the matter closely," but he too thought that no action should be taken in view of the disturbed condition of Hawaii. Fleming, though, was less patient. He was intensely anxious to ensure that the British flag and no other should float over Neckar, and that it should be there as an accomplished fact when the conference met at Ottawa. And to forestall disappointment, he decided in his private capacity to arrange for the occupation of the island by a British subject, and the hoisting of the British flag. Sir Charles Tupper duly communicated the project to the Colonial Office. The result was a complete damper. "Rosebery much annoyed at action," he cabled to Fleming on May 31. "Will repudiate. Fears will destroy good prospect of obtaining Neckar. Prevent action becoming public, if possible."

A Scheme Miscarries.—But the project was defeated from London. When the naval officer whom Fleming had entrusted with this duty reached Honolulu, he learned that the British Government had already acknowledged the sovereignty of Hawaii over the island—although nobody of either nation had landed there—and had asked the provisional government of Hawaii on what terms they would transfer control to Britain for the purpose of the cable station. Under the circumstances the officer had no option but to abandon his mission, and the Hawaiian Government forthwith chartered the steamer for which he had been negotiating and made good its shadowy claim by hoisting its flag.

Neckar Island still seemed so suitable for a landing-place that a Canadian Commission went to Hawaii to negotiate an agreement to use it for this purpose. They carried out their task quite satisfactorily, but the project was killed by the decision of the United States Senate that such a lease as was contemplated would be an infringement of the Reciprocity Treaty with Hawaii.

Other Islands Annexed.—In view of the cable being laid, Great Britain in 1888 hoisted her flag on a number of small islands which seemed likely to be of use for landings. These included: Fanning, 3 deg. 51 min. N., 159 deg. 22 min. W.; Penrhyn, 9 deg. S., 158 deg. 3 min. W.; Christmas, 1 deg. 57 min. N., 157 deg. 27 min. W.; Suwarrow, 13 deg. 13 min. S., 163 deg. 9 min. W.

When the Neckar idea fell through Fanning was decided on as a landing station. The cable runs, therefore, from Bamfield (Vancouver) to Fanning Island, thence to Fiji and Norfolk, at which point it bifurcates to New Zealand and Australia. Suwarrow and Penrhy are now included in the extended boundaries of New Zealand.

Fanning was most favourably reported upon by the British consul at Hawaii as long ago as 1857. Besides large quantities of cocoa-nuts it produced abundance of bananas, arrowroot, firewood and fresh water. Moreover, in its oblong contour 10 miles in length was a deep lagoon "capable of holding the whole of the British Navy," and abounding in a variety of fine fish. The Pacific cable was cut at Fanning by a German squadron during the great war, but was shortly reunited.

THE PSYCHOLOGY OF SUPERVISION.

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

Sir,—Perhaps I may be allowed to say a few words by way of friendly criticism upon the very suggestive paper on "The Psychology of Supervision" in a recent number of your JOURNAL.

Interesting as the lecture is, it seems to me to have somehow left out of account the *moral* side of supervision—the necessity of character both in the man who commands and in the men whom he hopes to lead.

The finest schemes of organisation may be wrecked by the moral defect of the people that one relies upon.

We speak of analysing the mind into its various parts and powers, but it is the *one* mind all the time that thinks and admires, that wills and acts. The moral failure of a man may to a great extent paralyse his intellectual side. Fox, the debater, was to a large extent paralysed by Fox, the man. Clearly a man must have such character that he is reliable no matter how mentally equipped he may be.

It is the inimitable Mr. Dooley, or if not, it ought to be, who remarks that "it is a great thing in this world when your fellows trust you." And he goes on to tell how a certain Captain was once steering a wrong course in a choppy sea when the mate approached and remonstrated. "Am I or you in charge of this boat," yelled the skipper, "you go and be hanged." The mate withdrew adding lugubriously, "We respect him greatly." And thereby hangs a moral.

With regard to the training of memory by learning some poetry or some groups of figures I would venture to remark that I think any strengthening of the memory in any department helps the memory generally. If we train our muscles for fencing they will still be serviceable for hammering. I quite agree however that the training of the memory is to allow definite impressions to reach it. It is well to note and watch for the thing we want to remember.

With reference to the training of sub-consciousness, well, the very fact that it is *under* consciousness seems to me to bar it from *direct* training. It can however be trained effectively, but only *indirectly*. It is the *conscious* training of the mind that develops unconscious action. Anyone who has had practical experience in the training of young people, say in the Telegraph School, and who makes intelligent use of his power of observation will meet with frequent confirmation of this phenomena. I have observed—to go no farther afield than the Telegraph School—that we do not really know a thing until we cease to be really conscious of the knowledge. Many interesting instances of this may be found in the great world outside. A master handles a violin—he is not conscious of the effort to follow a note—but his pupils are; it is instinctive, I might say automatic, with him—but not with his pupils—and his power of playing is all the greater because he is not bothered, as they are, about mere mechanical details. And is not the object of the sergeant's drill to make men go through the same movements so often that they finally become automatic. The corporal of a squad says to his men "Always take aim along the sights even when using blank cartridge." Why? Because when the bullet is in the rifle the soldier will take aim without thinking of it. And I am sure that Mr. Beckett—over whom half of London appears to have gone crazy—does not think of what is the right counter for this or that stroke—he simply counters automatically.

If I remember aright Fenimore Cooper somewhere records a fragment of talk between a landsman and an old sailor which is interesting as bearing upon the present theme. "It beats me hollow," said the landsman, "how you can think how to tack that windbag when you're going round the Cape." And the old salt replied: "We don't think. What good would we be to the old man if we had to think. We just does it."

With apologies for length,

F. J. MILLAR.

C.T.O., London.

PERSONALIA.

LONDON TELEPHONE SERVICE.

Miss S. A. HODGSON, Woman Clerk, Class II, has been promoted Woman Clerk, Class I.

The following resignations have taken place on account of marriage:—

Miss W. E. ADAMS, Telephonist, of the Mayfair Exchange.
Miss E. L. FREITAG, Telephonist, of the Mayfair Exchange.
Miss D. WALLHEAD, Telephonist, of the Mayfair Exchange.
Miss O. M. BRIGGS, Telephonist, of the Avenue Exchange.
Miss I. HOLYFIELD, Telephonist, of the Avenue Exchange.
Miss D. DOWSETT, Telephonist, of the New Cross Exchange.
Miss CHALKLEY, Telephonist, of the Dartford Exchange.
Miss A. JOHNSON, Telephonist, of the Royal Arsenal Exchange.
Miss PILKINGTON, Telephonist, of the Victoria Exchange.
Miss COUCH, Telephonist, of the Victoria Exchange.
Miss DRANEY (Temp.), Telephonist, of the Victoria Exchange.
Miss MCMAHON, Telephonist, of the Victoria Exchange.
Miss BALE, Telephonist, of the Victoria Exchange.
Miss R. HODDER, Telephonist, of the Victoria Exchange.
Miss E. M. SPARKES, Telephonist, of the Victoria Exchange.
Miss F. C. COX, Telephonist, of the Hornsey Exchange.
Miss E. N. NEWNHAM, Telephonist, of the Gerrard Exchange.
Miss D. G. COLEMAN, Telephonist, of the Trunk Exchange.
Miss E. M. HUGHES, Telephonist, of the Trunk Exchange.
Miss E. LOMAS, Telephonist, of the Trunk Exchange.
Miss G. HOLLAND, Telephonist, of the Trunk Exchange.
Miss M. V. BALDWIN, Telephonist, of the Trunk Exchange.
Miss A. L. FUGE, Telephonist, of the Regent Exchange.
Miss B. M. HOLMES, Telephonist, of the Supt's. Office, F.E.S.
Miss F. A. TEDD, Telephonist, of the Central Exchange.

PROVINCIAL STAFF.

Miss H. BOLLARD, Telephonist, Plymouth, resigned on May 21 on account of marriage and was the recipient of a pair of silver-plated cake stands from the staff.

Mr. G. W. POLLARD, Male Clerical Assistant, Chester, was presented with a silver cheese dish on the occasion of his marriage.

OBITUARY.

The funeral of the late Mr. T. J. West, retired Superintending Engineer, and, at one time, Assistant Superintending Engineer of the South Metropolitan District, took place at Putney Vale, on June 4. The Post Office was represented by Mr. A. J. Stubbs, Assistant Engineer-in-Chief, and Mr. A. Moir, Metropolitan Superintending Engineer.

PRESENTATION TO MR. A. C. TUCKER.

The departure from Brighton of Mr. A. C. Tucker, First Class Contract Officer, after 16 years' service, on his promotion to the position of Contract Manager, Telephones, Swansea, was made the occasion of the presentation of a silver cigarette case suitably inscribed. In asking Mr. Tucker's acceptance of the parting gift, which was subscribed to by all sections of the staff, Mr. P. F. Currall, the District Manager, recorded his personal high appreciation of Mr. Tucker's services, which was cordially endorsed by Mr. F. W. George, Contract Manager.

Mr. Currall said it was a very great pleasure to him to make this presentation, accompanied as it was by the sincere good wishes of the entire staff who, with him, trusted that health and prosperity would attend Mr. Tucker in his new district.

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THE BANK EXCHANGE.

BY J. WEBB (*London Telephone Service*).

THE Bank Exchange with its predecessor "Queen Vic." which occupied the same premises, has played an important part in the development of telephone intercommunication inasmuch as it is now twenty-five years old and is therefore an historical link with the days when telephones began to play a real part in the commercial world.

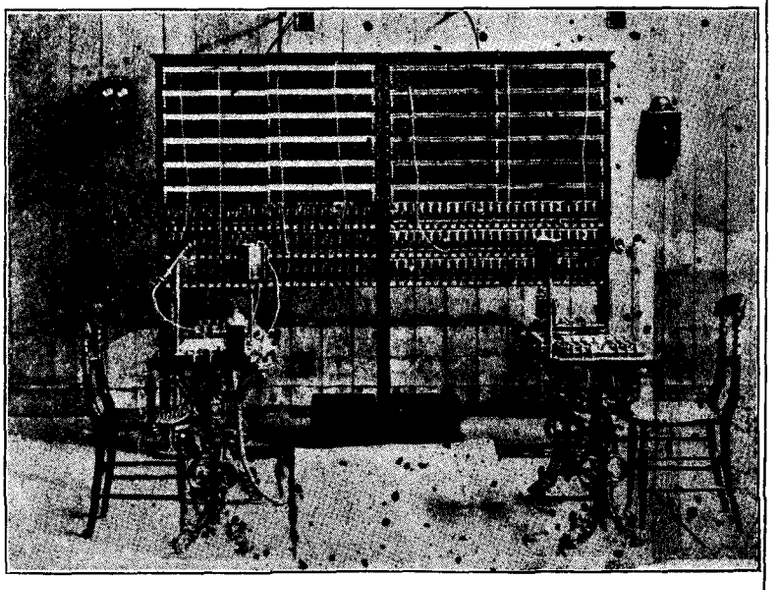

FIG. 1.—THE FIRST EXCHANGE OPENED IN LONDON, 36, COLEMAN STREET

In order to appreciate the link the Bank Exchange forms it may not be out of place perhaps to touch on the early history of London's Exchanges.

The Coleman Street Exchange (Fig. 1) which was opened with seven subscribers in 1878 had the distinction of being the first telephone exchange in London. Three operators were required to manipulate the switchboard, two answering operators sitting at tables and another standing to do the necessary switching on the upright board.

Although this equipment was called a switchboard, the connexions were made through the keys on the operators' tables, the connecting capacity being limited to twelve connexions at one time. The limitation of capacity was soon felt and improvements began to follow.

The number of subscribers rapidly increased and in 1879 exchanges with very similar boards were opened at Mincing Lane and Leadenhall Street.

In 1879 the Edison Company came into the field and opened an exchange named Queen Victoria at 11 Queen Victoria Street.

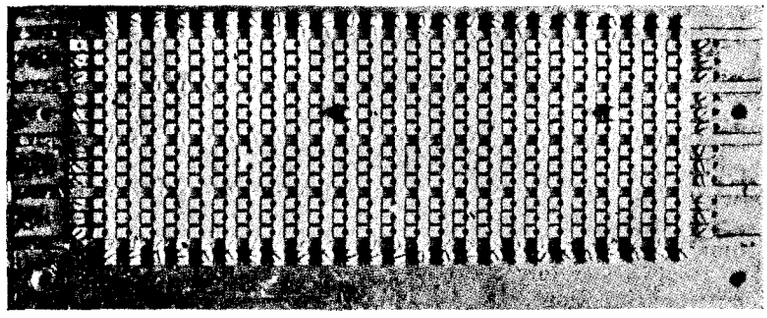

FIG. 2.—SECTION OF EDISON PEG BOARD.

The Edison peg board (Fig. 2) was fitted and was considered an improvement over the Slipper type fitted at Coleman Street, the vertical strips being used for the subscribers' line and the horizontal bars as connecting strips. A great advantage was that only one operator was necessary to attend to the calls.

The positions were lettered A. B. C. &c., and each had capacity for forty-eight subscribers, arranged in consecutive order. It was a simple matter to set up connexions when both the subscribers worked on the same position, but for the purpose of effecting calls through other positions and exchanges, strips were provided to each position to afford intercommunication; these served the

purpose of local transfer circuits. It was necessary for operators requiring numbers on other positions to call their demands across the room to operators attending on the required positions. Junction calls, which in those days were termed "through" calls were operated in a similar manner.

It will be appreciated that at an exchange with 500 subscribers, then a large one, this system, which necessitated operators calling across the room for numbers, was not conducive to quiet and smooth working, especially when, as frequently happened, only one strip was disengaged and the calling and called operator both required the strip for a connexion.

Multiple switchboards were first introduced into London in 1883, and exchanges gradually made their appearance in different parts of the Metropolis. Each was provided with direct junctions to all other exchanges. This was found to be inefficient and uneconomical and resulted in the formation of an "Exchange of Exchanges," now known as a Junction Centre. In 1887 the Edison Peg Board at "Queen Vic." was replaced by a multiple type.

Flat boards were then designed and introduced at various exchanges in the Provinces, on which the outgoing junction multiple as well as the subscribers' multiple was fitted on the flat portion of the switchboard, only the subscribers' answering jacks being

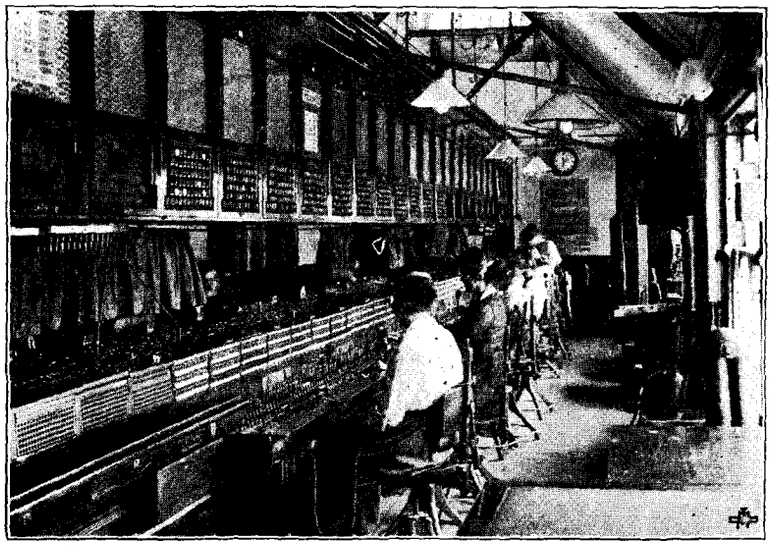

FIG. 3.—BANK EXCHANGE. "A" POSITIONS.

installed on the vertical portion. The answering cords were fitted on the key shelf while the calling cords were connected on a canopy above the multiple. It will be appreciated that although this arrangement gave two telephonists access to the multiple, it was difficult for the telephonist to whom the multiple appeared inverted to locate accurately the required jacks, particularly those of the outgoing junctions.

In the meantime, telephone experts became divided as to the best type of switchboard, the main difference of opinion being whether the board should be of an upright or flat pattern. Each party was very definite in its views and many conferences were held, which resulted in a compromise. A switchboard was designed, on which the subscribers' multiple was flat and the outgoing junctions and subscribers' answering jacks upright. This type of board was installed at Queen Victoria Street—hence the present Bank Exchange (as it was renamed) came into existence on completion of this change in 1895.

The equipment was originally designed for a capacity of 1,200 subscribers, accommodated on 24 "A" positions and 12 "B" positions, the latter working on the canopy system. Eventually extensions were carried out to accommodate 2,500 lines.

The chief advantages claimed for the flat multiple were economy in equipment and space, two operators having access to the same subscribers' multiple. The policy of economy in space is evident at the Bank Exchange where the restricted accommodation gives a general impression of compactness compared with that of modern exchanges, practically all the available space being utilised. The photographs were taken during Saturday afternoon, which accounts for the scantiness of staff and only convey some idea of the restricted accommodation.

The third illustration shows a general view of some of the "A" positions, the five rows of ten self-restoring subscribers' indicators to each position, being shown clearly on the top vertical portion of the switchboard, the bottom row of 12 being clearing indicators associated with the 12 pair of cords with which each position is fitted. The outgoing junctions, which are multipled

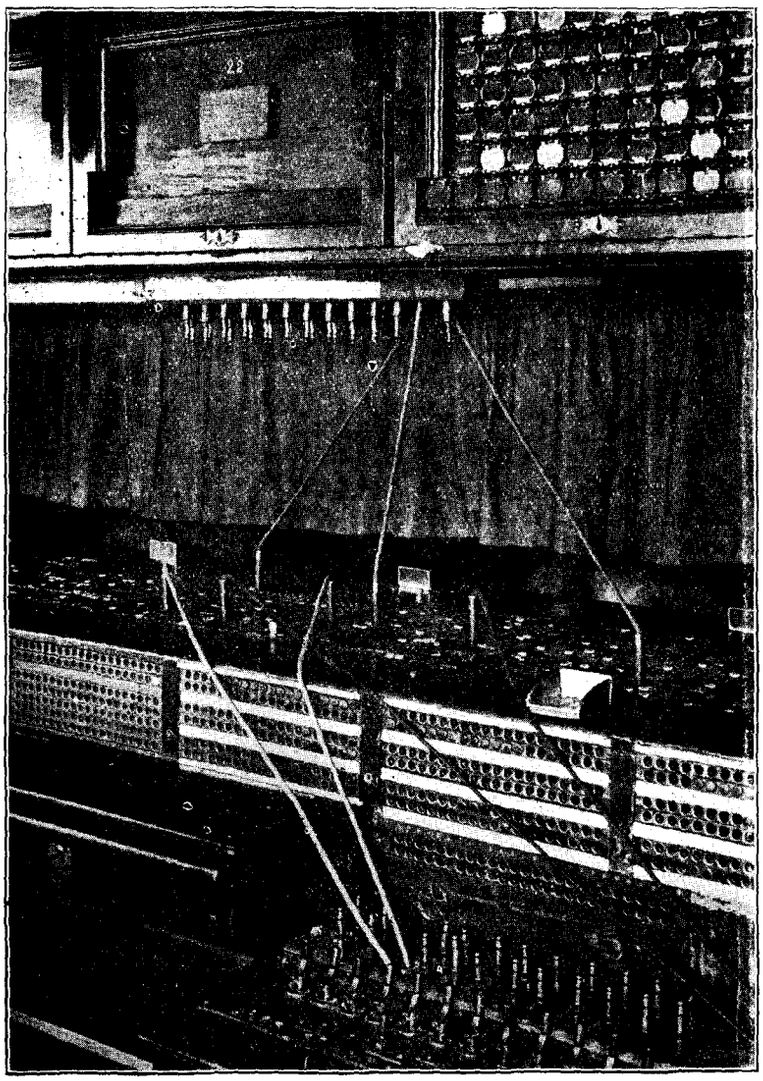

FIG. 4.—BANK EXCHANGE "CANOPY" POSITION AND PART OF "A" POSITION.

every four panels, will be seen on the upright portion of the board, with the subscribers answering jacks directly beneath them. The first "canopy" position will be seen on the left of the photograph.

The fourth photograph (Fig. 4) conveys an idea of the keys associated with the cords; those nearest the switchboard being the speaking keys which are brought down to speak on the corresponding cords, while the two keys in front are used for ringing purposes, the left being associated with the answering cords and the right with the calling cords. The order wire keys will also be seen on the left of the key shelf. This photograph also shows how connexions were set up from the canopy positions.

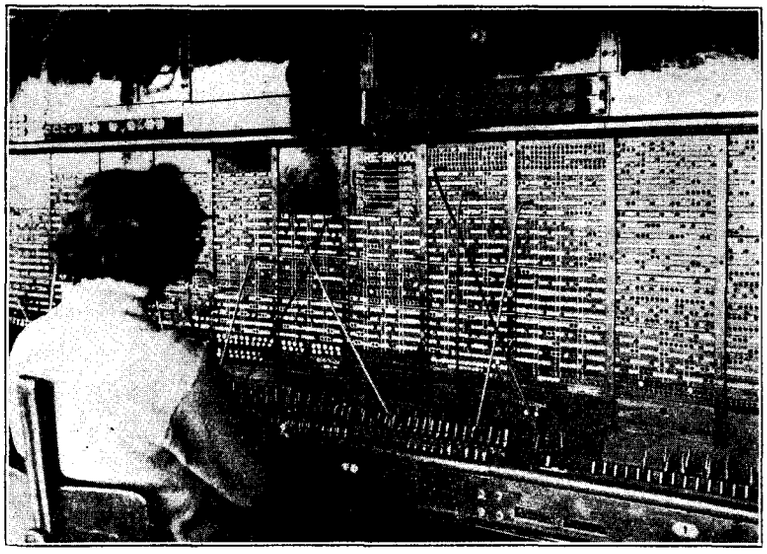

FIG. 5.—BANK EXCHANGE. "B" POSITIONS.

FIG. 6.—BANK EXCHANGE. LOCAL OBSERVATION DESK.

The fifth picture shows a section of the "B" positions. The complete multiple extends over eight panels and the peculiar numbering can be observed. The sequence of groups comprises 1—1,000, 5,000—8,600, there being no working numbers between 1,000—5,000. This is a relic of the period when exchanges werg not known by name. The indicators are for calling and clearine purposes, the position shown being equipped for signal junction working.

The sixth illustration, which is the local observation desk, shows the old type of apparatus, which is still in use at the Bank Exchange.

The seventh photograph shows a portion of the intermediate distributing frame; the peculiar design as compared with that of modern frames will be observed. The picture hardly conveys a good impression of the conditions, owing to very limited space, the frame being packed in a room 10 feet by 10 feet, there being barely sufficient space for a free passage way.

The last photograph shows the Power "Room," which is actually installed in a passage, with miscellaneous plant fitted in cupboards. The box in the picture contains the power plant.

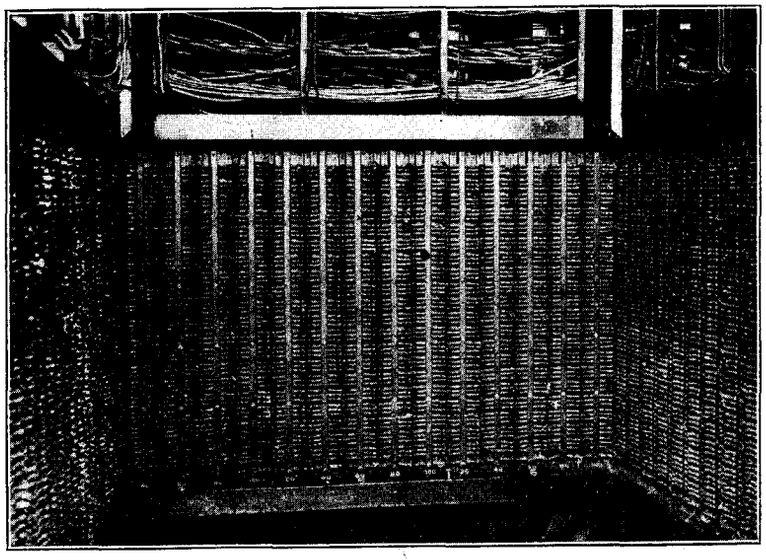

FIG. 7.—BANK EXCHANGE. THE I.D.F.

The operating conditions at the Bank Exchange have been very different to those obtaining to-day and it will no doubt be of interest to mention the chief features. There were no operating schools until 1899, prior to which the learner commenced training in an exchange by listening in circuit with a senior telephonist, and was expected to have a good grip of the work in about a month. During the probationary period she attended as a "part timer" usually from 9 a.m. to 1 p.m., at a weekly wage of 4*s*. When efficient if a vacancy existed she was promoted to a "full-timer" at 9*s*. per week.

Exchanges were not known by name for operating purposes, the whole of London being represented by one sequence of numbers, and it was necessary for operators to memorise certain groups, which indicated the various exchanges:—for example, 1—1,000 =Bank, 1,001—2,000 Holborn, 2,001-4,000 Avenue, &c. As more exchanges opened this system was superseded by that in vogue at present.

Order wire keys were not fitted, the order wire working on the first jack of the junction group, and it was necessary to plug into this jack to speak to the distant exchange. Subscribers' lines were joined up on the "A" positions in strict numerical order, fifty per position, no provision being made for distribution. This resulted in some positions being extremely busy and others relatively

slack. Calls were "teamed" by means of supervisors calling out subscribers' numbers and a disengaged operator answering the call by plugging into the multiple. In addition operators could answer calling subscribers six positions away, as owing to numerical arrangement of the lines the number could be easily identified. Information desks had not been introduced; inquiries and complaints were answered on the supervisors' instruments and operators tapped their own numbers, &c.

The incoming junctions worked on the canopy positions. There were no clearing signals and "A" operators gave in "clears" on the order wire. The engaged advice was given by the "B" operator speaking on the junction allotted.

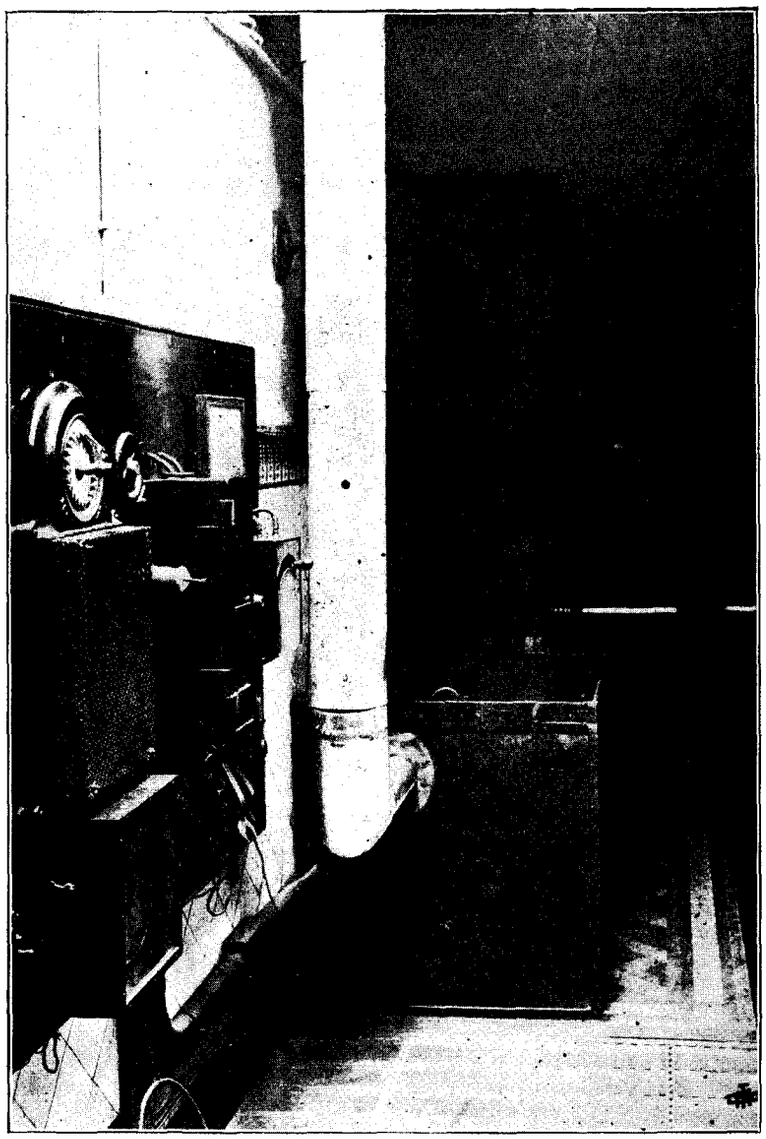

FIG. 8.—BANK EXCHANGE. THE POWER ROOM.

Black overalls were worn at the switchboard: it is said that this rule was introduced owing to the number of various and vivid blouses worn by the staff. No jewellery or flowers were allowed to be worn, and it is related that on a certain part of the switchboard being opened, several rings were found amongst the cables—so the story goes.

There were no catering arrangements. The junior learner collected orders made the required purchases, and a "cook" was selected by the staff.

Improvements were sought and introduced. As previously shown the subscribers' calling indicators were fitted at the top of the upright portion of the switchboard, and it was necessary for operators continually to look up to see if any subscribers were calling. This was found to be most uncomfortable, and in 1898 an indicator was fitted on the eye level of the switchboard, which indicated subscribers' calling and clearing signals. This was called a Star Indicator and was the forerunner of the pilot lamp now fitted at C.B. Exchanges. Order wire keys and ringing vibrators were also fitted at this period, the latter for the purpose of assuring the operator that the ringing was O.K. It must be remembered that the "A" operator actually rang the required numbers, the automatic ringing not having been introduced on "B" positions.

The disadvantages of the flat type of multiple for incoming junction working became apparent and a new upright "B" position board was installed in a separate room and the incoming junctions transferred from the canopy positions to this board in 1900. The distribution frame as shown in Fig. 7 was brought into use at the same time, enabling the load to be more evenly distributed over the "A" positions.

In 1905 a destructive fire occurred by which the test room which was situated on the roof was completely gutted. The Bank Exchange was entirely disconnected, until the new test room was installed with more up-to-date apparatus. It was found that the fire was due to the electrification of the District Railway, a cable coming into contact with the "live" rail, there being no precautionary measures against heavy currents such as exist at the present time.

In 1919 it became apparent that all possible available exchange accommodation would be required to meet the rapid growth of traffic, and therefore it was decided reluctantly, to prolong the life of the exchange and increase the number of subscribers to 1,340 with a possibility of eventually reaching 1,540.

The calling rate, which has always been high owing to the exchange being situated in the heart of the City, still maintains this feature and Bank has, at present, the second highest calling rate of the London exchanges.

The Bank Exchange has given a comparatively good service during the years it has been in use. The falling off in 1919 was common to most exchanges and was due to causes which are already well known, but there is now indication that an improvement has set in. It should be remembered that this exchange, being 25 years old, cannot be fairly compared with any other exchange in London in view of the peculiarity and age of the equipment, its contemporary, Holborn Exchange, having been dismantled 16 years ago. When it is considered that the Bank Exchange has now worked 25 years, which speaks volumes for those who originally installed the switchboard and equipment, also for the sound maintenance during these years—as it is doubtful whether it was anticipated that the exchange like Charley's Aunt would still be running in 1920—its service should not be viewed too critically, but rather in the light of "good old Bank" still giving a service.

Many have happy reminiscences of the days spent at the Bank Exchange, among whom might be mentioned Mr. J. F. Edmonds, Assistant Controller, Traffic Branch, L.T.S., who commenced his career there, and was responsible in a large measure for the installation of the extension and the maintenance of the whole exchange for some years.

The present Chief Supervisor, Miss A. F. Casey, also started her career there and her experiences no doubt help her to bear the difficulties philosophically. The operating and engineering staffs are determined in spite of its vicissitudes that no effort on their part will be spared to give a satisfactory service to the public, and there is no doubt that the fine history and traditions of the Bank Exchange will be maintained.

I am indebted to Mr. T. F. Ragbourn for his assistance in preparing this article.

THE BAUDOT—XI.

BY J. J. T.

THE connexions of the keyboard as presented in Figs. XXXI and XXXII are those serving a *Simplex* Quadruple Baudot installation fitted with a Twin Plate Distributor. They may be passed over by the general reader as obsolescent, from a British point of view, unless it be added that the second or "back" plate of this type of distributor is similar to, though not identical with the "front" plate and that the numbering of the rings of the former is continuous with that of the rings of the latter. Thus the first ring of the second plate is known as No. 7 and so on up to No. 12. The same system of numbering is adopted with *Duplex* Twin Plate Distributors as will be seen.

The various points numerically indicated in Figs. XXXI and XXXII are joined up *externally* and *internally* with respect to the keyboard as follows :—

INTERNALLY.	EXTERNALLY.
Nos. 1 to 5. Keys of keyboard.	Distributor: Five consecutive segments of Ring VIII thence by means of brushes to Ring XI and thus to line.
No. 6. Connexion 16 and thus to *marking* plate.	Main *marking* battery.
No. 7. c^{1} of switch.	U of Line relay.
No. 8. c^{11} of switch.	Main spacing battery.
No. 9. c^{111} of switch.	Tongue of Leak relay.
No. 10. a^{111} of switch.	Tongue of Combiner relay.
No. 11. Cadence coil W and a of switch.	Main earth.
No. 12. c of switch.	Distributor: Ring IX.
No. 13. a^{11} of switch.	Distributor: Ring X.
No. 14. c^{IV} of switch.	Distributor: Ring V.
No. 15. a^{1} of switch.	Spacing plate of keyboard.
No. 16. See No. 6.	Marking plate of keyboard.

The switch Sw Fig. XXXI consists of a movable switch plate B upon which are fixed four studs with spiral spring attachments a, a^{1}, a^{11}, a^{111}. The fixed ends of these attachments are connected to insulated screws on their respective side-pieces V and X. The latter flank the plate B and are fastened to the flooring of the keyboard itself. To the side-pieces V and X are also respectively fitted two, and three *studs* which carry flat steel contact springs c, c^{111}, c^{1}, c^{11}, c^{IV}.

Fig. XXXII gives the connexions made when the switch is in the "sending" position, thus a and c connect up 11 and 12, putting the local battery from Ring XII *via* Ring IX to earth, and bringing the *cadence* into action. a^{1} and c^{11} join up 15 and 8, connecting the spacing battery to the spacing plate, against which Keys 1 to 5 normally rest. a^{11} and c^{111} connect 13 and 9, joining up Rings VII and X with the tongue of the Leak relay and giving a local record of the outgoing signals by means of a Baudot *receiver*.

When placed to "receive" the switch handle shifts the switch-plate B (Fig. XXXI) slightly to the left, carrying the studs, (Figs. XXXI and XXXII) a to a^{111} with it, the flat spring connexions c to c^{IV} remaining stationary. a and c are thus *dis*-connected cutting off the cadence, while a^{1} is connected to c^{1} instead of to c^{11} cutting off the spacing current from the keys and joining up 15, to 7 (U of Line relay), instead of to 8 the spacing battery. It will have been noted that the marking battery remains joined to the front or marking plate of the keyboard, while the back or spacing plate now remains open for the passage of the incoming currents from Rings XI and VIII *via* the keys of keyboard. The same movement of B connects a^{111} with c^{IV} joining up 10 and 14; that is the tongue of the *Combiner* relay with Ring V. The latter relay is actuated by the Line relay already mentioned, forming a special feature of Twin Plate *Simplex* installations.

The same keyboard adjusts itself readily to Single Plate installations either simplex or duplex as a study of the outline

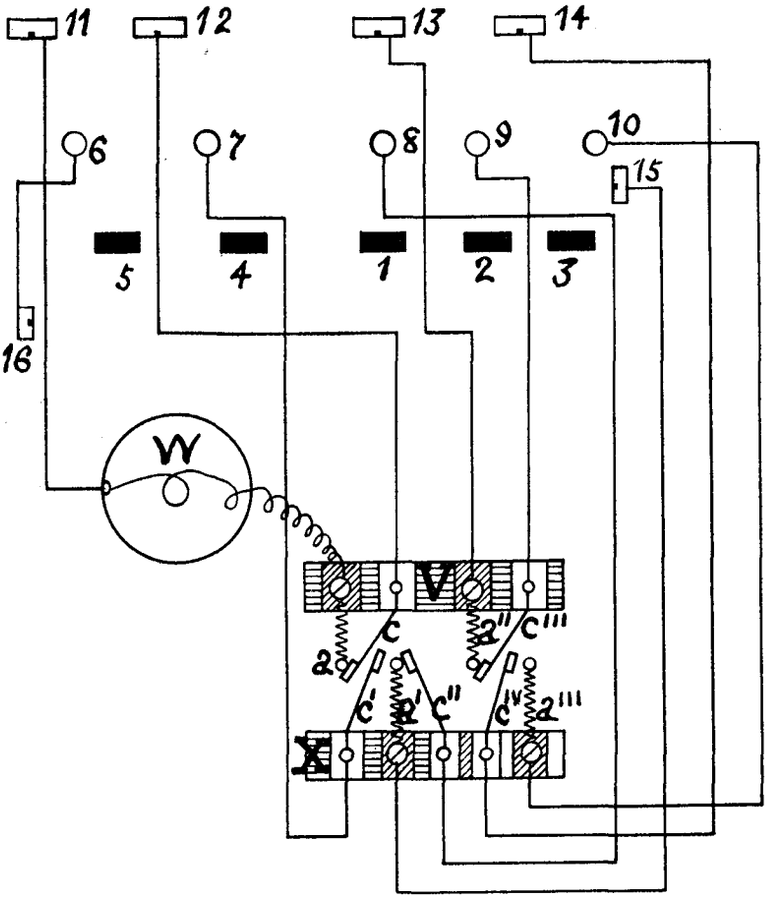

FIG. XXXII.

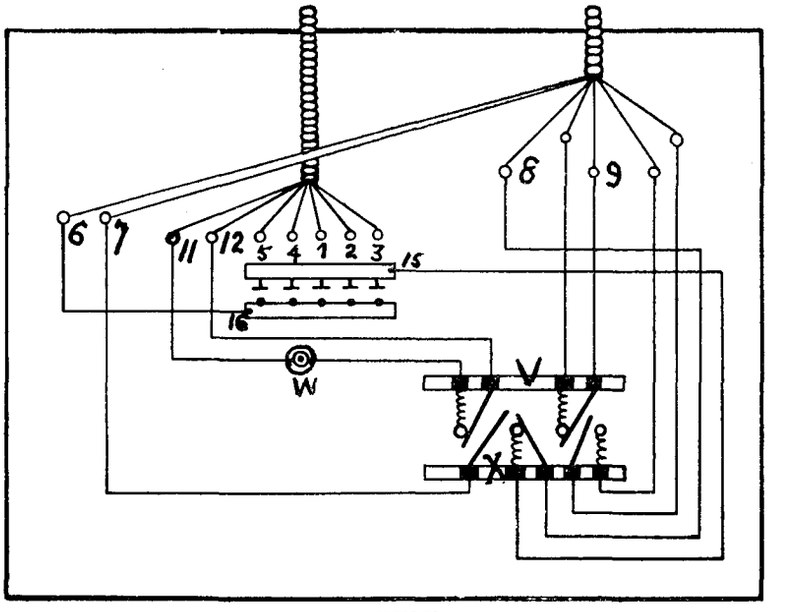

FIG. XXXIII.

sketch Fig. XXXIII will show. There also are shown the various internal connexions of the switch and in the sending position as in Fig. XXXII.

In a Single Plate installation there are only six rings to be served and this simplified form of Baudot simplex therefore demands a lesser number of keyboard and switch connexions which are now disposed thus for a Single Plate Simplex Baudot :—

INTERNALLY.	EXTERNALLY.
Nos. 1 to 5. Keys of keyboard.	Distributor : Five consecutive segments of Ring II thence by means of brushes to Ring V which in this type of Baudot is joined to line.
No. 6. Connexion 16 and thus to *marking* plate.	Marking plate of keyboard.
No. 7. c^{1} of switch.	U of Line relay.
No. 8. c^{11} of switch.	Main *spacing* battery.
No. 9. c^{111} of switch.	Tongue of Leak relay.
No. 10. Not in use.	
No. 11. Cadence coil W and a of switch.	Main earth.
No. 12. c of switch.	Distributor : Ring III.
Nos. 13 and 14. Not in use.	

It will thus be seen that in this simpler form of distributor which we have already studied, only the keyboard connexions 1 to 8 and 11 to 12 (Fig. XXXIII) are in use, so that on the switch itself a^{11}, c^{111} and a^{111}, c^{IV} are thrown out of use, and when *receiving* the only combination utilised is that through a^{1}, c^{1}.

(To be continued.)

TELEPHONE CHARGES.

I.—IN THE PAST.

IN the beginning a telephone subscriber paid an annual sum made up of (1) the rent of the instrument in his office ; (2) the rent of the wire from his office to the office of the Company or the Post Office ; and (3) a charge for switching, known in the Post Office system as "clerk's services," on the analogy of the clerk in a telegraph office who attended to a private wire used for handing in or delivering telegrams. For this annual sum the subscriber was entitled to get all the use he could out of the apparatus provided.

But as an inter-urban service grew up, either a higher flat rate charge had to be made (as in the Birmingham district) to cover such service, or an additional charge had to be made for each inter-urban call. The latter system was standardised when the Post Office took over the inter-urban or trunk lines in 1896. Thereafter a subscriber paid for his trunk calls according to a tariff graduated by distance and at a flat rate for his local service. For the purpose of distinguishing between "local" and "trunk" services, local areas were defined in a way which gave rise to the anomalies with which we are all familiar.

About 1900 discontent with the flat rate method of charge for local telephone service came to a head. There were complaints from the public that the rates were too high, which meant that there were many who wanted a telephone service but were not disposed to pay from £7 to £10 a year for it. On the other hand the Administrations, influenced no doubt largely by competitive considerations, wished to attract the small users into the system ; they also wished to make the large users pay in proportion to the ever increasing use of the system which these made. Hence the introduction of message and measured rate tariffs, which however it proved impossible to substitute entirely for flat rates in view of the opposition of the most influential subscribers. In the tariffs agreed between the Post Office and the National Telephone Company before the transfer of the Company's undertaking to the State, London subscribers were still allowed to contract for unlimited local service at £17 a year with the alternative of a message rate ; and, while in the Provinces only measured rates† were quoted to new subscribers, the flat rate contracts of old subscribers remained undisturbed.

Under the measured tariffs the large user got the advantage of a cheap rate for calls after a certain number had been made, *e.g.*, in Tariff B areas (*i.e.*, those the telephone service of which had not been developed by the Post Office or Municipalities) the subscriber buys his calls after the first 1,300 for 4*s.* per 100, instead of 7*s.* 6*d.* On the other hand the subscriber who does not make more than 500 calls a year has those covered by his annual subscription.

The alterations in telephone charges made during the war were due not only to a desire for greater revenue but also in order to check demands for service which could only be met with great difficulty in war conditions.

The charges for trunk calls were raised by one-third ; the flat rates were raised—in London from £17 to £20 and elsewhere from £10 or less to £12 ; and the whole of the then existing obsolete rates (except the provincial flat rates) were swept away. Finally, new installations were constructed only at the cost of the renter, a restriction which, since the Armistice, has taken the modified form of an initial charge of £4. These changes are estimated to have brought in up to date an additional revenue of upwards of £700,000.

II.—THE PRESENT SITUATION.

Meanwhile post-war conditions have worked havoc with the finance of the telephone system, one of the principles of which is to be self-supporting. The following table shows that up to 1918-19 the total results were fairly satisfactory :—

Exchange and Trunk Systems Combined.

		1913-14	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20 (estimated)
Expenditure	£	5,949,064	6,584,487	6,937,312	7,024,611	7,484,061	8,333,307	11,000,000
Income ..	£	6,188,175	6,473,479	6,819,135	7,226,340	7,839,529	8,297,046	9,050,000
Profit* ..	£	239,111	—	—	201,729	355,468	—	—
Loss* ..	£	—	111,018	118,177	—	—	36,261	1,950,000

* After providing for depreciation and interest on capital.

During the war capital expenditure was greatly restricted and was supplied in part by the contributions of subscribers, and expenditure on maintenance was deferred. The undertaking was profiting from the expenditure of former years and was making little provision for the future. Cables were utilised almost to full capacity, and the whole system was filled with traffic—Government traffic to a large extent, it is true ; but, from the point of view of the telephone balance sheet, a Government call is as good as a subscribers' call. Meanwhile the expenditure on salaries and wages (owing to the granting of war bonus) had risen from £2,500,000 in 1913-14 to £3,000,000 in 1918-19, and to £3,750,000 in 1919-20. There has been a further large increase this year. In other words the cost of operating and maintaining the system has increased 50 per cent. But this is not the worst. The cost of new construction has more than doubled ; and the same applies to renewals which are much in arrear. The interest on new capital is 5½ per cent. instead of 3½ per cent. and the annual allowance for depreciation has to be increased in order to cover the higher cost of replacing worn-out plant.

The problem before the Administration is how to raise the revenue from the users of the telephone system so as to cover the higher expenses, and to cover those expenses not only in the present year but also in the coming years in which the plant provided at post-war cost will bear an ever-increasing ratio to the whole. In the postal system, in which depreciation of plant and fresh capital expenditure are not important factors, it is being attempted to solve a similar problem by raising the pre-war penny letter postage to twopence. How it is proposed to solve the telephone problem must form the subject of a future article.

† The £8 a year residence rate in the Provinces may be regarded as a compounded message rate.

LONDON ENGINEERING DISTRICT NOTES.

ON June 23 and July 5 the Denman team met the Post Office Stores Department and Home Office teams respectively in the League Championship of the Civil Service Amateur Swimming Association, being successful on both occasions. The first match took place at the Westminster Baths, Great Smith Street and was won by 4 yards. The second encounter at Lavington Street Baths was won easily by 16 seconds. In both matches the Denman Club was represented by :—

Mr. J. R. Williams (Captain)
" A. W. Kelly
" A. W. Hopkins
" P. E. Rapps

A 100 yards Club handicap resulted in a win for Mr. T. A. Claydon (25 seconds start) in 107 seconds. Mr. J. E. Foster (10 seconds start) was second in 95 seconds.

In pre-war days it was usual for the London Centre of the Institution of Post Office Electrical Engineers to organise during the summer months a series of visits to contractors' works. Such visits had of course to be suspended during the period of hostilities, but now that the world, or at least the most important city in it, is at peace once more, the practice is being revived. The present session was opened on June 30 by a visit of some 40 members to the works of the Western Electric Co., North Woolwich. When the train from Fenchurch steamed in the party was rather taken aback by seeing a large placard on the front of the locomotive labelled L.T.S. It was soon realised however that the letters indicated the particular railway and not that our commercial colleagues had provided a " special " for the comfort of the travellers. The party was met at the railway station and escorted to and through the works after being split up into small groups, to each of which an expert guide was allotted. A great deal was learnt by the visitors about the manufacture of covered wire and cables and telephone switchboard equipment. The processes were so intensely interesting to telephone engineers that none of those present wore that jaded appearance that is sometimes so noticeable on such occasions. A specially interesting feature was the demonstration of the Western Electric Co.'s loud speaking receiver. Three receivers were suspended at a height of about 20 feet above the yard, and at intervals of about 20 feet. Music and spoken words practically free from distortion were heard perfectly clearly over a wide area. It was noticed that it was not necessary to shout into the transmitter to get the results. As a matter of fact the speaker at the transmitting end was talking in a normal tone some two or three feet from the transmitter. There should be a considerable field for the use of such apparatus in connexion with public meetings, etc.

A welcome feature of the visit was the tea with which the visitors were regaled before leaving the premises by the courtesy of the firm. Major Booth took this opportunity to thank the firm on behalf of the I.P.O.E.E. for making the visit so interesting and for the trouble that had been taken in the matter. Mr. Pease replied for the Company saying how glad he was to see so many old friends at the works. He stated that it had been decided to transfer the business to Wembley where a suitable site had already been taken.

With the passing of the winter months one's thoughts naturally turn from technical meetings to summer pastimes, but the prospects of successful Winter Sessions will be brightened if it is realised how swiftly the summer months fly and how necessary it is to have one or two papers ready by the autumn. It generally falls upon the Committee of every technical society to call upon someone to write a paper at short notice because of the human failing of putting off until to-morrow that which could and should be done to-day. Those who have in mind the preparation of a paper for the forthcoming Session will be well advised to prepare the framework at least during the coming months and so lighten their task at the last and incidentally remove much anxiety from the minds of the responsible Committee. The difficulty that undoubtedly exists in obtaining papers is largely due to the fact that the opinion is widely held that only papers on new phases of our work are of general interest. This is quite a mistaken notion. Some of the most successful papers have dealt with the everyday work of the department, the interest lying on the new thoughts brought to bear upon it. However standardised one's work may be by instructions and regulations there is always scope for constructive criticism.

It is a practice frequently adopted with up-to-date firms to keep a record of the qualifications and personal attributes of each employee, but it has not apparently occurred yet to any employer to include hobbies and pastimes in the list of items which help to indicate character, although undoubtedly much useful information concerning a man's suitability for a particular class of employment could be gleaned from a knowledge of the way he spends his time after office hours. Probably objections would be raised by some to any attempt on the part of the Department to extend its interest in its employees beyond the usual official hours, which, by the bye, in the case of engineers are 24 per day. Among the clerical staff of the London Engineering District are some who possess considerable skill in mechanics. One senior clerk at Denman Street having completed the construction of a grandfather's clock, making every part, even the wheels, is now engaged on a still more ambitious task, namely the building of an astronomical clock. Another clerk is a lecturer of no mean skill in electrical engineering. One of the draughtsmen has just completed from materials bought for something under £50, the construction of a complete motor car, for which he has been offered a large sum. Men of this stamp are a loss to actual engineering. In addition to the more common pursuits such as photography, conchology, numismatics, philately and the culture of flowers and vegetables, there are some who keep pigs and those marvellous little insects which gather nectar from the neighbour's flowers.

It is said of one Headquarters' engineer, who is at times nonplussed by some telephone problem, that he discusses it with his bees and arrives at the office next day with a satisfactory solution.

Probably every known game has its votary among so large a staff. Recently one engineer noted for his sarcasm gave it as his opinion that the descending scale of physical and mental deterioration in sport is :—(1) golf, (2) bowls and (3) tiddley-winks. He himself plays skittles.

The suggestion to record the "off duty" activities of the staff is certainly worth consideration, and information so obtained would form a valuable adjunct to the existing records which already include all cases of specially meritorious work.

Presentation.

In the presence of a number of his colleagues and personal friends Mr. J. N. Hill of the Engineering Section, Superintending Engineer's Office was presented with a handsome silver plated spirit kettle on the occasion of his marriage.

Captain J. G. Hines, Executive Engineer, who made the presentation on behalf of the staff, spoke of the esteem in which Mr. Hill is held by those who are associated with him officially, and voiced the good wishes of all for his future happiness.

Metropolitan Special Constabulary Reserve, Post Office Division, (Engineering Groups).

The preliminary arrangements for the formation of a force which will perform duty in the area south of the Thames on occasions of public emergency have been completed. It is the intention to provide groups for Hop, Battersea, Streatham, Brixton, New Cross, Wimbledon and Putney Exchanges, and a fair number of the original members of the 1914 force have already enrolled for these groups. The following officers have been appointed :—

Mr. A. Wright (South Internal)
" T. H. Edgerton (City Internal)
" D. H. Watson (City External)
" F. J. Judd (South Internal)
" P. J. Sard (South Internal)
" E. D. Evans (City External)

Applicants for enrolment have the option of joining for either a one year, or three years' engagement. Enrolment for three years will entitle a man to receive uniform, and to qualify for the long service medal. Time already served by original members will be taken into account in awarding this medal. Any members of the engineering force residing in the neighbourhood of these exchanges who desire to enrol should apply to the Commandant, 26 Queen Anne's Gate, Westminster, S.W.1, or to any of the above mentioned officers.

REVIEWS.

" *Who's Who in Engineering* " (*Annual*). *The Compendium Publishing Co.*, 93-94, *Chancery Lane, W.C.*2.—This book meets a real need in the engineering profession and should, as the editor hopes, prove not only useful to engineers in their business, but also to the individual engineer in his career. We appreciate the difficulties of making the first issue really representative of the profession and these may account for the omission of many important personalities in the Telegraph and Telephone World in which we are specially interested. The Institution of Post Office Engineers is not mentioned nor do the names of Sir John Snell, Mr. Frank Gill, late Engineer-in-Chief of the National Telephone Company, Sir John Gavey, late Engineer-in-Chief of the Post Office, and erstwhile President of the Institution of Electrical Engineers, Mr. A. J. Stubbs and Major T. F. Purves, Assistant Engineers-in-Chief of the Post Office, to mention only a few, appear in the personal section.

" *The Practical Electrician's Pocket Book and Diary.*" (*S. Rentell & Co. Ltd.* 2*s.* 6*d. net.*)—The twenty-second edition of this useful little book has been brought up to date and expanded to nearly 600 pp. It contains numerous illustrations and scores of tables relating to all kinds of electrical data. Much of the chapter on wiring has been recast and a new section added on the subject of special electric furnaces for the hardening and tempering of high-speed tool steel. We believe the book is already well known to most of our readers.

The
Telegraph and Telephone Journal.

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Editing and Organising Committee - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - - W. H. GUNSTON.

NOTICES.

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

VOL VI. AUGUST, 1920. No. 65.

A EUROPEAN CONFERENCE.

WITHOUT blare of trumpets or advertisement the past month has witnessed the sittings of a continental Telegraph Conference, comparatively small in the number of its delegates, but of major importance to the political, economic and business worlds. It was an outward and visible sign of the real spirit of re-construction. It permitted new voices to speak; the voices of new administrators; even the voices of new nations were able to give expression to their aspirations.

New psychological views were doubtless presented and new psychological studies made in the differing mentalities and outlooks; new apparatus was discussed, new methods were examined, new routes were suggested; probably new schemes for continental traffic-centres were adumbrated. Even such schemes as those involving complete re-orientations of the European *reseau* could with profit have been discussed, if only to clear the ground of impossible impedimenta. It may not prove to be the least service which the conference has rendered if a large portion of its labours should result in the simple separation of the practical from the impracticable schemes which were set before it. The idealist and the visionary are of the highest value to the State. Without vision a nation perishes, but without lowering such ideals, *qua* ideals, as practical administrators there are facts undoubtedly recognised by the delegates which must in any international arrangement militate against whole-hearted unreserved acceptance of certain propositions. The British administration showed no early enthusiasm for the adoption of the Baudot system, and the French were no more enthusiastic concerning duplex Hughes, while the Hauptamt Berlin was equally reluctant to try Wheatstone over the Anglo-German cables. That is history.

Thus facing facts we are nevertheless not disposed to be unduly pessimistic as to the ultimate results of the Conference held during the aftermath of a world disaster. The fact that the Conference has met and was prepared to discuss continental and Anglo-continental telegraphic facilities from a higher view-point than the mere parochial is all to the good. No nation in these times can live unto itself. All are parts of one huge whole which international telegraphy and telephony has done its part towards proving, but has yet to do its part in consolidating.

One phase of the present problem of Anglo-European telegraphic communication could scarcely escape discussion, could scarcely indeed escape one verdict. No matter what system be adopted for telegraphic transmission, be it Baudot, Murray, Siemens, Wheatstone, Wheatstone-Creed, &c., &c., without a high standard of electrical line efficiency, without stability, the high standard of expeditious treatment of telegraph traffic combined with the increased accuracy demanded by the modern telegraph user will prove impossible of attainment.

There are admittedly other phases of the same problem, staff efficiency, staff conditions, amicable relationship between the various termini, to quote but a few, nevertheless line efficiency stands out clear-cut and well-defined as a fundamental condition of satisfactory international telegraphy.

The broad, general and non-committal terms of former International Telegraph conventions regarding the standard of electrical efficiency for international communications are altogether too vague to prove of the slightest utility. It should not be difficult for a committee of international telegraph engineers to provide satisfactory and acceptable formulæ covering the three points of construction, insulation and conductivity.

We may also rest assured that no telegraph conference of international composition could possibly have assembled in the present decade of the twentieth century without some searching discussions on wireless systems and their adaptability to trans-continental traffic needs. It has been stated on German authority that Berlin communicated continuously with Constantinople by this very means for the greater part of the war period.

However this may be, we should be much surprised if some very interesting developments were not to eventuate—in the direction of high speed wireless for example—at first experimentally, as among the early fruits of these most valuable deliberations.

MESSRS. SIEMEN'S AUTOPHONE.

We have received Messrs. Siemens Brothers' pamphlet entitled "Autophone," No. 2, which describes fully the working of the Siemens' automatic telephone system and its possibilities as a time saving factor in any large business house or factory where rapid communication between the different departments is essential. The pamphlet describes very clearly and simply the switching apparatus and the method of operation and is illustrated with some excellent photographs of automatic exchanges and apparatus.

TELEGRAPHIC MEMORABILIA.

ASCOT week proved an unqualified success from a telegraph point of view as well as from a Society one, and the C.T.O. has thereby undoubtedly added to its laurels. All agree that there was more than a touch of pre-war times about the entire function, and not least of all as regards the composition and excellency of the special staff which dealt with the very heavy traffic. The Controller's personal interest was evinced by his presence at the function.

Quite of another character was the Boulogne Conference for which a *simplex* quadruple Baudot was available at practically a few hours' notice. The utility of this special type of apparatus as during the San Remo event was its pliability. In each case at certain periods the flow of traffic was fairly equally divided in the two directions, at other times there were rushes of press matter in the direction of London. By the turn of a switch one of the two transmitting arms was converted into a receiving sector giving three outlets to the distant office and one to the "home" station. There were other but less frequent periods (in the case of San Remo only) when the flow of traffic was greater in an outward direction and in this case the same simple turn of a switch at each end gave three outlets in an outward direction as against one inward. In an emergency and by arrangement all four points could be worked in the one or the other direction as traffic demanded. I am conscious that this is no new discovery, but the pliability of this form of Baudot, *i.e.*, simplex quadruple, should not be lost sight of for certain Anglo-foreign circuits, a fact of which, in our natural enthusiasm for duplex arrangements, we may be inclined to overlook. The writer is also conscious that this type of apparatus is viewed as obsolete in certain quarters. Nevertheless, with all due respect for the views taken by some of my most respected engineering friends, and with all high hopes for those halcyon days of continental telegraphic re-construction,

> "When the Underground is 'stablish'd
> And the O'erhead swings no more."

I would place on record my firm conviction that for at least another decade *Simplex* Quadruple *Single* Plate Baudots will be needed on the Continental circuits.

About ten thousand words of Press were dealt with on the three inwards points of the Boulogne Quadruple.

It was regrettable and, we suppose, unavoidable that during this period of re-construction no spare apparatus of this type should have been available for emergency use, and that it should have been urgently necessary to interrupt direct communication with a distant continental city in order to meet the needs of a special event, international though it be. It also accentuates the extent to which the Anglo-Continental telegraphs are expanding, that at the present moment there is actually no *space* for spare apparatus of this or any other kind. To declaim against a fault is admittedly one thing, to remedy the same quite another, and without withdrawing one word of regret at the cramped conditions which preclude the scientific lay-out of an office with some truly prescient allowance for more or less sectional development, one is compelled to admit that the price of every square inch of space in the City of London can only be quoted in terms of pounds sterling. The Postal section was fortunate in that King Edward's Building was erected in pre-war times and that its fairy godmother associating a happy national sentiment with its christening charmed away the evil spirits which would otherwise have carped at the "extravagance" of its ornate public counter, though the marble walls of a bank, of an assurance company, or the palm-roof of a modern emporium would with equal certainty have been lauded to the skies as the splendid results of the "energy, resource, pushfulness, public spirit, encouragement of art and wide vision," &c., &c., of private enterprise!

Whatever may be the criticism, one thing is certain, the C.T.O. appears to be growing out of its clothes, especially those particular sections which comprehend the various foreign and colonial submarine cables.

The telegraphic conditions under which the special double duplex Baudot circuit was compelled to work between London and Spa during the July Conference did not touch the excellency of those which governed the Boulogne event, as was to have been expected, but truth demands the admission that the San Remo circuit despite the greater distance and despite the temporary make-up of a portion of the latter line, proved of greater reliability than the shorter Anglo-Belgian communication. One is not unaware that the post-war conditions of a war-swept land must severely handicap line construction of the first quality, but after having made the fullest allowance for these admittedly unique adverse conditions it must be placed on record that the instability of the foreign section of this line proved a severe drag upon the efficient working and output of a circuit which should have been capable of "eating the work."

According to the Army Estimates of 1920-21 that for the Anti-Aircraft Searchlight and Sound Locator School amounts to nearly £2,000. Under the same heading it is noted that the Wireless Station at Bathurst, West Africa, is to be provided with additional house accommodation for the staff maintained there, at a cost to the Admiralty of £8,400.

The following is culled from the pages of *Electricity* and relates certain facts which though known to a number in telegraphic circles during the war may not be so thoroughly known to the majority of the T. and T. readers:—

"Recent light shed on the circumstances immediately preceding the destruction of the German raiding cruiser *Emden*, Captain Muller, at the Cocos, or Keeling Islands show that a 'heathen Chinee' had a good deal to do with the luring of the captain to his doom when he landed his party to destroy the all-important wireless station there, on Nov. 9, 1914. The station is on Direction Island, the most northerly of the Southern Keelings. A boat-load of Germans was sent from the *Emden* to destroy the station, and after landing they commandeered a Chinaman to lead the way, which he did by a circuitous route, having in the interim 'given the tip' to a countryman to get there first, with the happy result that just in the nick of time the operator got through a message which was picked up by H.M.A.S. *Sydney* and the *Melbourne*. 'Strange warship off entrance,' it read, and 'Full speed ahead,' was the order to the cruisers, and the fate of the *Emden* was settled. Her party had lost a valuable hour in blowing up the wireless station and cutting the cable—the dummy one—for the genuine cable was never touched; the staff having rigged up a decoy cable. The enemy overlooked the fact that there was a duplicate set of instruments very cleverly concealed, with which the service was restored shortly after the raider fled to his doom. The Chinaman, who was a servant of the Cable Company, was suitably rewarded."

From the same useful source also:—

"At a meeting of the Wireless Society of London, held in the Lecture Hall of the Inst. C.E., on April 30, a Paper was given on an Automatic Call Device, by Major Basil Binyon, O.B.E. By means of an aerial which had been erected, Major Binyon was able to give a practical working demonstration of this ingenious piece of mechanism. Pre-arranged messages were received from his Wireless Station at Slough, and the selector mechanism proved beyond doubt that it would respond only to signals for which it was set to receive. By the use of this apparatus it is therefore possible to make use of only one operator on board ship, so that during the less busy hours of the day the Automatic Call Device may be left to take incoming signals, and on the receipt of a message giving the call signal of the ship in which it is installed, or the distress signal S.O.S., a relay is put in action, a bell rung, and the operator called to his instruments. Those present voted this one of the most interesting meetings the Society has yet held, and Major Binyon was accorded a hearty vote of thanks. Twenty new members and Associate members were elected, including the Society's first lady member. Particulars of membership of this Society can be obtained from the Honorary Secretary, Mr. L. McMichael, 32, Quex Road, West Hampstead, London, N.W.6.

Our friends, the Illuminating Engineers' Society, and what telegraphist is not entitled to call those gentlemen 'friends' who make the minute and careful study of artificial illumination their special thought and care?—these friends of ours are constantly giving evidence of the thoroughly scientific thoroughness of their investigations. At one of their meetings during the early part of the year a Dr. T. Lister Llewellyn introduced the subject of the "Eyesight of miners." Dr. Llewellyn has written a treatise on "*Miners' Nystagmus*" and is therefore an authority on artificial illumination, and estimates that some thousands of miners are more or less disabled each year owing to this disease.

The phenomena are very complex as the disease may take from ten to twenty years to develop completely. The trouble would appear to be the great difficulty in determining what are the best illuminating conditions.

Telegraphists and most indoor workers have experienced similar difficulties. Lighting conditions which when first installed appeared to give every satisfaction have subsequently produced detrimental effects so that all that may be safely said is, that hasty verdicts with regard to any new system of lighting either *pro* or *contra* are to be severely deprecated. An interesting result of the discussion was an agreed determination on the part of the above Society to do its utmost to study questions of this type in co-operation with the Council of British Ophthalmologists. It was stated that a necessary feature of any inquiry into the relationship between illumination and defective vision is "the collection of statistics on vision by ophthalmologists accompanied by measurements of illumination by a photometric expert so that the relation between visual defects and illumination could be studied on a uniform basis."

There is a prevalent idea that as wireless telegraphy *and* telephony have become part and parcel of our modern economy wire telegraphy and telephony are about to be finally superseded. Nothing could be farther from the facts as at present established. It is usually the uninformed public ably coached by the uninformed and unscientific press-writers who prophesy these things for the near future. Whatever may be in store for us in the way of new discoveries which may revolutionise these two realms there is nothing for the moment to justify these flights of journalistic imagination that we are soon to see "everyone his own telegraphist and telephonist without the aid of wires!" As a scientific journal very aptly says, the results of throwing open to millions of amateur telegraphing and telephoning correspondents would be chaos, indeed, and adds: "Moreover, the available tuning range would be altogether too limited to freeze out those conversations which had nothing in common. The problem of differentiating calls for various subscribers, for example, also presents an impossible problem in the light of our present knowledge."

The adventures of our telegraphists, anyway, of a mild type, are not over with the war. One of ours was suddenly requested to go to Hythe during a recent international event. He then seemed to disappear from our ken until we heard of him on the wire at a foreign coastal town. Without passport and almost on the spur of the moment he had been whisked away again for special service and arrived safely back in London after an historic trip, still without passport, but under the highest aegis, and with the return half of a third class ticket in his pocket as a souvenir of a unique journey and mission! As these pages go to press news comes that he has again disappeared. This time, however, no surprise is evinced by his colleagues who have made fairly shrewd guesses as to his temporary location and have accepted the incident as one more tribute to the part which the Anglo-foreign telegraphs must needs play in the present and future plans for the world.

Mr. A. E. Thompson, the writer of the June article on "Where the Arctic Cable ends," has left the Service for civil employment. He is still connected with our craft and when last heard of was busily employed on telegraph matters in Copenhagen. The Government Telegraphs at home here thus loses an excellent officer who was apparently not without honour—and commercial value—save in his own country. It is understood that an American firm has secured his services.

Most readers will agree that Miss McMillan's "Alice in Numberland" in the July issue was one of the cleverest parodies of a classic, which have ever appeared in print. The style, the character, and the rhythm of Lewis Carrol are unmistakably preserved and well maintained throughout. Miss McMillan is of ex-National origin and one who, evidently, keeps well in touch with telephone developments, including up-to-date methods of training and control. In one word she has grasped the root meaning of super*vision*.

Despite the opinion of a certain leader-writer in the London daily press that it was, "simply a blunder, one of the familiar incompetencies of the Post Office," the Triple Rate for Urgent Foreign telegrams has been accepted with avidity by men of the business world. So far the "Urgent" habit appears to be growing, and despite uninformed criticisms, has been accepted as a reasonable proposition by those who expect to pay higher rates for "taxis" than for hansom cabs. It may, perhaps, interest our fellow journalists to know that the Post Office claims no special priority for having introduced the system. It existed, before the war, over certain lines and through certain countries, and formed the subject of many a weighty discussion in administrative circles in this country prior to August 1914.

The bed chosen by the C.T.O. War Memorial Committee in Bartholomew's Hospital it will interest readers to know is No. 6 Hope Ward. A suitable tablet will be placed above the bed indicating that it was subscribed for by the men and women of the C.T.O. in memory of those of their number who had made the supreme sacrifice during the war. Mr. Edwards and the C.T.O. alike are to be congratulated upon the happy idea by which the name of the Deputy-Controller has been added to the list of Governors of Bart's. It should mean closer touch with this truly time-honoured institution.

The remainder of the money subscribed is to be spent in the purchase and fixing of a suitable memorial tablet which will be placed on the outer wall of the C.T.O., in Newgate Street. The order for the tablet has already been placed.

Owing to the absolute necessity for going to press at an earlier date than usual or the non-arrival of the necessary "copy" from correspondents, only passing notice can be made of the following interesting C.T.O. events:—

The presentations to Messrs. Adams and Simmonds passed off with the usual *élan*. Again the pleasure of viewing old faces and gripping hands with many of the Old Guard was experienced, while Mr. J. Field added to the delight of a delightful evening. As a souvenir of the versatile talent of the C.T.O. the illuminated album, amongst other items presented, should prove "something that money could not buy." Mr. Adams doubtless appreciates the sketch of himself and his rose-garden.

To Mr. Francis Morgan, also retired from the supervising ranks of the C.T.O., suitable tokens of respect have been privately presented. He will no doubt now and again give a passing thought to the donors of those "motor-cycles accessories" as we who are left still welter in the summer heat of the City while he whizzes away through forest and field.

J. J. T.

BELFAST TELEPHONES.

On the occasion of her departure to Canada, Miss J. McCartney, Travelling Supervisor, was presented with a handsome solid silver tea service, and was entertained to an enjoyable musical evening in Thompson's Restaurant, where a large number of the Indoor and Outdoor Telephone staffs were assembled. Many of those present paid tribute to Miss McCartney's sterling qualities, and to the high esteem in which she was held by her numerous friends both in private and official life. Our late supervisor, who has endeared herself to all, leaves us with every good wish for her future happiness, and the best of luck in her new life.

G.P.O. ARTS CLUB.

Many readers will be interested to learn that the G.P.O. Arts Club, which was founed in 1906, has survived the war. It is hoped to hold an exhibition of selected work in London this year if accommodation can be found.

Membership is open to all members of the Post Office interested in painting, pastel work, black and white, etching, design, pictorial photography and Art Crafts, such as wood carving, metal work, needle work, gesso work, &c. The annual subscription is 2*s*., and the Hon. Secretary, Mr. C. U. Cooke, 369, Essex Road, Islington, N.1.

HOW THE REPEATER REPEATS.

IN an American Telephone Journal Mr. I. Manutt has a description of the action of a telephone repeater told in simple language for the benefit of the non-technical reader. We give an abridgement of his "Twentieth Century Fairy Tale." He claims that the place of the romancer and necromancer is now taken by what is known in America as a "highbrow."

Well, here is their answer to "How does a repeater repeat?" In the first place they refer you way back to the grandfather of all highbrows, Clerk Maxwell, who could make the calculus do ground and lofty tumbling and eat out of his hand. In fact from all we know of this gentleman, we believe he was probably the only man that ever lived who could answer all the questions the comptroller asks before the books are closed. Well, our highbrows tell us that he found it convenient to demonstrate some of his theories by the fairy method, only he called them "daemons." They didn't have any comptroller where he worked or he never would have gotten away with it. By bringing in a daemon, however, he proved that it might be possible to heat a small quantity of gas or air from a larger amount at a lower temperature. In other words, you could get hot air from cold air if you had a daemon to assist you. Now you can guess how Happy Hottentot Harry keeps up his supply. But where does he keep his daemon?

You all remember what you learned at school about matter being made up of molecules, and molecules being made of atoms beyond which matter is indivisible. That is, with a meat axe you can divide a substance into s nall pieces like hash; and with a microscope and hair-splitting equipment, like that of a prominent engineer, you can divide a substance into pieces smaller than the naked eye can distinguish; after that by means of chemicals you

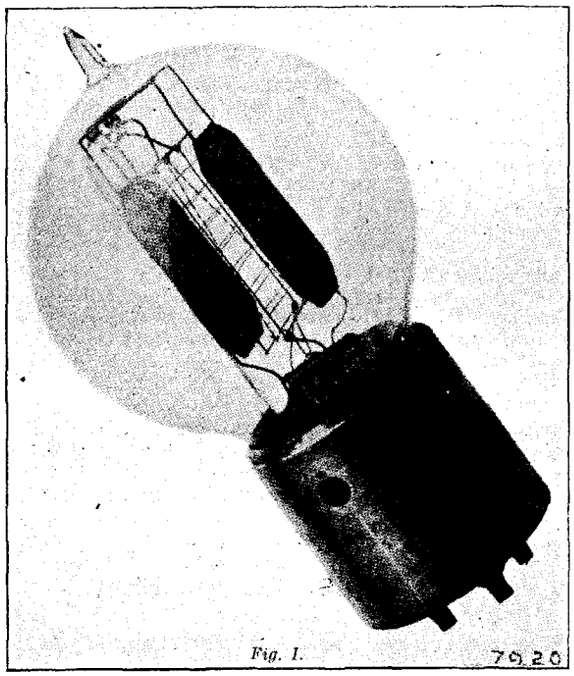

Fig. I. 7920

can separate molecules from each other although you can't see them even with a microscope; then with more chemicals you can separate the atoms from each other, but beyond this no treatment has any effect; at least, that's what we learned at school, and that effectually proves that there are no such things as fairies or daemons. But now come our highbrows with another story. Mind you, you don't have to believe it. They say that atoms may be made to throw off particles as a small boy throws gravel at the passing trolley car, only the small boy does it voluntarily for the fun of the thing, whereas the atoms must have some provocation; for example, if they get good and hot they commence to throw gravel, like a terrier pup at a wood-chuck hole.

Fig. 2 represents the interior of one of our repeater bulbs, shown in Fig. 1, and says that "f" is a filament which is heated red hot by the electric current from battery "A," and "P" is a plate which is connected to the outgoing line. In the space between the filament and the plate is the piece of picket fence "g" which is connected with the incoming line, and this gridiron is what puts the fire in the amplifier.

To make the matter clear as a fairy tale should be, look at Fig. 3, where instead of a filament there is an iron stepladder on which you can see a lot of atoms, or daemons—it doesn't matter which you call them—and on the other side you see the plate as in Fig. 2. Between these two is an ordinary window blind with slats which are all operated together by the usual center stick. Now, suppose a strong electric current is passed through the iron stepladder so that it heats up like the filament in Fig. 2, then each little daemon gets as mad as a hen on a hot griddle and begins to throw pebbles at the window shutter. What's that? Where do they get the pebbles? Say, this is a fairy story and you must not ask foolish questions; besides the highbrows are stumped by this question. Lord Kelvin thought the atoms were made of these pebbles, or corpuscles, and that these corpuscles were electricity itself, hence the name electrons. In other words, matter is made of electricity and electricity is imponderable; therefore, there is no matter, and if that is no matter we should worry.

If while the daemons are bombarding the shutter we should open the slats, enough pebbles would go through and strike the plate to make a noise like a hailstorm on a tin roof, and the number that strike the plate would be in proportion to the amount the slats are opened. Therefore, if the slats are opened and closed in time with music it would be possible to play a tune on the plate, and if each electron carried a little bit of electricity with it,

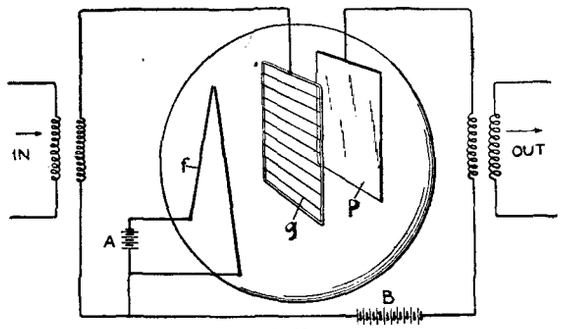

Fig II.

the effect would be like a current from the stepladder to the plate, and this current would pulsate, increasing when the slats are opened and decreasing when they are closed.

This is just what happens in the repeater bulb shown in Fig. 2. The filament is heated red hot by the current from battery "A" and at this temperature millions of corpuscles or electrons are thrown off. The electric current is not necessary to cause this; the same thing would happen if it were heated by a gas flame. These electrons are considered to carry charges of negative electricity itself. Here again we should worry, because the result is the same, no matter what anyone thinks; because a current actually does flow from the filament to the plate.

You all remember that unlike polarities of electricity attract each other while like polarities repel, and so if the gridiron is made negative to the filament the electrons will be repelled by it and very few will get through

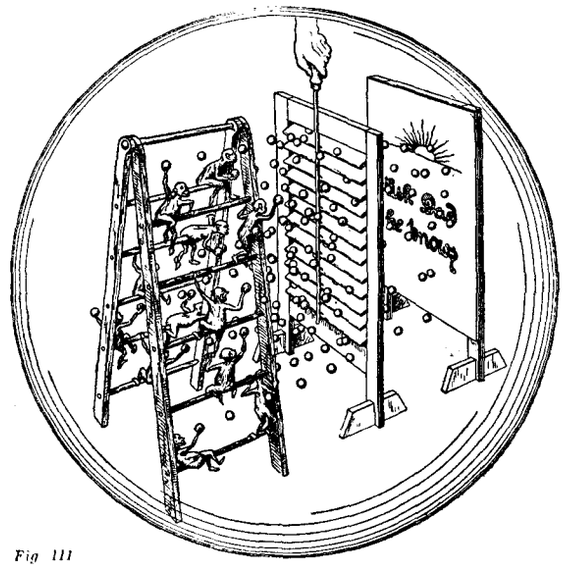

Fig III

between the slats; in fact, if the slats are too close together no electrons at all will get through to the plate. The effect would be the same as though the slats in Fig. 3 were entirely closed.

Now the sound waves of telephonic speech produce electrical pulsations of current coming to the induction coil at the left side of Fig. 2. These pulsations are, of course, very weak because of the long line over which they have travelled and the purpose of the repeater is to amplify or strengthen these pulsations.

Now while it takes considerable power to open and close the slats of a window blind, especially if you painted them yourself last spring, the operation of the electric shutter is frictionless and even the weak impulses of speech

transmitted over 500 miles of line are sufficient to give the desired results, so that as each increase or decrease of current raises or lowers the negative potential of the grating "g" more or less electrons each with its infinitesimal charge of electricity get through from the red hot filament to the plate and give the exact same, but much stronger, impulses of current from the plate to the induction coil at the right side of the picture, and so out on the line for another 500 miles, the amount of additional pep put in the impulses depending on the strength of the battery "B."

Now you are probably wondering why this apparatus is put in a glass case. The reason is that the scheme will only work in a very good vacuum because a clear space is necessary for the electrons to travel in. You must remember that everything, even an invisible gas, is composed of atoms, so if there was air or any kind of gas in the space between the filament and the plate the electrons would bump the atoms of the gas and while the daemons might put a good many across, the number would not be constant from minute to minute, depending on how successful they were in dodging the atoms and the result of this would be jerky current which would entirely mask the telephonic pulsations. Therefore, in order to obtain the required accuracy of control of the rate at which the electrons strike the plate, it is necessary to pull out of the space between the filament and the plate every loose atom that it is physically possible to get hold of.

This is so important that our highbrows have developed an extremely interesting method of inducing daemons themselves to call the game when the space is cleared, but that is another story to be told when you have recovered from this one.

LONDON TELEPHONE SERVICE NOTES.

THIS column of notes gives frequent evidence of the enthusiasm with which the staff of the L.T.S. has espoused the cause of men disabled in the Great War, and particularly in that section of disablement which is dealt with by the War Seal Foundation.

From the time that interest in the War Seal Foundation was first enkindled Exchanges seem to have entered into a keen rivalry in money-raising schemes for this excellent work, and although there is a little relaxation during the holiday season we understand that plans are in hand for a continued campaign in the coming autumn and winter.

One of the outstanding features of all these staff efforts is the small expenses account which means so much more brain work and spade work for the organisers and a relatively larger gain to the funds.

Up to and including June 28, 1920, the total sum raised by the staff of the L.T.S. and handed over to the War Seal Foundation is £1,882 2*s.* 2½*d.*, and that excludes the amount realised by the Hiawatha concert given by the Langham Choral Society at the Alhambra Theatre on June 27, the accounts of that successful function not being quite ready for publication at the time these notes are written. Concerts, whist drives, dramatic performances and bazaars have all lent their aid and small Exchanges no less than the large ones have made their contribution.

The Secretary of the Foundation, who has "said a few words" at most of the functions, affirms his highest admiration for the business ability of our members and the artistic talent displayed by those who have contributed to the entertainments.

The War Seal Foundation has built seventy-two flats at Fulham, together with a Treatment-Administrative Section, and these have been in occupation and use by an equal number of disabled men and their families—a total of 226 persons—for over a year.

Many members of our staff have visited these flats and have echoed the sentiments of the Queen who expressed herself as delighted at having "Seen the men so comfortably housed in their own quarters and with their own people around them."

Mr. Wm. J. Roberts, Secretary, informs us that he has a large number of disabled men on the waiting-list, hoping against hope that flats will become vacant or that others will be built. The need for more accommodation is so evident that Sir Oswald Stoll, who initiated the scheme, has abandoned his intention of building a theatre on land which adjoins the present site of War Seal Mansions, and instead has handed over the freehold of the site to the Foundation whereon, should sufficient funds be forthcoming, a further 65 flats will be erected.

Concerning the Langham Choral Society and its effort for the War Seal Foundation, we hope to have particulars for our next issue. It is, however, interesting to recall that the Lord Mayor and the Lady Mayoress were present on the occasion of the concert at the Alhambra and the Lady Mayoress subsequently sent the following message :—

"Dear Mr. Roberts,—I had hardly time to thank you for the pleasant evening we had at the Alhambra. I was very much impressed with the performance of 'Hiawatha,' the music lends itself to the words and the chorus said their words very distinctly (no doubt from daily habit) so a programme was hardly necessary."

London Wall Exchange records in this issue a very commendable achievement on behalf of the Foundation.

The London Telephone Service Whitley Committee has at the time of going to press held its third meeting. The subjects which have been considered include :—

The departure, in individual instances, from the regular hour of commencement of duty to meet the wishes of those who suffer from the present housing and travelling difficulties.

Substitution on clerical grades.

Duties performed by paperkeepers in the London Telephone Service.

Recruitment of Assistant Superintendents of Traffic.

Congestion in the London Trunk Exchange.

The placing on the permanent staff of temporary full time night telephonists engaged during the War.

* * *

Contract Branch.

The Contract Branch negotiated agreements for 3,728 stations during the four weeks which ended June 26. The number of stations recovered during the same period amounted to 1,378, leaving a net gain of 2,350 stations.

In the portion of the London Telephone Area which is in the London Engineering District 360 applications for lines were refused during the month owing to shortage of plant.

Gerrard Exchange.

The reference made in the last issue of this Journal to the swimming contest which takes place at the end of August did not exactly express the spirit in which the event was conceived, inasmuch as a *challenge* is not intended. The officers and members of the Club wish to remove any misapprehension which might exist as the result of the previous announcement.

On July 3 the staff gave a tea, concert and dance at the Queen's Hospital, Sidcup. About 400 men shared in the festivities, the bed cases being specially catered for. The Colonel and Matron were most enthusiastic in their praise of the entertainment and thanked the staff most warmly for their efforts To use the Colonel's own words "now that the play is over and the curtain rung down" it is good to find that the boys are not forgotten.

London Wall Exchange.

By the kind permission of the Controller a very successful bazaar and sale of work was held in the sitting room at London Wall Exchange on June 14.

The bazaar was opened at 6 p.m. by Mr. Benham, supported by Mr. Roberts, Secretary of the War Seal Foundation and the Chief Supervisor, Miss Forge.

The stalls were well filled with useful and fancy articles, which spoke well of the industry of the staff. A fruit and flower stall managed by the monitorial and inquiry staff was most artistically arranged, and the perfume which wafted into the locker room reminded one of Devonshire orchards at harvest time.

The art (?) gallery was a great success and several competitions were held all of which helped to fill the money boxes.

The refreshment department called forth great praise on behalf of the clerical staff by whom it was organised.

There was much joy among all concerned when the takings were totalled and it was found possible to send £126 to the War Seal Foundation.

CORRESPONDENCE.

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

DEAR SIR,

Those of your readers who are perusing the amusing series of articles now appearing in *The Times*, relative to the telephone question, may be interested in the following letter which I addressed to the Editor of the paper mentioned on the 19th instant, and which has not yet secured publication :—

"A relative who has recently come from Boston, U.S.A., is perusing with interest the series of articles now appearing in *The Times* in connexion with the telephone question in the States.

"But she tells me that, in her personal experience, trunk communication from Boston to New York can rarely be effected under half an hour; and that the attitude of the local public towards the 'phone system is unlike that of the British public.

"She adds, much to my surprise, that in the large and up-to-date city of Los Angelos, there are two separate 'phone systems. One is, apparently, used by the business offices and the other mainly by residents in the suburbs. There is, apparently, no inter-communication between these two systems: the result is that a resident in the suburbs who wishes to be in close touch with the business quarter must, perforce, subscribe to two systems."

But for the evils which they issue in, one could smile, amusedly, at these periodical press campaigns.

Yours faithfully,

"EQUITABLE."

P.S.—I append my signature but not for publication.

Royal Societies Club, St. James's Street, S.W.
July 23, 1920.

TRUNKS AND LOCALS.

ONCE upon a time there was a theory fairly widely believed that telephonists who had been employed on local telephone exchange work could never reach a state of efficiency in trunk operating. Needless to say the converse idea reigned in the "Locals"—your trunk telephonist could never become a satisfactory "A" position telephonist. Each side knew its own strong points and suspected the other side's weaknesses, and both were rather borne towards the conclusion that a change over of occupations would produce neither happiness nor good service. But the tempering influence of passing years has, with an easy grace, smoothed away corners of misunderstanding and opened out such vistas of experience as have tended to modify the view and to introduce a deeper perspective in the field of vision.

When an aspirant to telephonic honours beholds for the first time a busy switchboard, either trunk or local, it produces a sense of bewilderment and a feeling of awe. It even has a mollifying effect on recalcitrant subscribers when they can be induced to come and see. The telephonist, juggling with cords, manipulating keys, and plugging up, with a swift decision, a small aperture in the multiple field, produces in the uninitiated a wonder akin to that inspired by an artist in legerdemain. Nor is the mystification altogether unwarranted, for is the operator not assisting to demonstrate one of the most remarkable feats of all time—the mechanical reproduction of the human voice far beyond the possible range of its natural power? But the aspirant enters the school of telephony, learns the why and the wherefore of strange devices, the brief phraseology of "standard expressions," the laws of enunciation—which seem to demand that "three" shall be spoken in a manner calculated to make a kilted comedian envious, and, lo, the aspirant is a graduate—one versed in the lore of switch-boards, one who has penetrated the mysteries, one who, eager to take a position in the hurly-burly of the busy hour, will soon cause the next new aspirant to tremble or the impressionable visitor to murmur "Marvellous!"

What then are the differences in trunk and local telephone operating that the exponents of each should have thought those of the other so little likely to overcome the anticipated difficulties of a transfer? It must be admitted that the fundamental essentials are the same in each case—good speaking and hearing powers, good eyesight, a patient and courteous manner in the face of many exacerbating circumstances, speed, accuracy (we have heard them all so often); and the learner should preferably be caught in the brief and glorious hey-day of her youth. But the "Trunks" and the "Locals" develop different styles, ay, almost different spirits; and spirit does not easily suffer a change.

Take standard expressions. In a local exchange the more common phrases such as "Number, please?" or "Number engaged, shall I call you?" are all so brief as to leave little room for the development of individuality, albeit much variety of feeling can be worked into the two words, "Number, please?" They can be made to express cheerfulness, weariness, anger, and indifference. But in a trunk exchange the standard phrases have a tendency to expansion, such as "Trunks—number, please," and "Number engaged, shall I call you? . . . there will be no extra charge." The latter expression gives an operator a fine opportunity for adopting an inflexion bespeaking magnanimity and of playing upon that chord of the human gamut which, especially in these profiteering years, responds so sweetly to a nice touch. It is also graciously conceded that "occasions will occur when it will be necessary to use other expressions" than those standardised. There is such a wealth of subtle humour in that quotation as could not be matched in any commonplace literary effusion; it is a masterpiece of the Great Author of The Rules. And the occasions so delicately hinted at seem to occur more frequently in a trunk exchange than in a local. Altogether, the trunk telephonists, it would appear, find more opportunities than their local colleagues for the cultivation of eloquent individuality.

In a trunk exchange the classification of circuits is fairly comprehensively covered by labels of two colours—red and white, supplemented by a dotted lamp-cap. Local exchange circuits on the other hand, so various in character, require classifying codes of colours that almost rival the beauty and interest of an advertisement of *Drubber Dyes*. For subscribers' circuits, the opal code flaunts its white, green and red signals; in the junction multiple green, yellow, white and, sometimes, red labels intermingle with a garish complexity; and in the subscribers' multiple, white, yellow red, black and green pegs form a dancing sequence of magical effect. And still, not satisfied, the "Locals" aspire to underlinings of bright purple. Who shall say that an operator's life in a local exchange is devoid of colour? She must, too, be able to interpret the meanings of the scheme. Verily, she must have good, strong eyesight and a fine, bright memory. Applicants for telephone vacancies used to be tested for colour sight; and the chart was composed for the most part of neutral shades!

In the matter of recording calls a local exchange has to contend with a greater diversity of practice than a trunk exchange. Calls from one class of subscribers do not necessitate the preparation of tickets; from a second class only certain calls must be recorded; and from yet a third class all calls must be accounted for. Tickets have to be endorsed with "effective," "cancellation," and "credit symbols, as well as various letter codes when certain services are obtained. In a trunk exchange the usage is more uniform, tickets being prepared for every originated call without exception. It is true a certain amount of variation occurs in connexion with zone and inward calls; but the principle is fairly consistently observed in all matters of recording, and cannot easily be twisted into such casuistical problems as are raised by our old friend of the "Locals"—"Coin-box Differences." Cancellation and credit marks are required on certain trunk tickets, but the effective mark is absent. It is superseded by the imprints of the calculagraph.

Here then is a concern that belongs absolutely to the "Trunks," and helps to invest operating with a sort of high ceremony. Trunk lines being expensive lines, the revenue derived therefrom must be commensurate with the outlay. Hence, a very elaborate system of charges and the careful timing of each transaction. Time-checks and calculagraphs are brought into play, the former to indicate and the latter to record the flight of time. How quickly three minutes pass—after conversation has commenced. Trunk operators are engaged in a constant race against the fleeting minutes: users must not out-stay their little lease of the line; the lines must not remain without users; and so the merry chase goes on. Time and the operator—the operator and Time. Which wins?

One phase of operating that is emphasised in a trunk exchange is composed of the troubles emanating from faulty circuits. Of course, even the shortest circuit is liable to faults, but long overhead trunk lines are necessarily subject to many more risks of interruption. Nor is this to be wondered at when an endeavour is made to visualise a trunk line. There it is, stretching away from the banks of the Clyde to the busy reaches of the Thames, along highways and down by-ways, up the stormy glens and across the wind-swept moors, past rural villages and through the corroding atmosphere of great cities. So the trunk lines may be "noisy"; and the nerves of the operators may become frayed with attempts, changing cords and circuits—no simple job, to make people hear who cannot and will not hear. Patience, as a virtue in operating, is severely tried in the "Trunks."

Speed and accuracy are the twin genii that follow all operators through their official lives, and they make life easy or hard according as their desires are propitiated or neglected. The need for ready and correct service is perhaps more insistent in the "Locals" than in the "Trunks." For the local telephonists are never far away from the presence of the great British Public. It waits and watches to see with what promptitude and exactness its minions in the exchange fulfils its demands. In the "Trunks," however, there is more inter-exchange working. One operator arranges matters with another operator, each having a sympathetic understanding of common difficulties; and, as it were, the stage is set before the public personages are called upon to speak their parts. Although the setting must be assembled quickly and correctly, a little delay here and a slight hitch there will pass unnoticed;

and no complaint will, as a rule, be made if the principals are provided with good acoustic properties and their declamation is not interrupted by untoward accidents. There is a ritualistic pomp in trunk operating, a dignified grandeur as opposed to a lively activity in local switching. The "Trunks" personnel has usually beautifully manicured hands.

The points of contrast probably arise out of the difference in the two spheres of activity, if local Exchange has a comparatively circumscribed region to look after, while a trunk exchange radiates its influence over the length and breadth of the whole country; nay, it goes farther; it ventures into Ireland, and seeks out nations of the Continent. The local operator deals with parochial affairs, the trunk operator with national. The one may be likened to a County Councillor, the other to a Member of Parliament: and just as a councillor who can conduct his county business with wisdom and precision would, in all probability, make a good show in the House, or a Minister of State prove to be useful in a council chamber, so the local telephonist will succeed in the "Trunks" and the trunk telephonist in the "Locals." It has been so proved, as it was bound to be, for the essential qualifications are the same in each sphere. The methods of procedure may vary slightly: but a little adaptability can remove a mountain of strange routine.

"IDLER."

TELEPHONE DIRECTORIES.

THE next issue of the Telephone Directory will be printed by H.M. Stationery Office at the Government Printing Works at Harrow, and the opportunity afforded by the resetting of type is being taken to carry out various small improvements, the chief of which involves an increase in the size of the pages used for the list of telephone subscribers in the Metropolis. For reasons of economy the dates of issue of the five volumes will be altered so as to spread the work more evenly over the year. Volume I. (London) will in future be issued in October and April; Volume II. (South of England and South Wales) in September and March: Volume III. (Midland, North of England and North Wales) in November and March: Volume IV. (Scotland) in August and February and Volume V. (Ireland) in December and June. The Directories for the Isle of Man and Jersey which are not connected with the Trunk system of the country will be published in July and January.

The following reply was given by the Postmaster-General in the House of Commons on June 30 to Major Henderson's question: To ask the Postmaster-General, whether he is aware that some residents in Hampstead and Beckenham who are telephone subscribers have not yet received the new Telephone Directory: whether he will take steps to expedite its delivery; and if he will explain what was the object of publishing a new directory in April if its issue is to be delayed until the end of June.

(*Answer*).—The issue of the London Telephone Directory was begun on April 19 and will, it is hoped, be completed during the course of the next week. About one-fifth of the subscribers have still to be supplied.

The delay is due to the difficulty which the printing contractors have experienced in obtaining the 300 tons of paper required for the Directory, largely in consequence of the moulders' strike which delayed the completion of new paper mills. They have also been hampered by the dearth of efficient labour, the reduction in the hours of working and the restrictions on overtime.

THE AWARDS COMMITTEE.

AWARDS Form "A" ought by now to be familiar to a very large number of telegraphists and telephonists. It starts "My suggestion is." Have you ever made a suggestion? True the awards, or rewards, may not be great; but there is the fame attaching to an improvement, and the joy of being able to point to it and say "That was my idea." The facilities for dealing with such proposals when mechanical devices are put forward by non-mechanicians are now very good. The Engineer-in-Chief has made suitable arrangements for constructing at the Central Telegraph Office Workshops small devices of which rough sketches or descriptions have been submitted to the Awards Committee by those who have not the facilities or skill to make the device personally. Any device which appears at all promising is sure of a practical trial. There can be no doubt that the members of the manipulative staff are in a position, from the nature of their duties, to see how many things could be improved; and they may be sure that all proposals will be sympathetically received and, as far as practicable, treated as confidential.

H.P.S.

PERSONALIA.

PROMOTIONS. LONDON TELEPHONE SERVICE.

To be Assistant Supervisors, Class I:

Miss K. H. HOWARD at City Exchange.
Miss A. BRAND at Museum Exchange.
Miss F. ISHAM at Trunk Exchange.
Miss E. M. AYLESBURY at Gerrard Exchange.

To be Assistant Supervisors, Class II:

Miss O. M. LONGMAN at Trunk Exchange.
Miss E. A. DAY at Trunk Exchange.
Miss N. KEENE at Hop Exchange.
Miss M. A. BRINSLEY at Gerrard Exchange.
Miss E. H. BUCK at Central Exchange.
Miss O. E. YOUNG at Regent Exchange.
Miss M. FORD at North Exchange.
Miss E. V. LANE at Holborn Exchange.
Miss D. M. PARKER at Museum Exchange.
Miss M. A. GAME at Sutton Exchange.
Miss M. S. MCPHERSON at Trunk Exchange.
Miss E. COSTER at Park Exchange.
Miss K. E. LAWDAY at City Exchange.
Miss L. M. CLAYTON at London Wall Exchange.
Miss F. E. HARE at Victoria Exchange.
Miss E. P. ISON at London Wall School.
Miss D. A. H. LANGTON at Gerrard Exchange.
Miss L. M. WHEATLEY at Paddington Exchange.
Miss A. K. HARLOW at Gerrard Exchange.
Miss E. N. RIDOUT at Central Exchange.
Miss J. SEXTON at City Exchange.
Miss M. FORSTER at Central Exchange.
Miss D. M. HITCHENS at Central Exchange.
Miss M. ARNOTT at Central Exchange.
Miss D. BARKER at East Exchange.
Miss R. A. GALLACHER at Wimbledon Exchange.
Miss B. ARNOLD at London Wall Exchange.
Miss G. E. HARROP at North Exchange.
Miss D. R. THOMPSON at Regent Exchange.
Miss M. OSLER at Central Exchange.
Miss D. A. POTTER at Holborn Exchange.
Miss G. M. CLAYDEN at Victoria Exchange.
Miss D. M. GIBB at Hornsey Exchange.
Miss E. BROWN at Gerrard Exchange.
Miss H. K. COBORN at Avenue Exchange.
Miss A. M. SKIPSEY at Holborn Exchange.
Miss D. HILL at Trunk Exchange.
Miss F. E. TOLLEY at London Wall Exchange.
Miss M. L. HOLLIS at London Wall Exchange.
Miss G. V. DASH at City Exchange.
Miss H. A. M. BROCK at Holborn Exchange.
Miss M. REDMOND at Paddington Exchange.
Miss A. L. WALKER at London Wall Exchange.
Miss V. P. V. QUELCH at Avenue Exchange.
Miss D. E. DULY at Gerrard Exchange.
Miss C. W. ROSS at Kensington Exchange.
Miss M. E. GARDNER at Paddington Exchange.
Miss J. GOVETT at London Wall School.
Miss F. M. S. MORGAN at Trunk Exchange.
Miss L. L. D. SAUNDERS at Enfield Exchange.
Miss L. SCRINE at Hampstead Exchange.
Miss E. H. WILD at Battersea Exchange.
Miss D. M. H. BOTT at Park Exchange.
Miss P. E. DRISCOLL at Avenue Exchange.
Miss R. G. THORNLEY at London Wall Exchange.
Miss R. BAKER at Trunk Exchange.
Miss G. D. M. DAWKINS at Park Exchange.
Miss M. L. DOE at Avenue Exchange.

Mr. W. E. BOWLER, Assistant Clerk, has been promoted Clerk, Class II Investigation Branch, Secretary's Office.

The following resignations have taken place on account of marriage :—

Miss E. A. WATSON, Telephonist, Avenue Exchange.
Miss E. M. MILTON, Telephonist, Central Exchange.
Miss D. M. MANNING, Telephonist, Central Exchange.
Miss I. M. LETHBRIDGE, Telephonist, Victoria Exchange.
Miss D. R. COOK, Telephonist, Victoria Exchange.
Miss E. W. GIBBS, Telephonist, Victoria Exchange.
Miss N. R. SMITH, Telephonist, Bromley Exchange.
Miss A. MILES, Telephonist, Bromley Exchange.
Miss A. M. MILLER, Telephonist, East Exchange.
Miss E. A. FRIPP, Telephonist, Paddington Exchange.
Miss E. A. J. S. COPP, Telephonist, Paddington Exchange.
Miss D. R. ALLEN, Telephonist, London Wall Exchange.
Miss G. E. FRANCIS, Telephonist, London Wall Exchange.
Miss A. L. E. DOVER, Telephonist, London Wall Exchange.
Miss E. G. ROGERS, Telephonist, Museum Exchange.
Miss H. B. I. PAYNE, Telephonist, Kensington Exchange.
Miss G. M. SEARLE, Telephonist, Mayfair.
Miss L. E. A. HORSMAN, Telephonist, Mayfair.
Miss E. R. NEWNS, Telephonist, Greenwich Exchange.
Miss Ethel SMITH, Telephonist, Gerrard Exchange.
Miss L. E. PICKETT, Telephonist, Trunk Exchange.
Miss E. J. PYATT, Telephonist, Trunk Exchange.
Miss E. N. MURRAY, Telephonist, Trunk Exchange.
Miss M. LEWIS, Telephonist, Trunk Exchange.
Miss H. W. WILKINS, Telephonist, Regent Exchange.
Miss K. M. VAUGHAN, Telephonist, Regent Exchange.

OBITUARY.

THE LATE MR. S. T. NIGHTINGALE.—In the death of Mr. S. T. Nightingale (Inspector, North East Internal Section) the London Engineering District has lost a very old and respected member, one who had been associated with the Engineering Department from its earliest days. He entered the Post Office service in 1879 as a boy sorter, resigning the appointment two years later, and obtained employment in the C.T.O. workshop. Here he was trained in the repair and maintenance of telegraph apparatus, and showing special aptitude for this class of work, was transferred to Moorgate Street Buildings, then the Headquarters of the South East London Area, and within a year or two was the lineman responsible for the fault clearing, and general maintenance in that Section. In this Section he gained considerable experience in "special event" work, as in addition to being used for cricket matches, Kennington Oval in those days was the venue of many other sporting fixtures, including the Football Association Cup finals.

Mr. Nightingale's knowledge of the London Fire Brigade fire alarm and telephone system, which is maintained by the Post Office, was unrivalled. Owing to the fact that the Headquarters of the Brigade in Southwark Street was situated in the South East Section he was brought into contact with the system while it was being built up, and he retained his interest in this side of the Department's operations to the end of his career.

In various London sections, and during the many changes in administration which took place in the Engineering Department so far as London was concerned, Mr. Nightingale became an expert on all classes of telegraph, fire alarm, and telephone apparatus. He was a good supervising officer, possessing tact and common sense in his methods of dealing with the staff placed under his control, and was universally liked and respected.

He served under Messrs. Eaton, Fleetwood, Stubbs, Catley, Noble and Moir, successively Superintending Engineers of the London District. He was appointed lineman in 1887, Junior Foreman in 1901, Construction Foreman in 1902, Inspector in 1908 and Senior Inspector in 1913. With the abolition of the rank of Senior Inspector on the revision of the Inspectors' class he was made Inspector on the new scale, and held this position at his death, which occurred on July 2, after a short illness.

The interment took place at Finchley Cemetery on July 7. The District was represented by the Sectional Engineer of the North-East Internal Section, Mr. R. A. Wells, and quite a representative gathering of Mr. Nightingale's former colleagues and friends also attended.

He made his mark in any undertaking in which he was engaged and the service has lost a most able and loyal officer."

THE LATE MR. H. E. MABEY.—Mr. Mabey (Inspector North External Section) who died suddenly on June 29 after an illness of a few days, entered the Engineering Department on December 1, 1900. During the greater part of his service he was engaged on the fitting and maintenance of subscribers' apparatus in the Central London Sections of the London Engineering District. He was appointed Lineman in 1903 and Inspector in 1911. Subsequent to 1913 Mr. Mabey was transferred to the external side and at the time of his death was employed in the Tottenham Area of the North External Section. The funeral took place at the Edmonton Cemetery on July 3. The Engineering Department was represented by Mr. Robertson (Chief Inspector), and the Inspectors of the Tottenham Area. There were also present at the graveside a large number of the friends and colleagues of the deceased. The Inspectors' Society, the operators at Dalston, North and Tottenham Exchanges were among the many who sent floral tributes of their respect and esteem.

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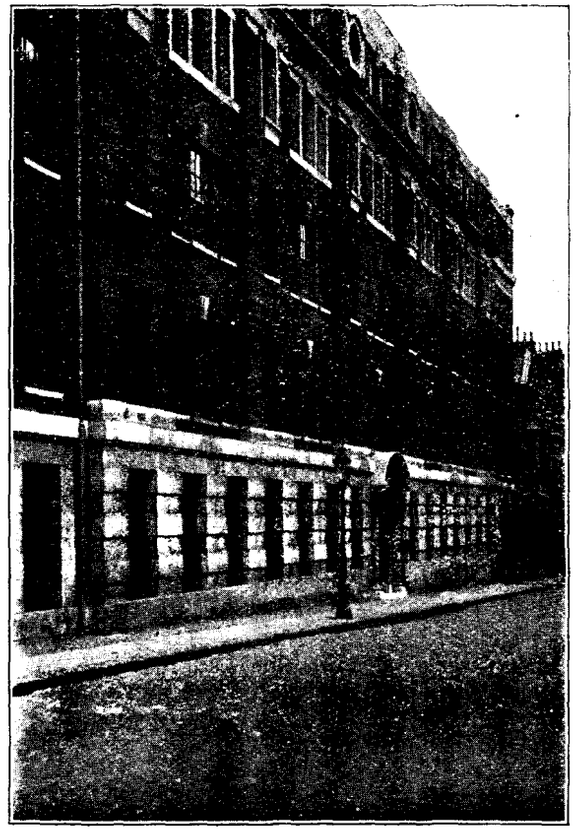
THE LONDON ENGINEERING DEPARTMENT.

(I).

THE growth of the London Engineering District may be likened to certain physical processes in which a concourse of loose atoms or particles become consolidated into one concrete mass. Curiously enough the process of evolution shows signs of being cyclic, inasmuch as the territory at one time under the control of one superintending engineer was subsequently split into three groups which in course of time were reduced to two and eventually reached the present stage of unified command. Back in the late nineties the Metropolitan superintending engineer occupied what would now be thought a small office at Mount Pleasant. Its exact location was the house which in still earlier days formed the residence of the Governor of the Coldbath Fields Prison. This building accommodated both engineering and clerical staffs consisting of the superintending engineer, assistant superintending engineer, eight first and second class engineers and a clerical staff of 26. Those who compare those remote days when the work of the District consisted wholly of construction and maintenance of telegraph and private lines with the subsequent period of telephonic activity may well liken them to a placid summer stream and the same water swollen and broken by winter storms.

When the Post Office undertook the telephoning of London the staff increased very rapidly, and in 1901 the Metropolitan Area was divided into there superintending engineers' districts. During the ten succeeding years great strides were made in the provision of the London telephone service, the most notable feature being the opening of the Central Exchange in Carter Lane. In 1910 came the next stage of evolution when one of the three superintending engineers' areas was carved up, leaving the Central and South Metropolitan Districts, the headquarters of which were at Denman Street, London Bridge and Spanish Road, Wandsworth Common respectively.

On Jan. 1, 1912, came the great day when the National Telephone Company's extensive system was absorbed by the Post Office and later in the same year a further reorganisation took place by which the whole of the London District was once more under one superintending engineer. He would have been a far-seeing individual who would in pre-telephone days have foretold the rapid growth of the Engineering Department which actually took place. We are in a better position to-day to forecast the future, but it is quite possible that our most optimistic estimates



1.—HEADQUARTERS OF LONDON ENGINEERING DISTRICT, DENMAN STREET, S.E.

will be exceeded and it may even become necessary once more to break up London into two or more Districts despite the objections to such an alteration.

When the Central and South Metropolitan Districts were combined it was not possible to house the whole of the headquarters staff in the Denman Street premises and consequently a new building was erected on an adjacent site. The latter was opened by the Postmaster General, the Right Hon. Joseph Pease, now Lord Gainford, on June 21, 1916, and the old building was appropriated as the headquarters of three sectional engineers. It is worthy of remark that with the transfer of the headquarters staff to the new building the London superintending engineer for the first time occupied premises designed and built solely for his use. Despite the cramped conditions in the old building many of those who had spent considerable portions of their working lives in it felt some pangs of regret in leaving it. It is not perhaps generally known that the building was the original St. Thomas' Hospital.

It will, however, be generally agreed that it was only right and proper that the engineer responsible for the telegraph and telephone plant of the greatest city in the world should have an office in keeping with the importance of his position.

2.—A VIEW OF ONE OF THE CLERICAL ROOMS, DENMAN STREET.

The building is not ornate, but is quite in keeping with its surroundings. It has a frontage of 176 feet and rises five stories with a basement and sub-basement below.

Below the ground level are the furnaces, stationery and filing departments and a stores depot. The ground floor is occupied by the registry and technical staff dealing with internal construction and maintenance matters and temporarily the sectional engineer and office staff of the South Internal Section.

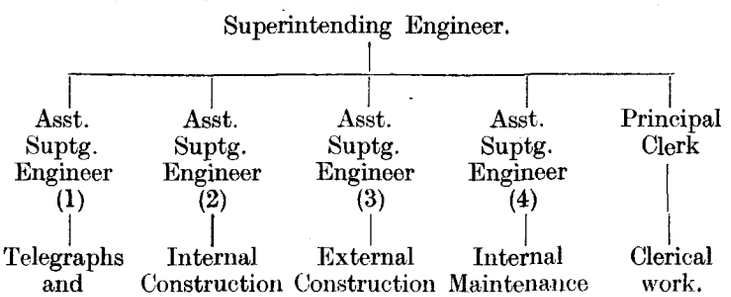
The first, second and third floors accommodate the superintending engineer, the clerical officers and the technical section dealing with external construction and maintenance work, and private branch switchroom, while on the fourth floor in addition to the drawing office and cloakroom for women, is an excellent kitchen and large dining room. The refreshment club managed by the staff is not the least of the advantages of the engineering headquarters building.

The rooms are light and airy, and the only fault that can be found is that the noise of traffic passing to and from London Bridge Station is rather disturbing and makes telephoning a difficult operation. No doubt in course of time when the need for economy in public monies is not so great as at present the replacement of the granite setts by wood blocks will remove this disability.

The headquarters staff numbering in all 276 is divided into 17 sections including the shorthand writers and typists.

The work at headquarters is of two classes—tenchical and clerical. The superintending engineer has four assistants to whom are allotted certain phases of the technical work, and a principal clerk who is responsible for the clerical work of the office.

The division of work is shown in the tree below :—



When the present London Engineering District was formed in Oct. 1912, the question of functional and territorial organisation

3.—A CORNER OF THE DRAWING OFFICE, DENMAN STREET.

was given very careful consideration, and it was decided that in such an area the advantages of a functional division of work would far outweigh its disadvantages.

Consequently the district was divided into a number of sections with responsibilities connected with the provision and maintenance of external plant, and others connected with internal plant. Internal plant is that located on the department's premises such as telephone exchanges, Post Offices and in subscribers' premises. The cables and wires and associated plant provided for the purpose of linking up the various items of internal plant are what is understood as external plant.

The main advantage (of functional organisation) is that the supervising officer is able to specialise and to obtain the maximum benefit of concentration while the principal disadvantage is that the work of connecting Exchange lines is a divided responsibility. This disadvantage is more apparent than real owing to the excellent co-operation that exists. Without co-operation functional organisation cannot be successful.

The art of telephony has now become so complex and so many other branches of engineering are included in the general term " telephone engineering " that it is almost impossible for one officer to have that intimate knowledge of all branches of the work which will enable him to apply the very latest and best methods to the solution of the many problems with which he is faced. In order to illustrate this the reader is referred to recent

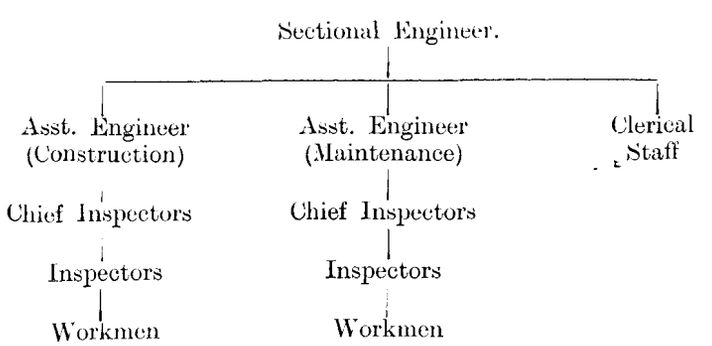
numbers of this JOURNAL in which brief descriptions have been given of an automatic traffic distributor, an electrophone exchange, type-printing telegraphs, a concrete pipe bridge, etc., and to the papers published by the Institution of Post Office Electrical Engineers.

There are actually eight external and six internal sections, each under the control of an executive engineer. In two cases one internal section coincides in territory with two external sections. One of the six internal sections is peculiar inasmuch as its activities are principally confined to one block of buildings, viz., the G.P.O., St. Martin's-le-Grand, which contain the Central Telegraph Office. Within the sections the work is also functionalised, the main divisions of work being construction on the one hand, and maintenance on the other.

The sectional engineers are executive officers, each being responsible to the superintending engineer for the efficient conduct of the work within his section. The Superintending Engineer is a controlling officer acting in an advisory capacity, and co-ordinates the work in the various sections of his district.

4.—ALEXANDER MOIR, M.I.E.E., O.B.E., SUPERINTENDING ENGINEER, LONDON ENGINEERING DISTRICT.

Although the duties in the internal and external sections differ considerably the tree below represents the chain of responsibilities in both:—



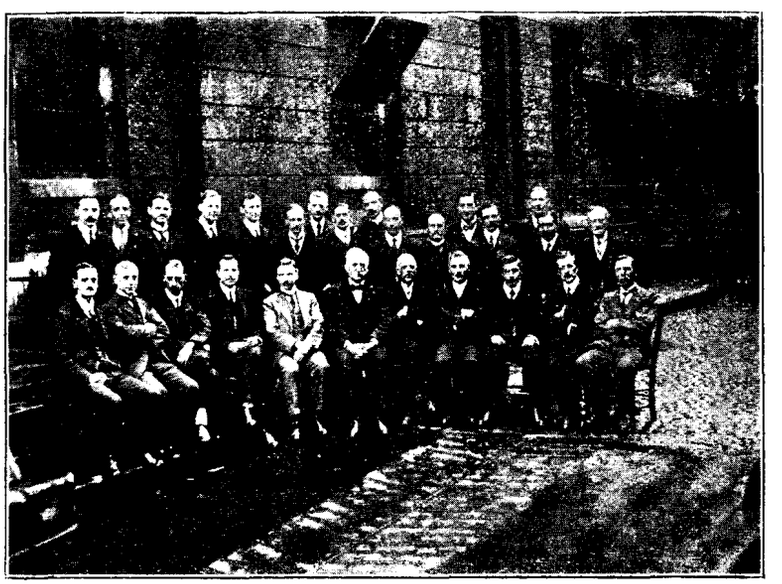
The number of subscribers' telephones under the supervision of an internal engineer varies from 30,000 to 90,000, and the number of working circuits from 25,000 to 49,000.

The number of lines maintained by an external engineer varies from 20,000 to 55,000.

Mere figures, however, convey a very inadequate idea of the scope of the sectional engineer's duties and how this scope has widened during the past few years. Some of our readers may be surprised to learn that the number of separate diagrams to which the circuits in a section are wired number many hundreds and the number is ever increasing as new types of equipment are introduced and additional facilities are required. The engineer sighs for standardisation in order that he may be in a better position to train his men in the clearance of faults, but as he realises that progress means change he cheerfully bows to the inevitable.

Automatic telephones, multiple type printing telegraphs, telephone repeaters, pneumatic tubes with special signalling devices, loaded and balanced cables, new types of motors, generators and fire alarm systems are all welcome, but all tend to add complexity to the normal work of the section. The supervision of the original installations is very important but it is equally important to devise satisfactory methods of testing and maintenance in order to ensure that the apparatus shall work at maximum efficiency and this need is constantly kept in mind by the supervising officers.

The installation of the large public exchanges is usually carried out by contractors to plans and specifications prepared by the engineer-in-chief, but upon the sectional engineer falls the responsibility of seeing that the work is carried out in a satisfactory manner.



5.—PRINCIPAL OFFICERS OF HEADQUARTERS STAFF, LONDON ENGINEERING DISTRICT.

The installation of subscribers' apparatus, private branch exchanges and small public exchanges is undertaken by the sectional engineer with the aid of his own staff. The term "small" is used in a relative sense as an exchange to accommodate 1,500 direct exchange lines, which has recently been installed in London by direct labour under the supervision of the sectional engineer, would, in some towns, be regarded as an exchange of considerable size. There are at the present moment two 2,000 line and one 1,500 line C.B. exchanges under construction with P.O. labour and two other 2,000 line exchanges will shortly be started. The sectional engineer is, of course, quite able to undertake the construction of the largest exchanges.

The number of the staff employed in an internal section varies from 250 to 630. The variation is accounted for by the difference in telephone density. Supervision is necessarily more difficult in a scattered area than it is where the installations are concentrated in a small area.

The number of staff in the external sections varies within similar limits and for the same reason. The laying of ducts and pipes and the construction of manholes is almost invariably carried out by contractors under the supervision of the external sectional engineer. In some cases the contractor also draws in the cable, but in the majority of cases the cable is drawn in and jointed by the department's workmen. The construction of all open routes

is carried out by direct labour. Although, as stated, a contractor does the actual work of laying conduits, the sectional engineer prepares the scheme, selects the route, negotiates wayleaves, schedules the classes of paving to be disturbed, requisitions the pipes, ducts, manhole castings, etc., supervises the work, measures up and certifies the account. He also decides what alternative shall be adopted if the work cannot be carried out as originally planned and prepares drawings to shew special methods of construction. In cases of doubt he refers the matter to the superintending engineer.

The sectional engineer is responsible for the training of the men under his control and in this respect he is in a somewhat different position from his *confrere* in the electrical power undertakings since there is no other undertaking from which the Post Office engineer can obtain fully trained men. Fortunately the department is now alive to this fact, and assists in the training of the men by paying the fees for evening tuition in certain technical subjects provided that a certain number of attendances are made by each man. Schools for teaching cable jointing and the clearing of apparatus faults have also been established in London, and the sectional engineer selects men who would be most likely to benefit by such a course. In these and other ways the desire for efficiency is inculcated and with the possession of the desire, the battle is half won.

All new work in a section is carried out on the basis of an estimate previously prepared by the engineer, that is to say, he has not *carte blanche* to carry out work and render an account at the end but must first submit an estimate and then must either carry out the work for the sum mentioned in the estimate, or furnish a satisfactory reason for not doing so. It will be obvious that before the engineer can prepare an estimate he must have full knowledge of the requirements. The number of estimates prepared each year by a sectional engineer in London varies from 600 to 1,000, and the expenditure covered by an estimate varies from £1 to £50,000.

(*To be continued.*)

DELAY *v.* DATA.

"WHAT is your delay to ——— ?" How often has the question been asked by word of mouth, or by wire, and elicited a reply which gave rise to a shrug of the shoulders, or a note in the diary. Not an entry, mark you, which might be of assistance in gauging the number of channels and operators required to dispose of the daily load, but a "covering" note for self-protection in the event of complaint. Let us consider for a moment what information has been given and its value. Delay may be due to bad working of lines or excess of traffic consequent upon restricted facilities in one direction or another. The figures quoted in response to an inquiry merely give, in minutes or hours, the delay sustained by the telegram next in order to be transmitted. There may be thirty messages waiting, or three hundred. If high, the figures given are misleading to the public, and, in certain circumstances, can be used to the detriment of the working of the service. Two simple examples will illustrate this point of view. A business man, on being informed that telegrams to a certain destination are subject to a delay of 13 hours, is not aware that this only represents the period the earliest telegram on hand has been waiting. He does not realise that, owing to the removal of temporary faults and the opening of additional channels, his own despatch—the one which interests him—will probably reach its destination in about three hours. He leaves the counter labouring under a misapprehension, and probably launches a diatribe against the telegraphic system. An unscrupulous officer (*rara avis in terris*) in charge of an office or section, whose wires have just "come through," can mislead an inquiring colleague or office by quoting the maximum delay, *irrespective of the number of telegrams awaiting transmission*, and thereby relieve himself of the trouble of rendering assistance.

When heavy delay to a certain country or town is frequent, we learn (*a*) that the lines in that area are liable to interruption, (*b*) that the type of apparatus in use is unsuitable, or (*c*) that the channels provided are not sufficient to meet the needs of the country or town served, while from the habitual non-existence of delay, we gather that the lines are either just sufficient or too numerous. In the case of interruptions, we rely on the speedy action of our colleagues the test clerks and engineers, or, in T.S.F., anathematize our Continental correspondents, blameless or otherwise. The question of apparatus is of great importance, particularly in connexion with long-distance communications. The instrument on a circuit composed of underground and submarine cable, together with landlines running through varying maintenance and climate, is peculiarly liable to interruption. We must therefore select the instrument which, in addition to any other advantages, is least liable to interference on wires which must be considered normally faulty or variable. The machine which shows the cleanest record of stoppages, and the highest output during working periods, will earn the support of all those whose duty it is to dispose of traffic. In ascertaining the degree of sufficiency, insufficiency, or over-sufficiency of our lines, delay is not an accurate or reliable guide. The real questions are, "How many telegrams are there (or will there be) on hand?" and "How many can (or will) our lines carry?" We may ascertain by means of half-yearly or other returns, the fact, interesting at the time to a degree, that the delay to a given country or town, at a selected time, reached a certain number of hours. After taking several returns, we may deduce from the statistics obtained that our lines are too few, but we cannot say by how many. In the case of another country or town, the details indicate that the traffic box is always "clear," and we may conclude that our channels are in excess of requirements, but we are unable to fix the unit of sufficiency. A bald statement, or record, of the amount of delay sustained does not provide us with data which will assist us in meeting these points.

By taking returns recording the number of telegrams coming to hand, and being disposed of, each hour of the day, for each town and country, the incidence and direction of traffic could be readily ascertained. The number of words a wire in normal condition, fitted with the various types of apparatus in use, can carry, is known. Influx and output should therefore constitute the standard of calculation for, (*a*) the probable time occupied in transmission, (*b*) the towns with which communication can most usefully be maintained, (*c*) the number of wires required, (*d*) the type of apparatus most suitable, and, (*e*) the number of operators necessary.

After having decided upon the type of instrument, number of outlets, and size of staff to satisfy our telegraphic needs, it is necessary to give attention to circulation and distribution. Here again apparatus, staff, and channels come into play. Tubes, carriers, or moving bands may be used as circumstances dictate. The number of staff can be fixed by computing the number of forms sorted and circulated when working at a fair rate, and the number and allocation of channels can be ascertained by a study of the volume and character of traffic. The main object, when arranging a system of circulation, should be to minimise the number of sortations and handlings between the accepting counter and the transmitting instrument. This could be achieved to a greater extent, so far as foreign traffic is concerned, by installing direct working tubes. On a recent date, taken haphazard, 16 of the London tube offices sent to the cable room over 4,400 telegrams for abroad. Seven forwarded between 100 and 200, two between 200 and 300, four between 300 and 400, two between 400 and 500, and one over 600. The whole of this traffic was handled at least twice in the "Central Hall T.S." *en route* to T.S.F. The period of time thus occupied may be small, but the disposal of ordinary, or "urgent," telegrams can only be accelerated by saving seconds here and there in circulation, sortation, distribution, and transmission. Development and action on the lines indicated in this brief article would, it is suggested, result in the compilation of useful data, while messages would reach the principal cities of Europe in three transmissions: counter to T.S.F. Circ., T.S.F. Circ. to instrument, and thence to destination, with a speed best described as "a hop, skip, and a jump."

H. G. S. (T.S.F.)

A PEEP INTO THE PAST.

A FEW NOTES ON THE EARLY DAYS OF THE TELEGRAPH.

BY J. SKINNER.

THE Post Office is a venerable institution, and many interesting stories of the "good old days" could doubtless be told. The history of its wonderful development and the deeds of the worthies long departed who conducted its business must, however, be told elsewhere. Our official fore-fathers lived in free and easy days apparently, and it may be permitted to quote just one illustration in this connexion before passing on to our subject.

A local journal, published in 1822, says: "In honour of the anniversary of our beloved Sovereign's Accession to the throne an excellent dinner at which our venerable and highly respected postmaster presided, was, on Wednesday, served up at the King's Arms Inn, to a truly loyal party of about thirty, who kept the sparkling glass briskly moving, and the table in a roar, till nearly midnight, when each reluctantly returned to his home." *Verbum sap.* !

The Electric Telegraph is also growing old—older indeed than many of us imagine. In fact, it is said that the principles of action of two of the working telegraphs in every-day use in the fifties were known to scientific men so long ago as 1821.

In a volume published in 1822 mention is made of a "Domestic Telegraph," invented by Mr. Pearson, of Boston, U.S.A., which consisted of two dials with needles. This would appear to be something similar in appearance to the well-known "A.B.C." instrument, but its method of working, electrical or otherwise, was not shown.

It is also said that, one year after the battle of Waterloo, Sir Francis Ronalds devised an electric telegraph, but on presenting his scheme to the Admiralty he was informed that, the war with France being over, no telegraphs were necessary, and his plan was consigned to the pigeon-hole !

In the thirties there came upon the scene a famous scientist Professor Wheatstone, and we read (*Magazine of Popular Science*, March 1, 1837) :—"During the month of June last year, in a course of lectures delivered at King's College, London, Prof. Wheatstone repeated his experiments on the velocity of electricity, but with an insulated circuit of copper wire, the length of which was now increased to nearly four miles. . . . Professor Wheatstone gave a sketch of the means by which he proposes to convert his apparatus into an electric telegraph, which, by the aid of a few finger stops, will instantaneously and distinctly, convey communications between the most distant parts."

In 1837 the professor, associated himself with Mr. Cooke, and a patent was taken out in their joint names.

Their telegraph had five wires and five needles, and immediately the patent was secured, the directors of the North Western Railway sanctioned the laying down of wires between the Euston Square and Camden Town stations.

On July 25, 1837, in the presence amongst others, of the celebrated Mr. Stephenson, the first message was sent and the electric telegraph commenced its wonderful career.

Elsewhere other investigators—Morse of New York, and Steinheil of Munich—were also at work, and the invention began to attract attention.

The telegraph was first confined to railway business, and, as in the case of other inventions, a good deal of prejudiced opposition was encountered. Indeed, at a general meeting of the directors of the Great Western Railway, a Mr. Hayward of Manchester, denounced the invention as a "new-fangled scheme" and actually succeeded in passing a resolution repudiating the agreement entered into with the patentees.

In the early days the double-needle was the instrument in general use, and this was followed by the more convenient single-needle. Other instruments, including the familiar "A.B.C." also came along, but it is not possible to enter into details concerning them in the space at our disposal.

Telegraphing was an expensive item in the forties, and the charges varied according to the number of words and the distance. On the South Western Railway, for instance, the fees ranged from 3*s.* to 9*s.*

The police commenced to use the telegraph in 1844, and criminals soon became aware of the fact.

Some well-known thieves, including a gentleman rejoicing in the name of "Fiddler Dick," left Paddington by train one summer morning on business bent. News that suspected persons were on the train was wired to Slough, where the police arrested the men. Unfortunately for the "Fiddler," who had lost no time *en route*, stolen property was found upon his person, and he was carried off to prison, no doubt calling down blessings on the new invention !

The possibilities of telegraphy were emphasised in the spring of 1845 when Queen Victoria opened Parliament. Her Majesty's Speech, consisting of 3,600 words, was telegraphed to Southampton, and the whole of it was set up in type at Southampton within two hours after the commencement of the telegraphing from London.

A further sensation was provided in 1847, when the telegraph was used to transmit an order for the delay, for two hours, of a criminal who was to be executed at noon. Shortly after this telegram was received a second message arrived, countermanding the first. The officials appear to have been considerably confused, and the Home Office was appealed to for definite instructions.

Commenting on this development in the use of the telegraph an anonymous writer said: "The telegraph showed its wonderful efficiency; but it also showed that the existence of a new power demands a judicious system of determining the mode in which, and the persons by whom, that power is to be exercised, in important Government matters."

The mileage of electric telegraph completed and in operation on the several English Railways in 1847 only totalled 1,056, but extensive additions soon followed.

The establishment of the Electric Telegraph Company in 1846 can be described as a landmark in the history of the telegraph, and from that date there were remarkable developments.

It may be interesting to notice the rate at which a skilled operator worked in those early days.

In 1850 statistics were obtained showing that on the occasion of one test the greatest speed was 20½ and the least 8¼ words per minute. Another test on the same type of instrument, however, revealed an average of 21¼ words per minute.

In 1852 a writer says: "On nearly all the railways, some of the wires are for the exclusive use of the companies, who pay the Electric Company for the use of the patent rights; a small number on some of the lines are for the exclusive use of the Government; but the larger number are for the use of the public for commercial purposes—the public paying the Electric Telegraph Company, and the company paying the railway for the use of the way and the stations. The commercial and social uses of the electric telegraph are indeed becoming very important."

At this period the charge was 2*s.* 6*d.* for 20 words, if the distance was under 100, and 5*s.* if it was over 100 miles. An extra charge was made for the services of messengers. In some districts, however, there was a local service, and a charge of 1*s.* for 20 words.

A little later the charges were somewhat reduced, and we find in 1854 a special tariff introduced between some of the largest cities where a considerable amount of traffic (for those days) was dealt with. Thus, between London and Birmingham 20 words could be telegraphed for 1*s.*, and between London and Manchester and Liverpool the fee was only 2*s.* 6*d.*

The following statistics relating to the Electric Telegraph Company, compiled by Dr. Lardner, will be interesting in the light of the enormous totals of the present day :—

Year.	Miles of line wire in use.	Total number of telegrams handled.
1850	7,200	66,634
1851	10,650	101,216
1852	19,560	215,137
1853	24,340	350,500

It may be noted here that, just 60 years afterwards, the Postmaster General, in the course of his Annual Report for the year ended March 31, 1913, mentioned that the total length of single wire in use for telegraph and telephone purposes in Great Britain amounted to 2,661,000 miles !

One remarkable features in the light of later varying fortunes of the State telegraphs is that, in 1853 the Electric Telegraph Company actually paid 7 per cent. dividend !

A rival came upon the scene in 1852 when the Magnetic Telegraph Company was incorporated. It got to work quickly, and in July 1854 had no less than 13,000 miles of wire in use.

The question of a popular tariff was in peoples' minds in the fifties. Writing in 1854 Dr. Andrew Wynter says (*Curiosities of Civilization*) : "The lowest point of cheapness, in our opinion is yet very far from being reached ; and it would only be a wise act on the part of the Company to at once adopt a uniform charge for messages, say of fifty words, for 1*s.* If this were done, the only limit to its business would be the number of wires they could conveniently hang, for the present set would clearly be insufficient."

The old Electric Telegraph Company certainly achieved remarkable success in spite of many difficulties. It is said to have actually sunk £170,000 in patent rights alone, yet we find it paying 7 per cent. in 1853 !

We have endeavoured briefly, and we are afraid, inadequately, to give our readers some little description of the early days of our craft. Perhaps at a later date and with the Editor's permission we may try to throw more light on this interesting subject, and also re-tell the story of the dauntless pioneers who, in the face of tremendous difficulties, linked the continents together by means of the cable.

Our grandfathers who did the spade work could have had but little idea of the great developments that would follow their early struggles.

It is related of Lord Palmerston that, in 1848 he made a remarkable prediction. It was to the effect that the day would come when, if a minister were to be asked in Parliament whether war had broken out in India, he would reply : "Wait a minute, I'll just telegraph to the Governor-General and let you know."

We, in the twentieth century, live in the days of marvels, not the least of which is the familiar telegraph !

We are informed, says *Pan*, that nearly two million pounds were lost on the Telephone system during the past twelve months. Surely this estimate is somewhat premature—the racing season is not nearly finished yet.

[The estimate, if it is to include all racing losses on telephoned bets, must surely be revised in the upward direction.—ED., T. & T. J.]

THE PSYCHOLOGY OF SUPERVISION.

IN his essay on "The Psychology of Supervision," Mr. Lee earlier in the year gave expression to ideas long entertained by many, and even practised by some, although those ideas have probably not been justified by science to those who have entertained and practised them. For long such ideas were considered chimerical, and only a few humane and brave souls ventured to practice them. But with the development of sociological knowledge, illuminated by the application of psychology, it is at length being made plain, that as of old, "science is but the tardy result of a long course of experience." It is truly remarkable how man distrusts his instincts. He may be prompted to an apparently wise and beneficent course of action, but he is slow in permitting himself to be actuated by the promptings, lest he earn the reputation of being a sentimentalist. It takes great courage to risk being regarded as a sentimentalist. The truth is that most people have been more influenced by the rankest kind of materialism than they realise. Materialistic ways of regarding life have permeated every sphere of interest and activity, and it is not difficult to preceive the influence it has had on men's modes of thinking, and so on their motives. The greatest immediate problem of the new world is to change our social motives, and it can only be done by twofold activity. The general environment must be improved, and science must show that the ideas usually associated with a new environment, which, so far as most people are concerned, is still in the clouds, are not wholly unsuitable ideas for our present social and industrial life. It must be made clear, as Mr. Lee has so well shown, that supervision, at its best, is really intelligent direction, and not management on the "word of command" system. In the past we have not got enough out of either management or service, for we have been too prone to think that management and service are antithetical, and so antagonistic, influences. And this has been our greatest error. It is not meant, as I am sure Mr. Lee does not mean it, that the supervisor should "lead his regiment from behind," like the Duke of Plaza Toro. His influence must be at once directive and inspirational. He must be able to create confidence by the influence of his control of himself on others. There is something in the negro's idea of the man who is doing nothing being the boss. A supervisor should be more a thinker than a drill sergeant. He should plan what he has to do, or get his staff to do ; and he should also study the individuals who make up his staff. If he is wise he will spend more effort in encouraging than in ordering and hustling about. He should not look busy. Sometimes prompting will be necessary, but it must be done by conveying the notion to the person aided that he is really doing it by his own initiative. Here is the whole problem in a sentence. A supervisor whose influence is so strong, and yet so restrained, that his staff learn from him how to exercise initiative, is the real supervisor. Such a person will succeed on all hands, not only in producing the best work, but in getting it done with the least effort, and with the maximum amount of good-will, and even cheerfulness. Any concern in which such ideas predominate will be efficient, and contentment will also prevail, because the management and the workers will be as one. I have always thought that most of the trouble in the world has been due to the false ideas which have constantly alienated those who manage or supervise, from those who do the detail work.

R. G. D.

PRESENTATION TO MR. HUTCHEON, ABERDEEN.

An interesting ceremony took place in the district manager's office, Telephone House, Aberdeen, when Mr. Alexander Hutcheon, who has been promoted Assistant Traffic Superintendent at Manchester P.O. Telephones, was presented with a time-piece by the staff at the Telephone House.

Mr. A. C. Scott, overseer, occupied the chair, and in a few well-chosen words congratulated Mr. Hutcheon on his advancement in the service. Mr. W. Davidson, assistant traffic superintendent, made the presentation, and Mr. Hutcheon feelingly replied.

The timepiece bears the following inscription—"Presented to Mr. Alexander Hutcheon by his colleagues in the Telephone Department at Aberdeen on his promotion to Assistant Traffic Superintendent, Manchester."

THE TECH. EXAM.

By J. WEBSTER (Newcastle-on-Tyne).

How I dreaded it ! The idea of having to memorise all these appalling diagrams was horrible, the fear of those indigestible text-books grew upon me. What would I not give to be excused from the ordeal of going slowly round the Instrument Room, revealing step by step to a solemn-looking examiner the jerry-built foundation on which my technical knowledge lay. Tags of the jargon associated with "Tech," occurred to me—"Decrement working," "B. Kick," "Automatic cut-outs," "Bridging Coils." I used to know something of them ; but now they were meaningless phrases. Thus week after week slipped by. "Are you going in for the next Tech. exam. ?" someone would say. "Thinking about it," I would reply, but refrain from adding that the thought of it brought out a cold sweat.

At last I made a start. It was a horrible stormy night and there was nothing else to do. I had bought a new *Herbert* and straightway launched forth on my self-taught course. I plunged into the chapter on the Central Battery system and had just got to the paragraph about the "feed" resistance when Doris burst in upon me with the news that baby had the croup. No more Tech. that night. Next night a friend called, the following night I was on overtime, and so on.

The next time I got out my text-book, and turned to the chapter on Central Battery working, I found that I had forgotten all that I had read. I began to suspect that mental decay had set in at an early age, and made a fresh start. In order that the impressions on my turgid brain might not be wholly obliterated on this occasion, I made a great effort on the following evening. This time a faint glimmering of the previous night's reading remained. The devoted martyr who is the partner of my destinies was that evening put to mental exercise equal in intensity to my own in order to hide from Aunt Matilda the fact that I, at my ripe age (Doris is three years younger than her husband) was studying for an examination, especially as the conversation was concerned mainly with youthful prodigies, who had apparently reached the B.Sc. stage before they were "breeched."

As to my prospects for the exam. I now began to feel desperate. Mr. Herbert's bulky volume would haunt me ; I would take it up, begin to read and almost immediately find myself dreaming about all sorts of things, start again, and so flounder on hour by hour. I determined to seek advice, and got it from an old friend who is expert in matters technical. "Keep your heart up," said he, "Keep saying to yourself, 'I'm going to pass the exam.' Say it when you're going to sleep, say it when you wake." "But," I replied, "I feel almost as sure as can be that I'm not going to pass it." "Then you never will pass it until you do," was the answer. I knew my friend well and was sure that his laconic advice was meant to be seriously taken, and began as best I could to put it into practice, but with much misgiving. I could not tolerate the idea of being one of these conceited, ponderous oracles going round with a "Leave it to me" attitude ; and I was much tempted to qualify the little speech which I made to myself at irregular intervals.

The following week my mentor was a little, a very little, more discursive. He arranged to tell me something every succeeding week until the examination, and advised me to keep on practising the whole of his precepts throughout his unorthodox course. "Make the text-book a secondary consideration. Study the instrument you are working at. Always ask yourself two questions, "How ?" and "Why ?"

On applying my study of the diagram to the instrument on the table, I found that owing to the pieces of apparatus not occupying the same positions as in the diagram, further mental efforts of quite a different kind were required. I also began to get a glimmering of interest in the subject, and most fortunately that interest grew with each attempt. To look at the various pieces of apparatus at a set one has worked at for years, to ask one's self the purpose of each resistance block, &c., and to realise that most of them have been there for years and that one has not even observed their presence is perhaps a humiliating but a stimulating experience.

After a terrible day on a quad when the marks were splitting and failing and goading us to desperation I would turn to quads in my *Herbert* and find it even more interesting than before, in trying to find what had been wrong.

"Talk about it to someone. If no one will listen, talk about it to the dog," was one bit of advice I received. "Discuss it with the old hands. Don't be afraid of being snubbed. Something is sure to appear to you in a light different from anybody else." This was found to be very valuable counsel. It was surprising to find how many people were interested in the workings of instruments, batteries, &c. It made one wish for regular discussions on technical telegraphy. On those days when I had a conversation with anyone on any of these points, I took care to read it up when I got home, and I was satisfied to think that now I seemed to be able to get much more study done, although circumstances at home were no more friendly than previously. The little girl next door began to learn "Home, sweet Home" on the piano. A long acquaintance with Wagnerian recitative had failed to make me impervious to the Futurist variations on the melody, counterpoint, and rhythm which that dear child produced from Patti's *pièce de resistance*.

My teacher warned me to be very careful regarding diagrams. "Know all of the skeleton diagrams, and when you tackle a full diagram, be sure you know the skeleton diagram thoroughly. Then remember "copper to line to mark from the up station" and also that the galvanometer needle moves from left to right to mark.

Still feelings of dread would sweep over me. How could one learn all the details of the chemistry of secondary cells, the paths of current through a bridge duplex and the vagaries of repeaters ? It would take months to grasp all this. Just then the time arrived for sending one's name in for the exam. "Discretion is the better part of valour," said I. "Think about what you're saying," retorted my friend. "Get hold of the right idea as to the meaning of discretion and remember it is a part of valour, not a substitute for it. What kind of discretion do you use when taking a cold bath ? Take the plunge."

So I took it, and henceforward instead of having to drive myself to study I had to be dragged from it. Doris would ask me if I did not know all that was within the covers of my *Herbert*, now much worn and fingermarked. "Vast areas yet uncultivated," I would reply. "Leave the bookworm to his grub." On the eve of the exam. I received my last advice, "Be assured it is not necessary to get full marks. Make certain of some. Don't attempt the higher flights unless you are sure of the ground floor. In the oral test you will probably be stumped by the first two or three questions. Don't let that confuse you. Try to make up on the later ones."

The great day arrived. I rose very early and did what the experts advise not to do, but what everybody does, namely, I tried to cram a bit more at the last moment. I was soon in a knot with the special set used in connexion with concentrators for working either central battery or double current circuits. "I'm sure to fail this beastly exam.," I muttered. Then Doris said I looked unwell and she was sure I ought to be in bed instead of at the office. This was too much. Bilious or not bilious, I was going through it. "Get thee behind me, Delilah," I retorted. "Go and read up 'Sesame and Lilies.' That's not the way to buckle on your knight's armour." "All right, Samson," was the reply. "But if you fail, after what I've had to put up with recently, I and the cherub are going to mother's for good."

I rushed off to the office, thinking of former days when sharp pencils, favourite pens, compasses, &c., were mascots for the fray. And so the rendezvous was reached and the ordeal began.

In the written examination I selected what seemed to be the more elementary questions and tried to do my best without spending too much time on them. Six were safely negotiated, and then but ten minutes remained of the allotted time. The ten minutes were devoted to revision. Now for the ordeal.

The prognostication as to the first questions was correct. I was at sea with the Megger and still floundering over the Wheatstone Bridge. Then, round and round the benches. Shower upon shower of questions followed by answers, sometimes prompt but frequently stumbling. "What is the purpose of the 'feed' resistance ?"—I knew that one. It was closely associated with a bad attack of croup, a hot bath and ipecacuanha wine in which my son and heir played a prominent part. I discoursed freely on the function of "feed" resistance. The last question was reached. "Draw a diagram of a seven-point transformer." My hand shook like an aspen leaf. The examiner had recently written a paper on his examining experiences, published in the *P.O. Engineers' Journal*, and had included some specimens of diagrams he had collected. "Here goes for a companion picture to the turnip lantern which someone intended for a D'Arsonval galvanometer," I said to myself. There was no time for sub-editing, and the drawing I tendered was more like a smashed-up bicycle wheel than the neat diagram given in the text-book. He solemnly put the scrap of paper into his pocket. "Are you going to put that in your next chapter of reminiscences," I asked. He smiled and replied, "I've had worse ones than that."

The examination was over. I had been entirely unaware of the scores of eyes which had followed me round the room, and the idea of being thus stared at had been one of the biggest deterrents which had hindered my undertaking the ordeal previously. Each question asked and each answer given, as well as the answers which ought to have been given will remain with me for many years to come, and the old Instrument Room and its apparatus now possess for me an interest, real and lasting, which it never did before. "What wonderful inventions these are, with which we work every day. Why don't all the fellows have a try at the exam. ?" I thought, and only a short time before, the thought of the test was intolerable.

A few days slipped by, and then one day I was sent for by the Chief. "I have pleasure in congratulating you on passing the Overseer's Technical Examination," he said. "Here is your certificate." Doris says she is going to frame it, in memory of the past three months when she was a grass widow. She can do what she likes with it. I don't suppose I shall need it to remind the powers that be when the time arrives for them to confer on me the additional increment it represents.

THE NEW SCIENCE.

Two workmen recently enrolled in the Engineering Department were watching with evident interest the working of a hand operated desiccator.

First Neophyte : "What are them blokes doing to our cables, Bill ?"

Second Neophyte ; "Oh, they're pumping in the 'ohms,'"

The
Telegraph and Telephone Journal.

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Editing and Organising Committee - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

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

VOL. VI. SEPTEMBER, 1920. No. 66.

THE "PANEL" SYSTEM.

THE decision to instal in London a trial automatic exchange of the Western Electric Company's "Panel" type may mark the commencement of a new era in telephone exchange design. The gradual substitution of machines for human effort in effecting the simpler types of telephone connexions has been regarded by most telephone authorities for years past as an inevitable process. Comparatively extensive experiments with automatic exchanges have already been made in the country; but the adoption of automatic switching for very large areas has presented considerable difficulties in connexion with the provision of intercommunication between automatic and manual exchanges, the numbering of subscribers' lines and the routing of junction calls.

One problem was to find a machine switching system which would be sufficiently flexible to permit the substitution to be effected without sacrificing the power, which a human operator possesses, of routing traffic to any exchange in whatever way the Administration may from time to time direct, without varying the manner in which a call to that exchange is passed by the public. In the manual system there is no relation between the exchange name and number passed by a subscriber and the location on the switchboard of the junction over which the call must be effected. The brain of the operator analyses the details of the call and determines how it is to be effected and where the connecting channels are to be found.

In the mechanical switching system now to be tried in London the "panel" is an extensive *flat* multiple field over which the selector switches operate vertically. This characteristic at once differentiates the system from others of the automatic type in use in this country and is so outstanding as fully to justify the name "Panel System." A more remarkable feature, however, is the device called a "sender," which acts as the agent of the human brain in setting up connexions. It receives the number signalled by a subscriber and translates the signals into such others as the Administration may require for the purpose of routing the call satisfactorily and economically over the junction system. It varies the circuit conditions and determines what impulses shall be sent over the junction circuits for the purpose of meeting the requirements of the apparatus at a junction centre or a terminal exchange.

The experiment should prove whether the system will be able to meet all the requirements of the inevitably long period during which manual exchanges must be retained. The adoption of any automatic system must, in the nature of things, be gradual and the development of machines for switching purposes will only involve a slow but nevertheless desirable process of relieving operators from the more mechanical portions of their work, eliminating the physical effort required to establish connexions in large multiple jack fields and enabling the staff to concentrate more and more on those types of telephone communication for which the existence of the "human touch" will always be essential.

The volume of telephone work is bound to expand enormously with the inevitable growth of the telephone habit in this country. We stand on the threshold of a new era and it behoves the traffic and engineering officers of the British Post Office to gird their loins and to go forward with a strong heart and the will to establish the new order of things on a sure foundation.

HIC ET UBIQUE.

WE observe in the series of articles which have been appearing in *The Times* on "The Telephone Problem," and in which we seem to recognise a well known hand, the statement that in a single American city there are more telephones than there are in the whole of Great Britain and Ireland. We should be interested to know what city that is. We have received some very recent statistics from America but we fail to discover therein any city with anything like 911,000 telephones. As we have remarked before in this connexion mere details of 150,000 or so are immaterial to our critics. We often wonder that a good case is spoiled by these wanton inaccuracies, for nobody doubts the superior development of telephony in the United States.

Mr. PIKE PEASE informed the House of Commons that orders during the last twelve months had been executed at the rate of 2,300 a month in London, and 3,900 in the Provinces. At this rate the number of telephones in the United Kingdom must be well over 950,000 by now and should approach the million by the end of the next financial year.

The Times articles inform us that when the Post Office took over the trunk telephone lines in 1906 "a tariff based on telegraph practice was evolved by guesswork." As the telegraph tariff was and is a flat rate irrespective of distance, and the trunk tariff was prior to 1906 and is still on a mileage basis, it will be seen how accurate and apposite is the writer's deduction.

GREAT BRITAIN is not the only country suffering from unsatisfied applications for telephone service owing to delay in delivery of materials, exchange equipment and the like. There are about 5,000 would-be subscribers in Sydney, according to the *Electrical Review*. In Japan the position is worse. Premiums of £300 are said to be offered by those eager to obtain service.

OUR Leeds correspondent sends us the following cutting from the *Bradford Daily Telegraph* :—

It has long been the habit for those who are dissatisfied with our telephone system to point to the American system as an example of everything that is efficient and desirable. This week an American called at our office and found us engaged in our customary occupation of tearing our hair and strafing the telephone girl. We expected sarcastic comparisons from our visitor, and were the more surprised when he said : "I see, you've got the same trouble we have." "But," we exclaimed, "we have always understood that you have no trouble." "Well, anyway," he replied, "we are always damning the telephone girls." So perhaps the Government control of telephones is not as bad as it is painted, after all.

He adds :—"In the same connexion I may mention that as recently as Monday last I interviewed a partner of a foreign shipping house in Bradford, when he, quite unsolicited, remarked that we heard a great deal about the slowness of the English operator, but he had recently spent a considerable time in Sweden—that telephone paradise—and his experience was that if our service was slow, he had no word to express the casual answering of the operating force in that country."

UNDER the heading "The Women go," the *Manchester Dispatch* (July 20) tells its readers that the women operators at the London Trunk Exchanges have just received a month's notice and that their places are being filled by ex-Service men, some of whom reply, "It's all right, mate," when you ask for better attention. Would one imagine from this that all that has happened is that the male night operators (a comparatively small body) are resuming their jobs which were filled by temporary women operators during the War ? The impression conveyed by the paragraph is that the women telephonists who behaved so splendidly during the air raids are being cleared out wholesale to make room for ex-service men without experience of operating.

OUR contributor, Mr. Webb, in his article on the Bank Exchange last month, claims too ancient a date for the opening of the first exchange in London in giving it as 1878. It actually took place in 1879, and much controversy has taken place between rival claimants on behalf of Coleman Street and Lombard Street, London, and Faulkner Street, Manchester, all of which can be proved to have been working in September 1879.

WE regret that in the letter from "Equitable" on p. 184 of our last issue the word "not" was omitted owing to a printer's error before "unlike" in the third paragraph. The letter was received just as the JOURNAL was going to press.

WESTERN ELECTRIC COMPANY, LIMITED.

The business of the Western Electric Company, Limited, North Woolwich, is growing so rapidly that they have found it necessary to acquire an additional building at 60 and 62, Finsbury Pavement, London, E.C. (Telephone Nos. London Wall 7608 and 7609). The Export Sales Department have removed from Oswaldestre House, and the Supply Sales Department from Norfolk House to the new address, and all Sales business will be carried on from Finsbury Pavement in future, where they now have extensive show rooms.

The registered offices of the Company will continue at Norfolk House.

TELEGRAPHIC MEMORABILIA.

FAVOURED by a peep at the minutes of the last Committee meeting of the Telephone and Telegraph Society of London, the winter session (October to March) of this society is likely to prove of more than exceptional interest to the telephone and telegraph departments alike. Without pledging one's self to absolute verbal exactitude regarding the titles of the papers scheduled to be read it is fairly safe to say that "Fifty Years of Telegraphy" by the Chairman, Mr. A. J. Stubbs, Assistant Engineer-in-Chief, will prove to be an excellent item with which to open proceedings in October. "Whitleyism," "The Panel System of Automatic Telephony," "American Telephones and Telegraphs," "Imperial Telegraphic Communications," "Telegraph and Telephone Problems of the Future," and "Further Words on Wireless Developments," are all to be dealt with by fully qualified and broad-minded writers.

The hopes expressed in the July number that to the Anglo-Continental telegraphs would belong the privilege of opening the first split duplex Baudot circuit are apparently not to be realised. Let it be at once placed on record that this was in no manner due to the failure of our own engineering staff to have the apparatus *in situ* by a scheduled date. Alas, our continental friends, owing doubtless to circumstances which are more easily controlled on this side of the Channel, were not in a position to meet us, and as we go to press still seem unable to do so.

It is one more proof, if yet another proof were needed, of the widely divergent conditions which obtain in the various continental countries with which our own country is in direct telegraphic *liaison*.

Our inland communications fortunately may now be definitely considered as normal, and even the working of many of our Anglo-foreign lines, though far from satisfactory, has sufficiently settled down to permit of the introduction of an urgent telegraph service, which, despite some of the criticisms of contemporaries in the Press world, continues to be increasingly favoured by the man-in-the-street. Of course we have examples of the *stunt* type by which it may be "proved" that it is much quicker to telegraph from London to Paris *via* New York than by sending over the direct Government lines, a species of "clear the line" speed trial, which, interesting as a trial, is incapable of manifold repetition as a business proposition or guaranteed as a public daily service. Since the institution of the urgent rate the writer has watched instances of well under a two-figure service between the London and Paris and London and Amsterdam bourses.

Unfortunately these latter records are unadvertised by the British public, only the failures or what are termed failures being brought to light. One should not complain. After all it is the criminal who can always depend upon a well "splashed" paragraph !

It is a special pleasure to note the recent visit of the Chief Inspector of the Roumanian Telegraphs, M. Pitilescu, to the C.T.O. and that of his engineer colleague, M. Batulesco.

Fresh from the Paris congress they were keen upon seeing the London office, and without undue pride or conceit on the writer's part as a Britisher, one may most truthfully state that they were deeply impressed by the organisation of the latter. The unfeigned cordiality of the visitors is accepted as a courtesy not only to the British telegraphs but to the British nation. This opportunity is therefore taken of expressing the whole-hearted appreciation of the honour thus conferred upon the Telegraph Department by the representatives of our well-tried allies.

A correspondent directs attention to Article IV. of the Lisbon Telegraph Convention 1908 revision, in relation to the upkeep and maintenance of the international wires of the respective high contracting parties, and claims that the objections of the leading article of the August issue of the T. AND T. JOURNAL are well met thereby. Article IV. reads :—

"Each Government undertakes to devote to the International Telegraph Service special wires sufficiently numerous to ensure the rapid transmission of telegrams. These wires shall be established and worked in the most efficient manner indicated by the experience of the Service."

The contention of our leader writer that the terms of recent conventions have been too vague would appear to be altogether well established by the mere quotation of this paragraph. It will be recalled that the article in our August issue commented upon the "general and non-committal terms of former international telegraph conventions regarding the standard of electrical efficiency for international communications," and further expressed the opinion that they were "far too vague to prove of the slightest utility." Certainly a foot-note to Article I. lays down a rough standard in the words that these wires are to have "a maximum electrical resistance of 7.5 ohms per kilometre and *afford sufficient guarantee in respect of mechanical strength and insulation.*" But the comment one feels inclined to make is to ask the question whether any body of responsible mechanical or electrical engineers would care to accept a contract on the broad and unqualified terms indicated by the last quotation with special reference to the words we have italicised ?

It is the experience of those who have had close connexion with international telegraphy for a considerable number of years that the lack of some definite electrical and mechanical standard for international lines has contributed all too completely to an inefficiency which does little credit to modern progress in telegraphy.

It is with the sincerest and deepest sorrow that one places on record the death of Mr. R. Pinnock, late Asst. Supt. C.T.O., which occurred on July 25. His remains were laid to rest in the picturesque churchyard of Roxeth, Harrow, amidst surroundings which would surely harmonise with the beauty of his gentle spirit. No better tribute could be paid to his memory than to quote the words of one of his office friends, "he had gained the greatest of all earthly rewards, the love and admiration of his fellow men." As an amateur gardener he was equalled by few of his colleagues who elected him President of their Amateur Gardeners' Association, an office which he filled with distinction, himself specialising in carnations, his favourite flower. The following represented in person the sympathy of the office by their presence at Roxeth, Messrs. A. W. Edwards, J. Kellett, P. Garrood, T. Almond, W. Pearce, G. R. Adams, H. W. Evans, J. Laxton, P. Diggins, G. W. Long, and E. Elwood, while Messrs. F. J. Westaway and P. G. Evans were specially deputed by the membership of the A.G.A.

Retirements seem the order of the day in T.S. these last few months, with yet more upon the horizon. The end of July saw the official departure of Mr. A. Bathurst from our midst accompanied by the unfeigned good wishes of the entire office. Mr. Bathurst entered the telegraph school in Moorgate Street in November, 1875, came to the C.T.O. in January of the succeeding year and was associated with the latter office uninterruptedly throughout his career. Promoted to Asst. Supt. II. in 1900, to Class I. in due course and finally to full Superintendent on July 18, 1917, "Alf" has left behind him nothing but pleasant memories of an unselfish disposition. To add further words to that record would savour of gilding refined gold. As a matter of local office history, old T.S.-ites may recall that Mr. Bathurst was formerly in the ancient "G" division (mixed) under the Misses Winter and Brown. Our friend succeeded Mr. Elphick in the chair of 69 Room, the staff of which presented him with a beautiful carved oak barometer as a token of their esteem and of their regret that officially, they should see his face no more. Into his retirement Alf will doubtless take many a sweet remembrance of these old associations, and of this we are confident. His pensioned life will surely not unduly partake of the *dolce far niente*. His activities on behalf of others and for the uplifting and helpful causes which have always formed an integral part of his life will themselves forbid.

The Admiralty have ordered that officers appointed to certain wireless telegraphy stations will be so appointed for varying periods. For example the appointments to Aden, Bathurst, Bermuda, Ceylon, Demerara, Falkland Islands, Jamaica, Mauritius, Seychelles and Singapore are terminable at the expiration of one year, while appointments for the following are normally for a period of two years:—Ascension, Durban, Gibraltar, Hong Kong, Malta, and St. John's. Officers desiring extensions of their appointments will be permitted such extensions up to a maximum of three years.

The following *resumé* of the 1920 Report of the City and Guilds of London Institute Council and the comments thereon are sure to prove interesting to our technical readers, especially the reference to the probable closing of Finsbury Technical College. The excerpt is from *Electricity*:—

"The 1920 Report is a most interesting document, recording as it does war work, the recent very large increase in the number of students at the Engineering College at South Kensington, the Finsbury Technical College, etc. The question of raising the former to University rank, resulting either in it being created a University or else in its becoming an integral part of the University of London, is dealt with, and the incidence of current education policy on the present system gone into. As a result it seems likely that the pioneer Technical College (Finsbury), whence come so many of our practical engineers, is likely to be closed in the near future. The question of cost is really the ultimate determining factor, but we hope some means may be found to keep for us this landmark of initiative and progress in technical education. The number of students last year was 215 compared with 121, 148, and 140 in preceding years."

The summer show of the C.T.O. Amateur Gardening Association was held in one of the rooms of the G.P.O. North, by the kindness of the Secretary of the Post Office, on July 14.

Occasional visits to the door of the show gave optical evidence of the interest taken by the C.T.O. staffs, and it was evident that next year more accommodation will be required both for the exhibits and for the admirers of the same. Some of the vases of flowers, skilfully arranged by the ladies, were delightfully effective in their simplicity, and well merited the prizes allotted to the artistes.

Our technical friends of the telephone side who are interested in the evolution of their service could not do better than read the excellent series of articles re-printed from *Telephony*, Chicago, on "Telephone Repeater Development," which have appeared in that excellent periodical of Messrs. Rentell, *Electricity*.

Having made the foregoing appreciative comments on the excellency of the fare provided by our contemporary it is, perhaps, with a minor sense of guilt that one *lifts* the following paragraph in entirety from one of its recent pages!

"*Wireless in China.*—If the scheme of linking up Pekin with the most distant provinces of China by wireless is working out all right, the scheme should now be well in hand according to latest information from the Celestial Country. The scheme embraces the erection of wireless stations at Urga and Kashgar, on the borders of the inhospitable Turkestan (Chinese), with a third at Kobdo. A fourth station will be at Hami, in Mongolia; and it is the intention of the Chinese Government to have the Nami and the Kobo stations and a fifth one in Sian-fu, Stenzi, Mongolia, working before the Urga and Kashgar stations are completed. Caravans conveying the materials are *en route* to the five places mentioned or should be there already, those going to Central Asia being already due at the end of their 1,400 miles trek. The caravans had as their departing point Fang-Cheng and their objective the town of Urumchi. Urga is on the Tola, one of the waters which flow into Lake Baikal, and is a very arid district. Kobda must not be confounded with the place of the same name on the borders of Tibet. Kashgar, in the valley of the Kashgar river, is the remotest western point of the system, not far from the Russian border."

From official sources it is gathered that a Royal Warrant was issued in July authorising the formation, pay, &c., of the Corps of Signals, which is to be formed out of existing signalling companies of the Royal Engineers; also that the administrative services of the Army, including Corps of Signals and Telegraph Supplies, are to be actively employed in peace time so as to be always ready for active service if required. It is also intimated amongst other things that field officers of the Royal Engineers who have held permanent, regular or temporary commissions in the Army, Special Reserve, or Territorial Force during the war will be eligible for engineer pay in the Territorial Army. Officers appointed to the Territorial Force since September, 1919, outside the above category, will be eligible for engineer pay if qualified as A.M.I.C.E., A.M.I.M.E., or A.M.I.E.E., or equivalent professional qualifications. The latter qualifications demanded obviously indicate the high standard of efficiency which is to be the aim of the future, while it will wave off all officers but those who are amongst the keenest in their profession.

Intelligence of an interesting application of the Murray phonic motor originally made for the distributor of the Baudot Printing Telegraph system, comes to hand from the Indian Government telegraph workshops at Calcutta, through the *Radio Review* of June. It formed the governing portion of an automatic sending device for time signalling from the Alipur Observatory. This consisted of a wheel ten inches in diameter which rotated uniformly at one r.p.m. through a worm gearing controlled by the reed driven motor mentioned above. The wheel carried brass strips let into ebonite on its periphery in connexion with its electrical functions.

J. J. T.

THE BAUDOT—XII.

By J. J. T.

IT should be remarked that the single plate simplex form of Baudot can be modified to the further extent of the suppression of a separate relay for leak or home local record purposes, both inward and outward records being taken off from the same relay, reducing the use of the Baudot keyboard switch for *receiving* to the two connexions A^1, C^1, as mentioned in the last article.

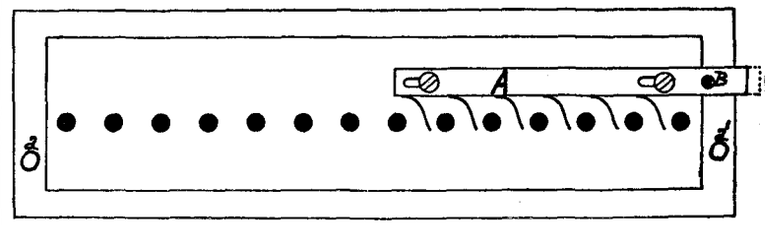

FIG. XXXIV.

Fig. XXXIV gives a skeletonised view of the connexion strip which carries the fourteen external flexible connexions of the keyboard. The fourteen corresponding internal connexions terminate in an equal number of flat springs which, when the strip is clamped against the keyboard make firm contact with their respective contact studs.

This particular type of connexion strip is provided with a special arrangement by means of which, while a keyboard is being changed, the spacing current is still sent out to line from the corresponding connexions of the five keyboard keys. The studs on the strip are so arranged that the fourteenth stud corresponds with the flexible connexion carrying the spacing battery current, while studs 9 to 13 inclusive correspond with the five external connexions of the five keyboard keys (see Figs. XXXV and XXXVI). The steel piece A, which carries six curved contacts, is fitted with a fairly powerful spiral steel spring, not shown, which, as soon as the

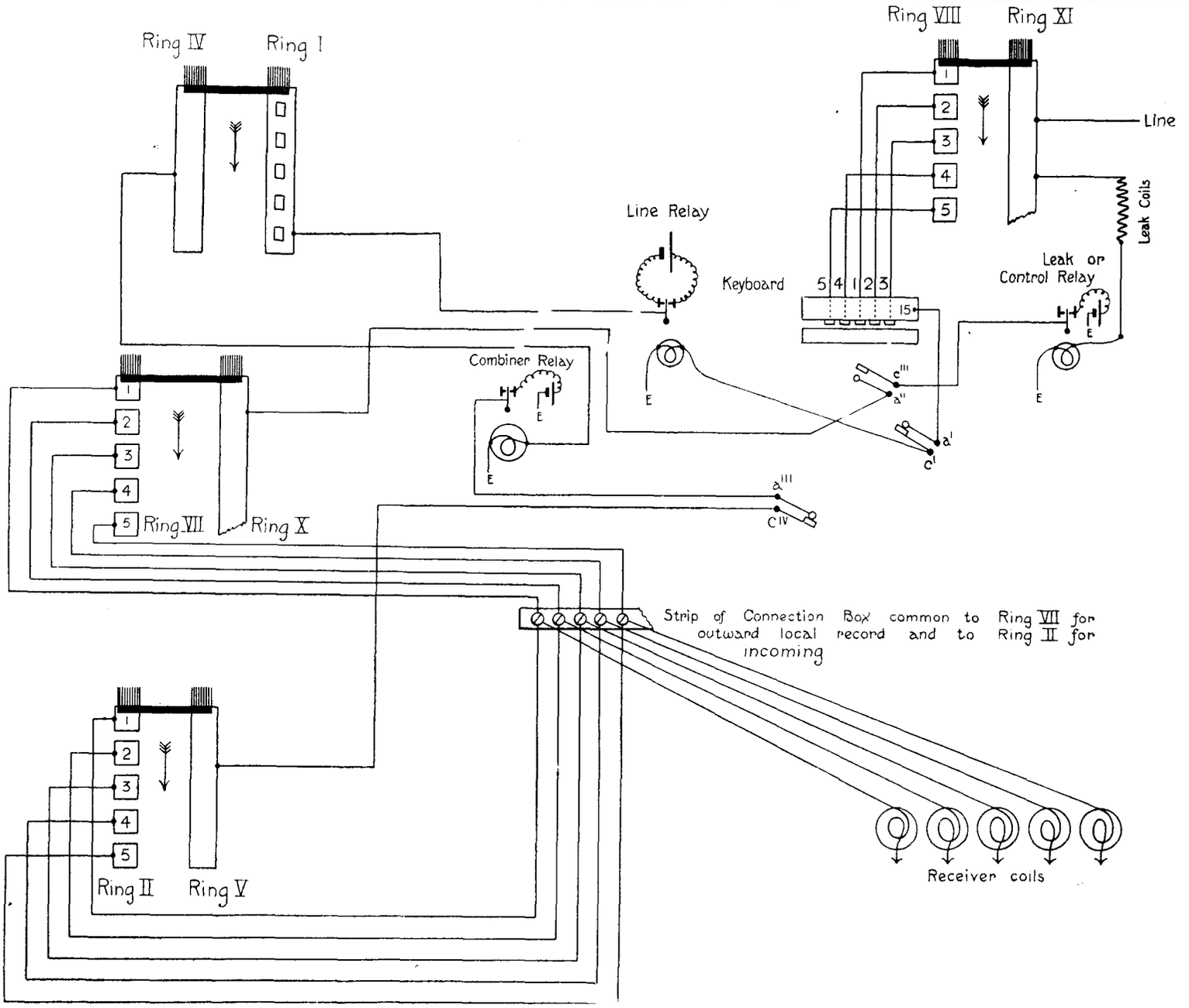

FIG. XXXVI.

strip is removed from the keyboard, pulls A into the position shown by the dotted line. This change brings all six curved contacts into metallic touch with studs 9 to 14 thus joining up the spacing current to the five external connexions of the five keys. Briefly, this gives spacing to line for these particular five keys in place of the keyboard. When replacing a keyboard, A is pressed back by the finger against the tension of the spring to the position shown in Fig. XXXIV. This action, simultaneously with that of placing the strip into position over two stout wormed pins, with which each keyboard is provided, and which pass through the strip by means of two metal-sleeved holes a, a^1, *fixes* A as seen in Fig. XXXIV, disconnected from the studs. These latter now automatically make their normal connexions with the keyboard keys, &c., by means of the flat spring contacts already mentioned. A brass stop B, fixed to the steel piece A, definitely fixes the latter by its insertion in a corresponding dome-shaped slot let into the woodwork of the keyboard in the appropriate position. Another type of connexion strip is designed with only nine connexions and is used with duplex sets.

Fig. XXXV is a skeleton plan of a Single Plate *Simplex* Baudot outlining the path of the inward current and showing the switch connexion specially concerned. A leak relay has been inserted, the connexion for which may be brought through the switch by means of A^{II} and C^{III}, but for simplicity's sake and to conform to later types the relay tongue has here been brought direct to the connexion box. Rings III and VI and the cadence, as being purely local, have also been omitted. This skeleton plan practically reduces Baudot diagrams to primary simplicity, and should be utilised as the basis upon which all types of Baudot are built. Aided by the Figs. XXXII and XXXIII it should be an easy matter for the student to plan out a similar skeleton plan in the "sending" position of the switch.

Similarly Fig. XXXVI, though somewhat more complicated, shows a skeleton plan of a Twin Plate Simplex Baudot and also shows the inward current path and omits the local cadence connexion and in this case Rings IX and XII. It is here recommended that the student himself or herself plan out the path of the *outward* and leak currents on a similar plan by the aid of the switch connexions and directions already given.

It should however be remembered that Twin Plate Simplex Baudots are not used on the British inland circuits and that therefore Fig. XXXVI may be ignored by those who are not directly *interested in Anglo-continental circuits.*

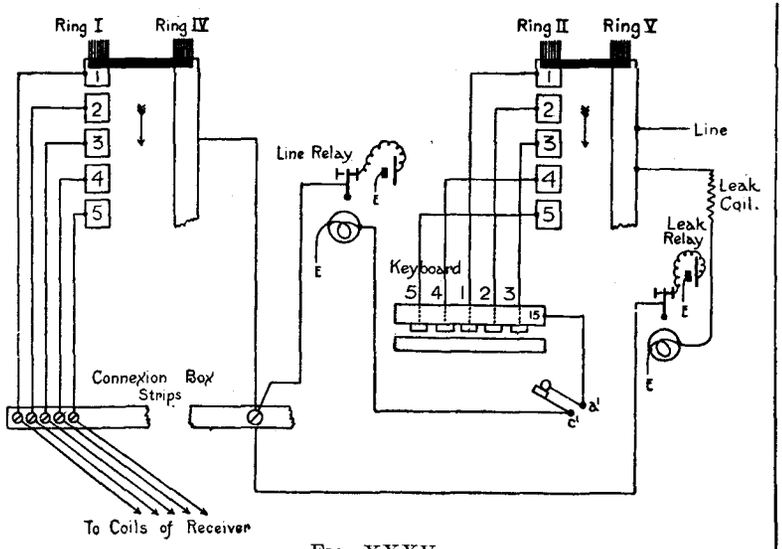

FIG. XXXV.

The one fact to be fixed is, that a thorough study of Fig. XXXV will ensure a knowledge of the groundwork of every type of simplex, be it double, triple or quadruple. The supposed complication of connexions in the Baudot is practically a multiplication of the connexions necessary for one simple channel shown in skeleton in this article, while, when we come to the study of duplex, simplicity will again be found to be the keynote.

NOTE.—To those readers specially interested in *Double Plate Simplex Installations*: *It will have been noticed that in dealing with this type the numbering of the rings has commenced with the* front *plate and has been continued in sequence on to the* back *plate*, i.e., I to VI *and* VII to XII *respectively*. This question of whether the numbering of Twin plate *simplex* sets should commence with the back or front plate, so far as I am aware, has never been officially settled. In the present circumstances it appeared to the writer that as these articles had commenced with the study of the simpler type of *simplex* (the single plate) the method of numbering of which is fairly obvious, by far the most logical method to adopt in touching upon *Twin* plate simplex (when practically another plate is *added*), was to continue the numbering on to the "added" plate. It is still thought that to have immediately altered the numbering of the plate which carries the small segments ring would have confused the novice. It is nevertheless regretted should inconvenience have been caused to any one of our readers, but it is hoped that with this explanation they will be better able to follow the skeleton plans which appear in the present issue.

(*To be continued.*)

WELCOME HOME TO EX-SERVICE TELEPHONE MEN AND WOMEN AT MANCHESTER, MAY 15.

WHILST the War was raging, and incidentally, whilst those members of the District Manager's staff were doing their duty in those beautiful suits of khaki, so were those members of the staff who stayed at home carrying on, in addition to their civil occupation, a thoughtful arrangement for the welcoming home of the warriors. Subscriptions were invited and entertainments arranged, the proceeds of which were devoted to a special fund to give the ex-Service boys and girls on their return a right good time. The Committee who had the matter in hand were complete in their endeavours in every way, for it was not possible to improve on the arrangements that had been made.

The rendezvous was the Grand Hotel, and the scene was full of beauty, for the ladies turned up in strong numbers and the different colours and varieties of dresses made the spectacle one of delight. In addition, everyone had made up their minds to have a jolly good time, smiling faces, witty talk and no telephone business being the principal points noted.

Mr. J. D. W. Stewart, District Manager, appeared as Chairman, and Mr. J. G. Maddan, the Postmaster Surveyor of Manchester, Messrs. A. C. Godfrey, Chief Clerk, H. Elliott, Contract Manager, and G. F. Staite, Traffic Superintendent, were also present. The dinner went down well, so did the wine and other comestibles.

After dinner, cigars, cigarettes and chocolates were handed round and were much appreciated.

Mr. Stewart proposed the toast of "The King" and afterwards the toast to "Our Fallen Comrades." Unfortunately six members had made the supreme sacrifice and as a last tribute, all present stood with bowed heads. In connexion with this toast, Mr. Stewart added the name of the late Mr. J. H. Smith, who died on Aug. 26, 1918. From the outbreak of war Mr. Smith closely identified himself with the various schemes for sending comforts to the men on Active Service, and not only did he do this whilst carrying a heavier load of work due to the shortage of staff, but utilised a great deal of his leisure in writing personal letters to the men on Active Service.

In proposing the next toast to the returned Service members, Mr. Stewart gave some very interesting information regarding the male and female staff who had joined up and the appended record is one that we shall ever be proud of:—

Total male force at outbreak of War, all grades approximately	100 men
Number released for Service	79
Female staff released for Service	9
Killed in Action	6
Wounded	2
P.O.W.	2

The names of those killed in action were:—

Pte. R. Driver (M.C.A.), 7th M/crs. (T.), killed in action, Sept. 15, 1915, Gallipoli.

Pte. G. E. Taylor (M.C.A.), 6th M/crs. (T.), killed in action, Aug. 7, 1915, Gallipoli.

Pte. J. R. Carroll (N. Telep. & Call Office Att.), K. Own Roy. Lanc., killed in action, June, 1915, Hill 60.

Pte. C. Jones (N. Telep. & Call Office Att.), R.A.M.C. (T.), killed in action, June, 1915, Gallipoli.

Pte. J. T. Turner (N. Telep. & Call Office Att.), R.A.S.C. (T.), killed in action, May, 1915, Gallipoli.

Pte. E. Norman (N. Telep. & Call Office Att.), 7th Manc. (T.), died of wounds, July 31, 1917, France.

One member of the staff (Mr. Macdonald) was unfortunate enough to be torpedoed twice in one day on his way overseas. (*Arragon*, December, 1917) and although there was a loss of nearly 700 men on this occasion, Mr. Macdonald was lucky enough to be picked up.

Fronts served upon.

Egypt, France, Flanders, Mesopotamia, Palestine, Syria, Soudan, Gallipoli, Italy, India, Macedonia, and in Germany as part of Army of occupation; in addition to these some members of the staff carried on in the North Sea and English Channel with the Naval Forces.

Honours.

Miss I. G. Fish (M.B.E.).
Ex-Lieut. Ogilvie (Mentioned in Despatches).
Ex.R.S.M. Deaville (Mentioned n Despatches).

Mons Men.

J. McManus, T. Neville, W. S. Davies, J. O'Donnell, and the late J. R. Carroll.

Distribution of Men and Women.

R. Navy 1, R.E. 23, R.G.A. 3, Yeomanry 1, Infantry 20, M.G. Corps 1, Tank Corps 1, R.A.F. 2, R.N.A.S. 1, R.A.M.C. 5, R.A.S.C. 3, R.A.O.C. 1, S. of M. 1, Q.M.A.A.C. 9.

Although we number only one Commissioned Officer amongst us, no less than 41 of the 79 men released for service attained Non-Commissioned or Warrant Rank.

First man to be discharged, Ex-Corp. Tomblin (wounded in Gallipoli, 1915);

Last man to be discharged, L./C. Wilkes, May 1, 1920, 5 years 8 months service;

both having enlisted at the end of August, 1914.

Miss Burgess and Mr. H. S. Humphreys suitably responded on behalf of the ex-Service members, thanking Mr. Stewart, the staff and committee for the very successful arrangements made in honour of their comrades.

The next item was the presentation by the Chairman to each of the returned heroes a silver pencil case. Following on this interesting ceremony commenced the concert, in which Mr. A. Caines performed at the piano, and the Misses M. Howard, M. Johnson, D. M. Cliff, A. Doyle, and Messrs. S. J. Hamilton, A. Caine and F. W. A. Clutterbuck, gave songs, and Mr. H. M. Llewellyn a humorous recitation.

During the concert Mr. Maddan was introduced to the staff by Mr. Stewart and stated how happy he was to have an opportunity of attending this particular function.

Another break in the concert programme was made when Mr. H. S. Humphreys, on behalf of the Service members, presented the Secretary of the Entertainments Committee, Miss A. Foster, with a beautiful writing desk. The evening was completed with a merry dance—some danced whilst others couldn't.

The Committee were:—Mr. A. C. Godfrey, Chairman, Misses A. Foster, Secretary, C. Broster, G. Finch, N. Hibbert, N. Smith, A. Talbot, A. Williams and Mr. T. Hibbert.

H. S. H.

LONDON ENGINEERING DISTRICT NOTES.

Provision of Additional Plant.—Despite all difficulties the work of providing additional plant goes on apace. The arrears of five years cannot be overcome in a few months, however willing the staff may be. Both the spirit and the flesh are willing despite unfair press criticisms. Unfortunately the good work is impeded by difficulties in obtaining materials. There can be no doubt that manufacturers of telephone stores are in their own interests doing all they can to keep pace with the demands. Their difficulty is to obtain raw materials of various sorts, of which there is a world shortage. The delays in the supply of stores throw additional burdens on the Post Office Engineering and Stores Departments, as hardly any works can be carried through in a normal manner. Much correspondence results with a view to alternative stores being adopted and various expedients have to be resorted to in order to enable the most urgent works to be completed. The mere fact that works cannot be disposed of in normal time imposes additional worry and strain on a much harassed staff. It will be readily understood how difficult it is under such circumstances for engineers to fulfil the requirements as to efficient and economical working.

A new common battery signalling exchange was opened in the Waltham Cross Post Office building on July 17. It consists of 3 "A" positions and 2 "B" positions. This is one of the first of a new design of C.B.S. exchanges to be completed. It was a great relief to dismantle the old magneto exchange and to hand over the premises for their normal use as a private residence.

* * *

An extension of the Avenue Exchange consisting of 20 "A" positions and 11 "B" positions will be completed before these notes are in print. Messrs. The Peel Conner Co. are the contractors in this case. The same firm is making satisfactory progress with an extension at Victoria Exchange and is to be congratulated on starting the work within a few days of the contract date. Good progress is being made with the temporary Langham Exchange on the roof of the Western District Office. This should be in active operation by the end of the year. An extension at Park Exchange is well forward and one at Hampstead Exchange has been completed.

* * *

A suite of switchboards forming practically a distinct exchange has been equipped in the Willesden switchroom and the Wembley and Kingsbury subscribers have been transferred from the main board to these, thus providing spare capacity for Willesden subscribers on the main board.

* * *

Thanks to our colleagues of the Traffic Staff with their desire to have everything up-to-date there is scarcely an exchange in the London area in which some work is not either in hand or shortly to be started.

* * *

Needless to say the provision of additional meters is in hand in connexion with the forthcoming introduction of the new rates. Those whose duties take them about London will have ocular evidence of the activities of the external engineering staff. As rapidly as manufacturers can supply cables they are beong laid, thus making it possible for new subscribers to be connected.

* * *

Bank Exchange.—In connexion with the article on the Bank Exchange which appeared in last month's number of the JOURNAL it may be interesting to recall that the engineer in charge of the construction of the flat board at the outset was Mr. R. Ridge who, it is believed, is still connected with telephone work in some remote part of the earth. Towards the conclusion of the work Mr. W. Clarke took charge. Mr. Clarke is still an active member of the London staff. Another officer concerned with the work, Mr. P. H. Cole, is now the general manager of the Shanghai Telephone Co. One of the present assistant superintending engineers in the London Engineering District made his first acquaintance with the mysteries of telephone engineering in connexion with the building of this exchange. He recalls the awe in which he held Mr. Blick, the officer then in charge of the test room and maintenance of the old Queen Victoria Exchange, which was in the same room as the new exchange. Mr. Blick later deserted the internal staff and is now in the Technical Section dealing with external work at Denman Street. Miss Ralph, who for so many years was in charge of the operating school at London Wall, was clerk-in-charge of the old exchange, and, for some time, of the new one. Those were happy days and less strenuous than the present.

Pipe Subways.—The sight of a number of people at the Crystal Palace examining the models of war trenches, made one think how interested and surprised these same people would be if they could see a model of London with the street surfaces removed. Of course all are familiar with the tube railway system into which they post themselves and are duly delivered at the other end, but few are aware of the extensive system of subways that have been provided for the accommodation of gas, water, electric, and telephone supply services. There is the Embankment subway, for instance, extending from Westminster Bridge to Blackfriars. This subway is comparatively large, and has ample head room for the average man. Although mains engineers are grateful to those who caused such a roomy subway to be constructed, they nevertheless wish that it had been twice as large so that more pipes and cables could be accommodated. Then there is the Queen Victoria Street subway which links up the Embankment subway with the Bank subway.

Holborn Circus is connected with Ludgate Circus by a subway underneath St. Bride Street. The writer remembers following a colleague along this subway one soft slushy day following a snow fall. An enterprising youth armed with a squeegee found a ready means of disposing of the liquid mud by dropping it down the ventilating grating of the subway. My friend was passing underneath at the time. It was some years ago, but I can remember how startled I was to hear the fluency of a man who had always hitherto been regarded as slow of speech.

Subways are also constructed underneath other streets amongst which are Holborn Viaduct, Shaftesbury Avenue, Kingsway, Rosebery Avenue and Southwark Street. The telephone engineer—like Oliver Twist—longs for more, especially of the type built with glazed bricks and fitted with electric light.

The Southwark Street subway extends from Blackfriars Bridge to London Bridge, a distance of about a mile. There is very little head room, so that it is necessary to walk with the head well bent. It is a weird experience when, for the first time, this subway is traversed, especially if one happens to be the last of a party, only the front member of which has a lamp. Space is so valuable that only a very narrow gangway is left between the projecting brackets which support the cables, and the unfortunate traveller, struggling along in the rear of a lamp which seems only to intensify the darkness, leaves portions of his skin or clothing on the brackets or roof as a memento of his visit.

The Post Office has recently completed the construction of a subway which, however, is not for the purpose of containing pipes, but will be used for carrying mails in electrically propelled cars operated by remote control. Space however, has been found to support a pneumatic tube which will be used for the transmission of messages between the Central Telegraph Office and Mount Pleasant.

In course of time, no doubt, one of our engineers will write the story of this railway subway and it will be found to be one of the most interesting and unique engineering undertakings carried under the soil of London.

Use of Motor Vehicles.—No doubt many readers of these notes while bumping on a motor bike along the *pavé* roads of France or across the sandy wastes in Egypt and Messpotts in pursuit of the elusive "intermittent short," have wondered whether the experience thus obtained would be of service to them in civil life, should that delightful time ever return. It may be news to some to know that motor bicycles have been introduced to a limited extent in the engineering department and there is little doubt that the policy will be extended. American practice is much ahead of British in this respect. Each lineman responsible for a section of route is supplied with a Ford car for his exclusive use. Think of it, ye Knights of the Soldering Iron. Undoubtedly it pays, as Uncle Sam does not do these things out of tender regard for the trouble-hunters' corns. We shall probably see this practice adopted in this country in time, although it does not necessarily follow that because something has proved economical and satisfactory in America it will prove equally suitable in England.

The *Daily Mail* is calling for suggestions for a poster to advertise their forthcoming efficiency exhibition. What could be more appropriate than a photograph of the staff of the officers of the London Engineering District.

* * *

A distinct improvement has been noticed recently in the sartorial appearance of officers of the Post Office. It is feared, however, that the war bonus is not yet sufficient to enable the staff to attain to the ideal of "R.W." in "Our Mutual Friend." Lovers of Dickens will call to mind that R.W. has an intense longing to have for once a complete new outfit but the opposing forces of a small salary and large family make it impossible. When his hat was new his coat was threadbare, and when he had saved up enough to purchase a new coat, his boots were down at heel. When he was able to buy some new boots, his hat was in the last stages of decrepitude.

One member of the engineering staff, who lives within 1,000 miles of Purley, was recently standing by the station cab-rank when he was instructed to drive to the neighbouring golf links. The would-be fare was rather taken aback when he discovered that our colleague was a prominent member of the golf club and not a cabby.

* * *

It is curious how the "by and for office boy" press loves to startle its readers by describing, more or less accurately, fresh developments in the world of science and industry, and incidentally generally takes credit to itself for the innovations.

Probably every reader of these notes knows that wireless telephony would have remained a scientific toy if a certain daily paper had not realised its possibilities and developed it.

The latest discovery is a Japanese who is able to do five things, viz., read, write, calculate, listen and talk simultaneously. It may well be said that a prophet has no honour in his own country. Why, the same thing is done daily by several officers of the London Engineering District. It is common practice with certain officers to dictate letters, talk on the telephone, discuss cases with one or two members of the staff, and sign papers all at the same time, while subconsciously working out the probable deduction for income tax from the next salary payment.

LONDON TELEPHONE SERVICE NOTES.

THE announcement that the first meeting of the new session of the London Telephonists' Society takes place next month reminds us that the season for outdoor recreation is fast giving place to the period of indoor functions such as crowd upon one another in the social life of our exchanges. The Society's programme for the coming winter promises its members a number of enjoyable evenings, and there is little doubt that the membership and attendances will tax the capacity of the Museum dining room in which meetings will again be held. The programme is as follows :—

1920.

Wednesday, October 6. Presidential address. Mr. T. A. Beck.

Wednesday, November 3. Two short Papers. (Probably on the work of the Fees and Directory Sections of the Accounts Branch).

Wednesday, December 1. Paper, "My impressions of London Telephones," by Sadie Worth, Telephone Operator, New York City. Read by Mr. M. C. Pink.

1921.

Saturday, January 1, New Year's Dance, Bishopsgate Institute.

Wednesday, February 2, Competition Papers.

Wednesday, March 2, Elocution Competition.

The competition from which the papers will be read at the February meeting represents a departure from the scheme of competitions which have been in vogue during the past few years. The number of classes has been reduced to two, governed by the age of the competitor, and the papers are confined to one subject, viz., "Suggestions towards the improvement of the service." Prizes of five guineas will be awarded for the best paper in each class. The prizes are substantial ones and there is every reason to anticipate that the alterations will be appreciated by the members of the society and result in even a larger number of papers being submitted than has been the case during the past few years.

* * *

Swimming has been receiving a large share of attention of our exchange staffs during the past months. The challenge cup presented by Mr. Pounds for competition among teams representing at least eight different exchanges, and Gerrard's success at the close of last season in winning the Business Houses Competition Cup, have undoubtedly given considerable impetus to the sport. The climax of the present season will be reached on the occasion of a gala which is being arranged to take place at the Holborn Baths on October 7. The programme of events for that occasion is very full and very attractive. The items include, among others, :—

The race for the championship,
Team racing for Mr. Pounds' challenge cup,
Open diving competition,
Walking race,
Lantern race,
Blindfold race for floating ducks,
Sunshade race,
Tub race.

There will also be a water polo match and it is hoped that the Amateur Diving Association will send a team which will give an exhibition of diving.

The enthusiasm with which the art of swimming has been taken up is evidenced by the fact that whereas clubs existed at only three exchanges last year 12 new clubs have been formed this season. Twelve of the clubs are affiliated to the Amateur Swimming Association and the total membership of the 15 clubs is about 850. Over 60 members have been taught to swim. Practically all the exchanges possessing teams will enter for the challenge cup and an exiting contest is anticipated. Unfortunately accommodation for visitors is limited and the organisers will be faced with the difficult task of allotting the available seats among those desiring to be present.

* * *

The Langham Choral Society concluded its first season on July 20 and can review its work with satisfaction and look forward to its second year with confidence. Started in December, 1919, it has held regularly weekly rehearsals, and the average attendance has exceeded 300. The first performance of Hiawatha at the Queen's Hall, was so successful that the National Sunday League engaged the Choir and Orchestra for an afternoon concert at the Palladium. The further success then achieved resulted in Sir Oswald Stoll lending the Alhambra for a Sunday evening performance of the same work in aid of the War Seals Foundation. Another excellent rendering of Coleridge Taylor's famous work was given on that occasion and the profit exceeded £150. The choir is indebted to Mr. Hugh Marleyn for the artistic excellence of their work and he has reason to be proud of it. The business side of the venture has been well looked after and the Committee and particularly the Secretary, Miss Nurse, are to be congratulated on finishing the season with a balance of about £70 in hand. Rehearsals for the next season started on Tuesday, August 31, and the first work to be performed is Berlioz' "Faust," which will be given at Queen's Hall in November. At least two other concerts will be given during the season. The cry still goes out for "more men."

* * *

Contract Branch.

The Contract Branch negotiated agreements for 4,462 stations during the five weeks ended July 31, 1920. The number of stations recovered during the same period amounted to 1,685, leaving a net gain of 2,777 stations.

L.T.S. Whitley Committee.

A sub-committee consisting of three on the official side and three on the staff side has been appointed to "consider and report upon the conditions obtaining at Directory Centres and the best means of improving the arrangements for dealing with Directory Enquiries."

PERSONALIA.

LONDON TELEPHONE SERVICE.

The following resignations have taken place on account of marriage :—

Assistant Supervisor, Class II.

Miss E. JARVIS (East)

Telephonists.

Miss E. GRINDEY (Avenue)
Miss J. L. G. MCINNES (Victoria)
Miss M. SMALL (Holborn)
Miss ABLEWHITE (Lee Green)
Miss A. MILES (Bromley)
Miss M. R. SMITH (Bromley)
Miss D. A. FRENCH (Trunk)
Miss R. BAKER (Trunk)
Miss E. SHORT (Trunk)
Miss I. E. PRESSEY (Purley)
Miss F. GRANT (Gerrard)
Miss R. MARTIN (Reigate)
Miss B. M. WALLACE (Putney)
Miss A. CHAPMAN (Chiswick)

EDINBURGH TELEPHONES.

Mr. R. WILLIAMSON, Asst. Traffic Supt., Edinburgh, has been appointed Traffic Supt. at York.

Before coming to Edinburgh Mr. Williamson was Assistant District Manager at Newport (Mon.) Mr. Williamson, before leaving for York, was presented by Mr. Macfee with tokens of the regard of the Edinburgh Staff, and Mr. Macfee and others expressed their high appreciation of Mr. Williamson's qualities. As a traffic officer Mr. Williamson is a tireless worker, and the York District is to be congratulated on his appointment as head of the traffic branch.

Mr. W. C. YARROLL, S.C. and T., Edinburgh, has been appointed Asst. Traffic Supt. at Edinburgh.

GLASGOW TELEPHONE NOTES.

Several staff changes have taken place lately in the Glasgow Telephone District. Mr. John A. MCCALLUM has been transferred from Chief Clerk to Postmaster of Dumfries. The district manager, Mr. Williamson, made a suitable presentation on behalf of the District office staff and in the course of a happy speech referred to Mr. McCallum's efficiency in organising his staff and his cordial relationship with those under his charge.

Mr. James R. BROWN, Contract Manager, has retired from the service and his cheerful presence will be missed by the District staff. A suitable token of the esteem in which he was held was presented to Mr. Brown by the District Manager and the gentlemen of the company thereafter adjourned for tea and harmony. A pleasant evening was spent under the genial chairmanship of Mr. Williamson.

Recent changes in the personnel of the operating staff are :—

PROMOTIONS.

To be Assistant Supervisors, Class II.

Miss E. KEAY (Central)
Miss C. S. SMITH (Trunk)

RESIGNATIONS.

Assistant Supervisor, Class II.

Miss M. A. CRICHTON (Trunk)

Telephonists.

Miss E. McL. GILMOUR (South)
Miss E. E. E. HILL (Central)
Miss J. O. WILSON (Central)
Miss I. S. MCLEOD (Bridgeton)
Miss J. M. GOLD (Trunk)

Mr. JAMES MAGNALL, Assistant Traffic Superintendent, Class II, York District Manager's Office, who has acted for some time past as Traffic Superintendent, has been promoted to the post of Assistant Superintendent of Traffic, Class II, on Headquarters Staff. His departure was made the occasion of the presentation of a handsome travelling bag.

Mr. J. P. MONGAN, Male Clerical Assistant, York District Manager's Office, was presented by the staff with an easy chair on the occasion of his marriage on June 1.

Miss E. S. M. HARDING, Telephonist, Chelmsford, has resigned on account of marriage, and received a gift of cutlery from the staff.

Mr. D. Ross, Assistant Superintendent, Class I (Telegraphs, Leicester), promoted to be Superintendent Telegraphs, Leicester.

Mr. E. W. CRAFTER, Assistant Superintendent, Class II, to be Assistant Superintendent, Telegraphs, Leicester.

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