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THE BRAZILIAN TELEGRAPHS.

At a time when the British Continental Telegraphs are well to the fore and great interest is being evoked the world over by automatic telegraphs and in view of the ever-increasing conquests of wireless, perhaps I may be allowed to occupy the reader's attention awhile with the origin and subsequent development of telegraphs in the great South American Republic of Brazil.

It will surely be of great interest to a large number to peruse a few facts concerning enterprise in other than European circles. Most of my data are culled from *Brazil Products and Manufactures*, a government publication, and I am also greatly indebted to the kindness of the Brazilian Vice-Consul here in London, who has rendered great assistance in the compiling of historical events coincident with the growth of telegraphs.

The birth of Brazilian telegraphy was due to the untiring efforts of Eusebio de Queiroz Coutinho Mattoso Camara aided by a competent helper in the form of the Professor of Physics, Dr. Guilherme Schuh. The initial stages of the telegraph service were inaugurated in 1852, but for a number of years developments did not proceed with great rapidity. However, the outbreak of the Paraguay War (1865-1875) necessitating speedy communications added great stimuli to the efforts of prominent engineers. In 1874 communication was established between Rio and Victoria (Espírito Santo), the next year saw Parahyba linked with the capital. The towns of Fortaleza 1881, Therezina 1884, and Para 1886, were thus connected in the early part of the next decade.

Internal lines were constructed about the same time to Curityba, Sao Paulo, Porto Alegre, and to the frontier of Uruguay at Jaquarãa.

The physical features of the country, however, are such as to present formidable barriers to the telegraph engineer. This led the State to obtain the services of the Amazon Telegraph Co. for the purpose of laying cables in the river Amazon. The principal cable commenced activity on Feb. 16, 1896, and served for providing Para and Manãos with direct communication. By this time, all the capitals of the various States forming the Republic were in

telegraphic communication as well as towns, which were actual hubs of commercial activity. Progress was rapid, and each succeeding year saw further and greater development in telegraph construction.

The guiding influence and administration are in the hands of the Ministry of Public Works.

Not content with merely being alive to the necessity of adequate communication, the Ministry has keenly followed the example of European Administrations, and experiments were exhaustively carried out towards reaching the highest pinnacle of efficiency possible for maintaining a thoroughly reliable system.

In 1877 Brazil became an adherent to the International Convention of St. Petersburg.

The instrument extensively favoured was, and I believe still is, the Werner-Siemens polarised apparatus. Prior to this, Stohrer's double Morse and Breguets with dial plates were originally the apparatus employed. 1885 saw Wheatstone apparatus in the service, followed in 1889 by the trials of modified Hughes-Maeyers automatic Morse, duplex with alternating currents, and Siemens quad. Steljes failed to give satisfactory results in 1894. Nov. 15, 1897, was a red-letter day, for on this date the Baudot was installed between Rio Janeiro and Sao Paulo. This inauguration after severe trials met with success, for exactly four years later a similar communication was established between Rio, Bahia and Pernambuco, the distance covered being somewhere in the region of 1,000 miles. A further development became operative in 1903 in a southerly direction between Rio and Porto Alegre and by repeater to Curityba with extensions to Pelotas and Rio Grande. The town of Fortaleza received Baudot double (or triple) installation on April 15, 1905, bringing up the distance of lines covered by this successful system to approximately 3,500 miles. The Hughes as we know it, did not meet with the same degree of success. Installed in 1900 at the central office (Rio) and at Petropolis and Juiz de Fora it met with but very little success. The reason is not definitely known, but exponents of the Hughes art would undoubtedly ascribe technical difficulty and incomplete tuition or inaptitude of operators as having some bearing upon its shelved position.

With regard to external communication the directorship, maintenance, &c., is in the hands of several "Sociétés des Télégraphes." Northerly, the cables are under the auspices of the French Transatlantic Telegraph Co., whose cables land near Salinas and the State of Para, and the South American Co., and the Western Co., whose cables land at Pernambuco. In the Southerly direction transit is provided by the cable of the Western Co., and aerial wires by way of Uruguay and the Argentine Republic.

The Eastern Telegraph Co. also, through the mutual agreement of the governments of the three Republics, Brazil, Argentine, and Uruguay, in 1899 provided a very important link with the outside world. The object of the inauguration of the French Transatlantic cable was to facilitate communication between Viven (Para), and the U.S.A. Commencing activities in 1892 the cable end had to be shifted at least twice on account of the powerful current at the mouth of the Amazon playing havoc with the shore end.

It was finally restored in 1907. The overland route passes from Porto Alegre and by three channels, these being—(1) Normal, by way of the Argentine. (2) Appointed, through the medium of the Eastern Telegraph Co.'s lines. (3) Optional, by the lines of the National Telegraph of Uruguay.

Also, to provide against isolation consequent upon possible interruption of the recognised routes an auxiliary line can be linked up by way of Quarahy-Santo Eugenio.

Before the advent of wireless, following the introduction of the electric telegraphs, messages were transmitted to and from ships by means of an elaborate system of semaphores round the coast, these were all linked by telegraph or telephone to the normal land lines. The more modern means has now replaced or is replacing the older and more cumbersome system.

W. H. GATEHOUSE,

Cable Room.

THE TOLL EXCHANGE.

BY CAPTAIN J. G. HINES, M.I.E.E.

A NEW exchange has just been completed which embodies some unusual features, and it is thought that a brief description of the installation will be of interest.

Hitherto the telephone traffic in the British Isles has been divided into two main classes, viz., local and trunk. The former class comprises all calls which do not pass outside the telephone area in which they originate. Sufficient junctions are provided to enable the majority of these calls to be completed on a no-delay basis. The second class comprises calls from one area to another. In the case of the trunk calls a certain amount of delay has hitherto been recognised to be unavoidable during the busy hours, especially on the longer lines. The cost of erecting and maintaining these lines is so heavy that they must be kept busy in order to prove remunerative.

The division between the two classes of traffic above-mentioned is not very sharp. A special fee is charged when calls are made between certain exchanges in the same telephone area. This involves the use of a ticketing system. On the other hand there are some towns which have so much traffic that trunk lines have been provided on what is practically a no-delay basis.

The trunk lines terminate in London at the Trunk Exchange, which is situated at the G.P.O. South. Owing to the nature and value of the traffic carried on the long trunk lines each operator handles the calls on two or three lines only.

In order to deal with the growing traffic on the shorter trunk lines a suite of 80 sections was installed in 1912 at the G.P.O. South in a room adjoining the Trunk Exchange. The suite was given the name "Toll" to distinguish it from the main Trunk Exchange. The installation was entirely carried out by the Sectional Engineer's local staff, and it was understood then that it was of a temporary character only, and would be replaced by a permanent exchange to which all the short distance trunks would be connected, thus affording much needed relief to the main Trunk Exchange. During the respite afforded by the opening of the temporary exchange, investigations were undertaken to determine the best means of dealing with the traffic on the shorter trunk lines and the longer junctions. It was eventually decided to remove all the short trunk lines (*i.e.*, up to 25 miles in length) from the Trunk Exchange and to connect them to one or more Toll Exchanges to be established in suitable positions. Sufficient lines would eventually be provided to enable the toll circuits to be worked on a no-delay basis, and an adequate provision of local junctions with a suitable grade of transmission for the class of traffic would also be made.

The traffic on the trunk and temporary toll exchanges at the G.P.O. South grew so rapidly however, that it was necessary to take further steps to relieve the immediate pressure, and in 1914 an existing building was acquired in Norwich Street, Fetter Lane, in which it was proposed to instal some switch sections as a temporary measure of relief. The outbreak of war stopped the scheme and instead of the dulcet tones of the operators, the building resounded to the strident notes of the sergeant-major and the beseeching request—it could not be called command—of the embryo officer.

Neither staff nor material was available for proceeding with the scheme and the fall in traffic removed the immediate urgency. At the conclusion of the War the trunk traffic increased and the scheme was revived.

Drawings and specifications were prepared by the Engineer-in-Chief and a contract was placed with the Western Electric Company for the internal equipment.

Plans were also prepared for a cable scheme which would enable the selected circuits to be diverted from the G.P.O. South and would also enable additional circuits to be provided to the towns which were to be included in the toll scheme.

The scheme includes new cables to the following towns:—

Hatfield and Welwyn.

Bishops Stortford.

Dartford, Gravesend and Chatham.

Purley, Caterham and New Oxted.

Ascot, Egham and Staines.

Dorking, Leatherhead and Cobham.

Pinner and Chesham.

Uxbridge, Beaconsfield and High Wycombe.

Some trunk circuits will be carried in the above cables and in addition other cables are being provided which will carry trunk circuits only.

During recent years much experimental work has been carried out in order to improve transmission over underground conductors, and the results of this experimental work have been embodied in the specifications for the new cables.

Considerable difficulties were met with in the work of laying the necessary conduits between Norwich Street and the G.P.O. South. Not only does the route between the two buildings carry some of the densest vehicular traffic in the world, but beneath the surface of the roads there is a mass of pipes of all descriptions. In Holborn it was necessary to excavate deeply and to lay the new conduits underneath a nest of conduits which had been laid by the Post Office some years ago. Still greater difficulty was met with in Ludgate Hill where gas mains, water pipes and sewers have had

to be diverted in order to find space for the Department's conduits. The difficulties have been surmounted, however, and a very valuable route has been secured. Opportunity was, of course, taken while the ground was open to provide sufficient conduits for the expected local, trunk and pneumatic tube development on this route.

Junction cables have been drawn in between the Toll Exchange and certain junction cable centres. Provision has also been made for extending to the Toll Exchange certain toll circuits which are carried in cables connected to the Trunk Exchange.

The actual number of toll circuits connected to the exchange at the opening is approximately 350 and the number of junctions is 600. On the completion of some cables now in hand the number of toll circuits will be increased to 540.

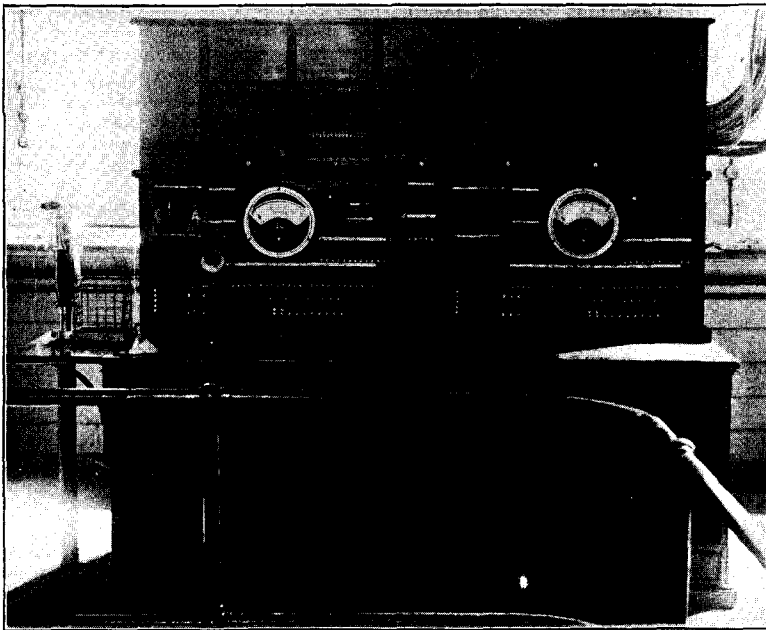


FIG. 1.—TEST DESK.

In anticipation of the opening of the exchange in Norwich Street, the name of the temporary exchange at G.P.O. South was changed from "Toll" to "Annexe" and the suite of sections will serve as an overflow to the main Trunk Exchange.

As the acquired building had not been designed for telephone work the exercise of some ingenuity has been necessary in order to use the space to the best advantage. The power plant, distribution frames, test desk, batteries, repeating coil and relay racks are on the ground floor. This plant is generally of standard design with modifications to suit the particular equipment and class of circuit. The two main batteries each have an ampere hour capacity of 1,750 hours, and are fully equipped. The voltage is 22. Two auxiliary batteries are provided each having a capacity of 315 ampere hours. There are two motor generators each having an output of 260 amperes at 26 volts.

A novel feature is the provision of a test cabinet over the test desk through which all the toll circuits are led on break jacks. It is thus possible for the testing officer to test both the internal and external portion without moving from the desk or obtaining special connexions. (Fig. I).

The switch sections are located on the third floor and on a gallery which partly surrounds this floor. Fortunately the natural lighting is fairly good, although the positions of the lights are not arranged as they would be in a building specially designed for telephone work. (Fig. II).

The switch sections are of the Number 10 C.B. type with two panels per section, each section forming one position.

Sixty of the sections are equipped with 10 answering jacks and lamps for incoming local junctions. These sections are termed "Control" positions. They are equipped with 12 cord circuits each and have a capacity for 17. Provision is made for concentrating all the incoming jack-ended junctions upon 20 selected positions at slack periods.

Thirty sections are each equipped with 20 answering jacks and lamps for incoming toll lines and are provided with 17 cord circuits per position.

Provision is made for concentrating the incoming toll lines on 10 sections when required.

Three sections are equipped with 30 plug-ended junction circuits and will be used for circuits incoming from the Trunk Exchange.

Two six-panel multiples are provided. The upper is for junctions to local exchanges and comprises 500 jacks per multiple. The lower is for working to provincial exchanges and also comprises 500 jacks per multiple, but is divided into two parts. One part containing 380 jacks is further divided into groups of four working lines and one test jack. The latter, which is the first jack of the group, will test engaged if all the four working lines are in use. The test jack is fitted with a metal plug of conical shape to facilitate the operation of testing.

The second part of the multiple, containing 120 jacks, is not provided with group testing jacks.

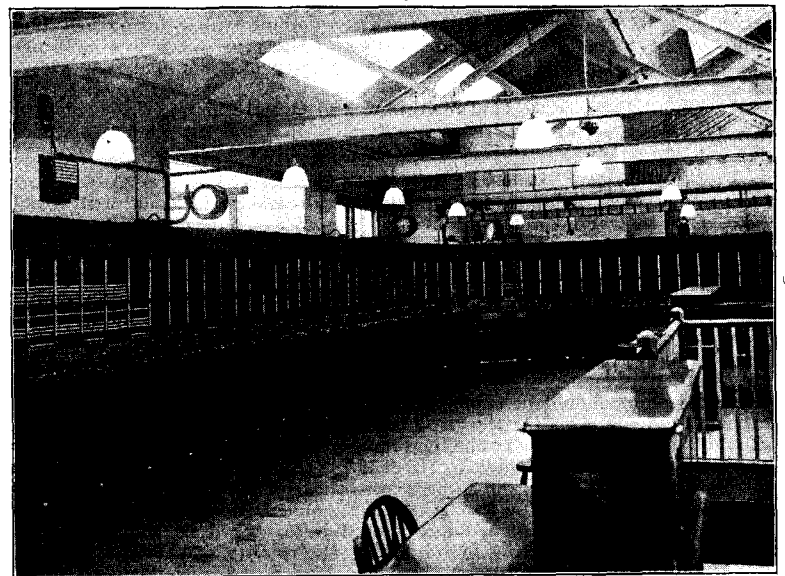


FIG. 2.—PORTION OF SWITCHROOM.

The two parts of the multiple are separated by a spacing strip.

Two one-position and two four-position desks are provided for supervising purposes.

The number of different electrical circuits of varying degrees of intricacy is over 70. This is not great compared with some exchanges, but is an indication of the complexity of a modern telephone exchange compared with those that were constructed 25 or 30 years ago, when the number did not, as a rule, exceed half-a-dozen.

THE REVISED SYSTEM OF DELIVERING TELEGRAMS.

BY MAJOR A. A. JAYNE, D.S.O., O.B.E., M.C.

THE authority given by the Postmaster-General recently for the introduction of the Revised System of Delivering Telegrams marks an advance for the Telegraph Service more far-reaching than the local character of the change indicates. It is true that an improved delivery service will result, in addition to a large annual saving, but above all it points the way to a better regulation and control of traffic than has ever yet been contemplated in our Service. We will first of all look at the Revised System. It is based upon the following principles:—

A. The division of telegraph delivery areas into definite walks radiating from the delivery office so arranged that the time occupied for each walk will be so far as local conditions permit of approximately equal duration.

B. A pre-arranged time table for the despatch of the messengers on their walks.

1. Messages will be despatched from the sending-out point in the delivery room at intervals of 10 minutes in the case of Head Post Offices and Branch Offices where the traffic is received by tube from the Central Office, and at 15 minutes' intervals at Branch and Town Sub-Offices where the traffic is received by wire.

In connexion with A. the delivery area should be divided into walks after the density and direction of the traffic has been ascertained. For this purpose returns showing the time of receipt at the sending-out point and particulars of the "address to" should be taken for the *busy hour* on three representative days of the week. The direction and density of traffic for each 10 minutes, or 15 minutes' interval should be plotted on maps of the whole area by means of coloured pencils; each interval being indicated by red, black, violet, green, blue, and yellow pencils respectively. A separate map for each day is required. When the average density and direction of the busy hour traffic for the three days has been ascertained the probable duration of the journeys should be estimated and the proposed walks radiating from the delivery office should then be marked on a delivery map. At some offices the direction and density of the traffic are already known and in this case walks should be marked off on a delivery map without returns. Observations will reveal the need for any adjustments of boundaries. It is important that the maximum number of walks for the busiest hour should be taken as a basis. It will then be easy to combine walks during less busy times of the day and during slack periods of the year, when less messenger force is required, while maintaining the integrity of the walks. At Class I offices and other similar busy offices certain walks have dense zones. The walks should then be divided into Inner and Outer Zones. The whole walk being sent out say at 11.0, the Inner Zone at 11.5 and the whole walk again at 11.10 and so on.

In cases where batches of messages are delivered to the same address (e.g., commission agents), the number of addresses to be dealt with should be taken into account and not the actual number of telegrams delivered.

2. As regards "B." The messages as they arrive at the sending-out point should be sorted into shallow trays corresponding with the walks and entered as soon as possible on the messengers' dockets (T. 155) by the sending-out officer. At busy delivery offices the sending-out officer should be assisted by a messenger whose knowledge of the delivery area would enable him to sort the messages. It is convenient to have separate trays for addressees who receive large batches of messages in order to obviate subsequent sorting by messengers. The messengers should be despatched promptly in accordance with the time table. Immediately after the departure of one relay of messengers the next should hand their dockets to the sending-out officer and take up their positions near the sending-out point. "Urgent" (triple-rate) and other special telegrams should be sent out *at once* but other telegrams for the appropriate walk may be delivered after the "Urgents." Where there are many "urgents" one or two extra messenger-hours should be arranged so that the special journeys have the effecting of improving the quality of service.

3. As a preliminary to the permanent adoption of the system the following procedure provides a ready means of obtaining statistics for calculating the staff required on delivery work. After arrangements have been made as in 1 and 2 the system should be brought into force for three full consecutive days with the normal messenger force on duty and returns taken in the form shown on Appendix A. A summary of the information shown on Appendix A should be prepared on Appendix B.

4. The result of the preliminary trial (paragraph 3) may necessitate some adjustment of boundaries either for the purpose of equalising the duration of journeys or for effecting reductions of force. Full sorting should be maintained throughout the day, but the returns will show the extent to which walks may be combined during the slack hours. It follows that the full force of messengers will not be required for delivery purposes during the less busy hours, and it is during these periods that resting time, meal reliefs, and educational facilities where given in official time should as far as possible be arranged.

5. At many offices the demands of Express Letter Services present difficulties in the maintenance of a sufficient number of messengers for telegraph delivery work.

As regards Service I it has been found economical to have the Express Letters brought from the counter to the delivery room where, if they fall within the normal telegraph delivery area, they are sorted to the walks and sent out with the next periodical despatch. If they are outside the area and the use of public conveyance all the way is necessitated they should be sent out at once; otherwise they should be sorted to the most appropriate walk. In cases where requests for Express Messengers are received by telephone, the address of the Express packet should be ascertained to enable the sending-out officer to determine whether it should be brought to the delivery office for sorting or delivered direct. Where necessary, one or more messengers should be allocated for this service throughout the day in order that the regular walk arrangements may not be unduly disturbed.

Service II. These letters if for an address within the normal delivery areas, should be sorted into the ordinary walks for delivery. If outside, they should be included in the most appropriate walk. If this is done during the preliminary trial the average duration of journeys will automatically include this service.

6. In order that there may be no leakage of messenger force it is important that certain services such as the following should be organised and the walk system used to the fullest possible extent.

- (i) Telegrams for the Postmaster's offices or other offices in the building should be sorted into walk No. 1, and central points at which telegrams should be left for various branches or sections should be arranged and notified to the sending-out officer.
- (ii) Telegraph Money Order advices, should be delivered to the proper officer at the counter and the messenger should at once proceed on his walk. When the necessary order for the payee has been prepared it should be sent to the delivery room for ordinary treatment.
- (iii) Requests to the delivery room for messengers to convey letters and packets specially to offices within the building or to subordinate offices outside should be restricted as far as possible. All covers of an urgent character should be sent to the delivery point for inclusion in the usual walks. Non-urgent communications should fall into the ordinary postal delivery.

7. In connexion with the study of the foregoing method of delivery, the average time occupied in delivery to addresses under both the present and the new system should be ascertained.

8. At offices where the walk system of delivery has been tried it has been practicable to suspend certain branch and town sub-office deliveries by the concentration of the delivery work upon the Head Office. The total transit time of telegrams has not been materially increased while economy has been effected inasmuch as both telegraph transmissions have been avoided and messenger force saved.

A very senior p.s.c. staff officer once remarked to me that "the worst of technical services is, that they always quarrel among themselves." In the Post Office we do not exactly quarrel but we are all so frightfully enthusiastic about our own particular way of looking at problems that we are inclined to become somewhat parochial in our outlook. This cannot be said of the attitude adopted by responsible officers all over the country, in regard to the Revised System when it was first tried. Certainly, it was pointed out that a neighbouring hilly town would be more suitable for the system than the flat town we were in and *vice versa*, and in other places that the traffic was too dense or not sufficiently dense, in short that in other towns it would be quite practicable but not in the particular one under notice for some abstruse reason. As soon as a short demonstration was made, however, nobody could have been more helpful or enthusiastic than the local officials.

As regards paragraph 1 above, it is quite clear that the average sending-out times are improved, if times under the old system are impartially compared with those of the new. Whatever system is used there is a certain amount of preparation work to be done, such as sorting into routes, entering on dockets, &c. This is not delay any more than any other necessary treatment during the transit of a telegram. Under the old system there was no prearranged route—the route of the messenger was determined by the addresses of the telegrams on hand and when the messenger had been despatched a fresh route was made up. In what manner succeeding routes clashed with those that had gone before no man knoweth, but it was fairly indicated by the puzzling mystery of three or four messengers strolling down a street together. However, everybody was quite happy if the few messages actually being dealt with were sent out comparatively quickly regardless of the delay accumulating in the message cage. It was based on the theory of individual delivery which like other theories did not evolve into practice. And then came that awful period of messages waiting and no messengers! What was the explanation?—"shortage of messengers." Does not everyone know too of the times when messengers would be sitting down, idle, and no messages to be sent out—always the occasion for an Inspecting Officer to come round and demand reduction of force; and how between the requests for increased force and reduction of force everybody concerned "gave it up." Now, however, the routes are prearranged by means of walks, there is a fixed interval at which batches are to be despatched; and the average time within which the messages are to be sent out is laid down. Leaping into the dark should be a thing of the past, as should be shortage of messengers, while it ought to be a very long arm of coincidence to account for messengers walking or cycling on a route together. In some cases different series of walks have to be arranged at different hours of the day, for example, the delivery from the C.T.O. at different times of the day is affected by Billingsgate, Smithfield, the lunch hour, Stock Exchange opening, and the like.

APPENDIX A.

Office..... Date.....

DELIVERED TRAFFIC RETURN.

Hour.	WALK No. 1.			WALK No. 2.			WALK No. 3.		
	Messengers' No.	No. of Messages.	Time of Messengers' return.	Messengers' No.	No. of Messages.	Time of Messengers' return.	Messengers' No.	No. of Messages.	Time of Messengers' return.
8. 0	Examples :— 12	S1	9.10	—	—	—	—	—	—
8.10	22	4	8.35	18	3	8.29	14	5	8.36
8.20	13	3	8.45	11	(3) + 2	8.40	16	2	8.50
etc.		1E)						2E)	

NOTES :—

- S. Indicates Express letter sent out specially under Service I.
- E. Signifies Express letter sent out with a batch of telegrams.
- (3) Signifies 3 telegrams for one address. To be counted as 1 in the Summary.

APPENDIX B.

Office..... Date.....

SUMMARY OF DELIVERED TRAFFIC RETURN AND DELIVERY FORCE REQUIREMENTS.

Hour and Number of Journeys.	Number of items delivered :— See Appendix A.			Total time occupied in delivery.	Average duration of journey.	Average number of addresses per journey.	Number of Messengers required each hour.					Existing Messenger Force.
	Telegrams for separate addresses.	Express Letters delivered.					In respect of Column (5)	As an addition to Column (8) for rest during slack hours.	For educational facilities (where given in official time).	For meal reliefs.	Total	
		In walks.	Specially (Service I)									
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	

NOTE :—The periods covered by columns (10) and (11) are to be taken into account as resting time.

It should be made quite clear that the " Revised System " is not one that should be started off and then left severely alone. It requires regular and frequent overhauling at every office ; traffic observation in this direction will be remunerative and Appendixes A and B have been designed to make it easy.

The time table is really the basic principle of the system. Without this no proper method can be introduced. Life cannot be imagined without time tables, and it is difficult to visualise a proper messenger delivery service at a busy telegraph office without them. Here at once there is an objective for telegraph offices to work up to. At every office there should be a standard time for a message to be collected from the circuit, taken to the circulation table, addressed and enveloped, and despatched to the delivery room. That is to say, at a fairly large office that has despatches every 10 minutes, messages received at circuits at 11. 57 should be received in the delivery room in time to catch the 12 o'clock despatch. I can hear my readers saying " there is the weakness, the messages received at 11.58 will not be despatched until 12.10 p.m." That is so, of course, and my reply is that under the old system it would probably not be despatched until after 12.10 p.m. Having regard to all that depends upon the System, staff matters, efficiency, standards of working, &c., it is surely better to have an average sending-out time from circuit time of say 6 minutes, than for a few messages to go out with 6 minutes' transit time and very many more with 15 minutes and over.

Paragraph 2 provides much needed relief to sending-out officers at busy delivery offices. Instead of mental gymnastics in order to find the best combination of telegrams for routes, particularly in cases where the sending-out officer does not know the area, efforts to find the messengers next for going out, dealing with the boys continually returning, meeting demands for messengers to go on express services and so on, the sending-out officer will have a properly regulated interval in which to prepare his next despatch. Compara-

tive calm will reign in the delivery room, for the last boy in will take his seat next to the messenger who returned just before him and then when the despatch is made, the next relay of messengers will move up to the best position for the sending-out officer.

Paragraph 6. For some mysterious reason everybody has the idea that a messenger's time is not worth very much and that, therefore, his services may be most generously taken up for all sorts of minor tasks. As a matter of fact an effective messenger hour costs the Post Office something in the neighbourhood of 2s., and I hope this fact will cause all concerned to see that it is not frittered away. A messenger should not be put on a duty where he can only occasionally do something useful. A great deal of the economy effected under the scheme is due to the attack it automatically makes on the leakage of messengers from their proper work of delivering telegrams. At many offices it is the practice to ring a bell for a messenger to take a note or a return, frequently of no urgency, to another part of the building, a small parcel of stationery to a sub-office or a bundle of forms to another Department. Where the new system is properly brought into force, that is to include all such missives in the walks, the amount of leakage that must have taken place under the old system can be seen at once.

Paragraph 8 is most important. It will often be found that telegrams can be delivered quicker from the Head Post Office than from a local Branch Office if internal circulation and line time are taken into account. The economic gain is obvious.

As already indicated the principal advantage of the Revised System is derived from the fixed time table. The time table could have been fixed at any interval desired, but there must be a time table. It discloses the weak spots and renders a correct revision of force an easy matter ; without it there is no basis upon which an efficient delivery service can be built up.

(To be continued).

MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

By F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

(Continued from page 173).

The valve is joined up as shown in Fig. 14. The filament is made to glow by the battery B_1 , the strength of the heating current being controlled by the adjustable resistance R . The grid is joined to one side of the condenser C_1 , and the other side of this condenser is joined to the filament, not directly, but through the potentiometer R_1 . By means of this potentiometer the potential of the grid can be brought to any desired value above that of the negative end of the filament, up to the limit set by the electro-motive force of the battery B_1 , the connection between the slider of the potentiometer and the grid being by way of the coils S_1 and P_2 .

The high tension battery B_2 has its positive pole joined to the anode of the valve through the coil S_2 , while its negative pole is joined to the negative terminal of the filament.

The potentiometer R_1 is adjusted so that the grid is brought to a potential corresponding to about the middle of the steep part of the characteristic curve of the valve. For the curve in Fig. 13 this potential would be about a quarter of a volt. The anode current which will flow through the valve can then be read off the curve. For Fig. 13 its value would be 0.35 milliamperes.

The anode current will remain steady at this value as long as the grid potential remains unchanged. Any alteration in the grid potential, however, will have an immediate effect on the strength of the anode current.

When signals are being received, and the intermediate circuit is set into oscillation, the potential between the plates of the condenser C_1 will oscillate, the potential of the plate joined to the grid being first a certain amount above and then nearly the same amount below the potential of the plate joined to the filament, and so on alternately as long as the oscillations last. These alternating potentials will be super-imposed on the steady potential given to the grid by the potentiometer. Suppose the potential of the grid alternately to rise and to fall by a quarter of a volt, that is first to rise half a volt above the negative end of the filament, and then to fall to the same potential as the negative end of the filament. Referring again to Fig. 13, the effect of these changes in the grid potential will be that the anode current will alternately rise to about 0.41 milliamperes, and fall to about 0.29 milliamperes, a change in each direction of about 0.06 milliamperes from its steady value of 0.35 milliamperes.

Since the characteristic curve is a straight line for some distance on either side of the point to which the grid voltage is adjusted by the potentiometer, it follows that the changes in the anode current produced by fluctuations in the grid voltage will be proportional to these fluctuations, so long as they are not great enough to reach the parts of the curve where it begins to bend over. That is, because a change in grid voltage of a quarter of a volt in either direction produces a change of 0.06 milliamperes in the anode current, a change of grid voltage of one eighth of a volt will produce a change in the anode current of 0.03 milliamperes, and so on.

Consequently, any regular or irregular changes of grid voltage whatever within the limits mentioned will cause exactly similar fluctuations in the anode current. If both the grid voltage changes and the resulting anode current fluctuations be plotted as

curves in the ordinary manner, the horizontal scale of the curves representing time, these curves will be of exactly the same shape.

This proportionality between grid voltage and anode current is of special importance in connection with wireless telephony, as will be explained later.

The pulsations in the anode current will occur in step with the variations in the grid potential, which latter occur at the same frequency as the oscillations in the circuit $S_1 P_2 C_1$. The anode current pulsations in the coil S_2 set up alternating electro-motive forces in that coil by virtue of a property called its "self induction," the electro-motive force being in the same direction as that in which the anode current is flowing when a pulse of anode current is diminishing in strength, and in the opposite direction when a pulse is increasing in strength.

Because of the steepness of the slope of the characteristic curve, however, a small change in grid potential will produce a comparatively large change in anode current. As a result of this the electro-motive forces set up in S_2 by the pulsations in the anode current will be considerably greater than the potential changes at the grid by which they are originated. Thus we have alternating electro-motive forces set up in the circuit $S_2 C_2$ of the frequency to which the circuit $S_1 P_2 C_1$ is tuned, and therefore also of the frequency to which the circuit $S_2 C_2$ is tuned, because, as explained above, all three oscillatory circuits in the receiving apparatus are adjusted to the frequency of the incoming signals. The connexions of the apparatus are so arranged that the successive pulses of the oscillatory electro-motive forces set up in this way in the coil S_2 occur not only at the same times but also in the same directions as those of the other electro-motive forces in that coil induced directly from the oscillations in the coil P_2 . Thus the two oscillatory electro-motive forces in S_2 assist one another in setting the circuit $S_2 C_2$ into oscillation, and the amplitude of these oscillations will be considerably greater than that of the oscillations which would be set up by the unaided electro-motive forces induced in the coil S_2 from the oscillations in the circuit $S_1 P_2 C_1$.

But the increase in the strength of the oscillations in the circuit $S_2 C_2$ does not end at this point. The oscillations in $S_2 C_2$ will react back on the circuit $S_1 P_2 C_1$ across the oscillation transformer $S_2 P_2$. The connexions of the apparatus are so arranged that the electro-motive forces set up in the coil P_2 by this reaction help the oscillations which have already been set up in the circuit $S_1 P_2 C_1$. Consequently the amplitude of these oscillations is increased, the potential changes applied to the grid become greater, and these give rise to larger pulsations in the anode current and more intense oscillations in the circuit $S_2 C_2$.

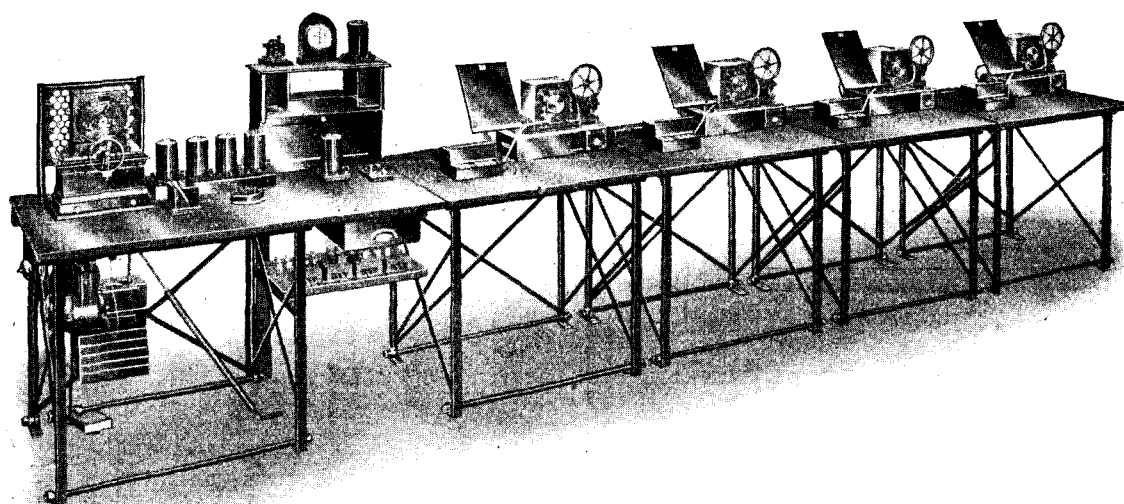
The same train of actions is then repeated, and the amplitude of the oscillations in the circuit $S_2 C_2$ continues to increase till the energy losses in the various circuits due to resistance, &c., which increase more rapidly than the current increases, just balance the energy supplied to the circuits from the high tension battery and from the incoming signals. Thus the amplitude of the oscillations in the circuit $S_2 C_2$ is very much greater than it would be if the valve were not used, and as a consequence the signals in the telephones are very much louder.

For receiving spark signals the circuits are so adjusted that directly the supply of energy from the aerial due to the incoming signals ceases, the energy losses in the various circuits are greater than the supply of energy from the high tension battery, and so the oscillations stop. It is possible, however, by making suitable adjustments, to arrange that the energy losses may be completely made good by the supply from the high tension battery. In these circumstances the circuits are in a state of unstable equilibrium, and the least electrical disturbance will cause the oscillations to start. In fact, with the proper conditions it is not possible to avoid starting the oscillations. Once started, they will build themselves up till the stage is reached at which the loss and gain of energy just balance, and then they will continue with a constant amplitude.

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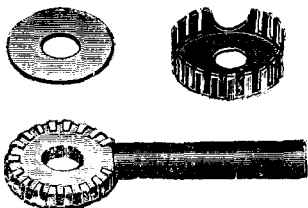
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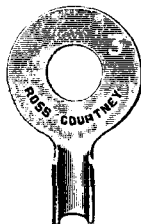


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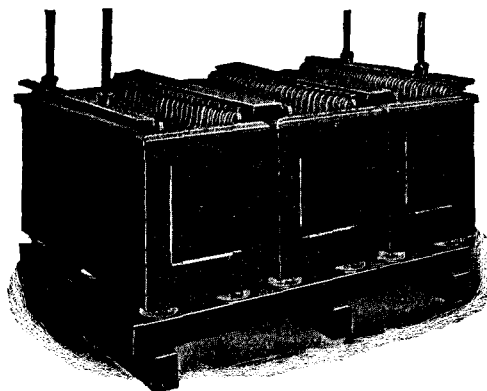
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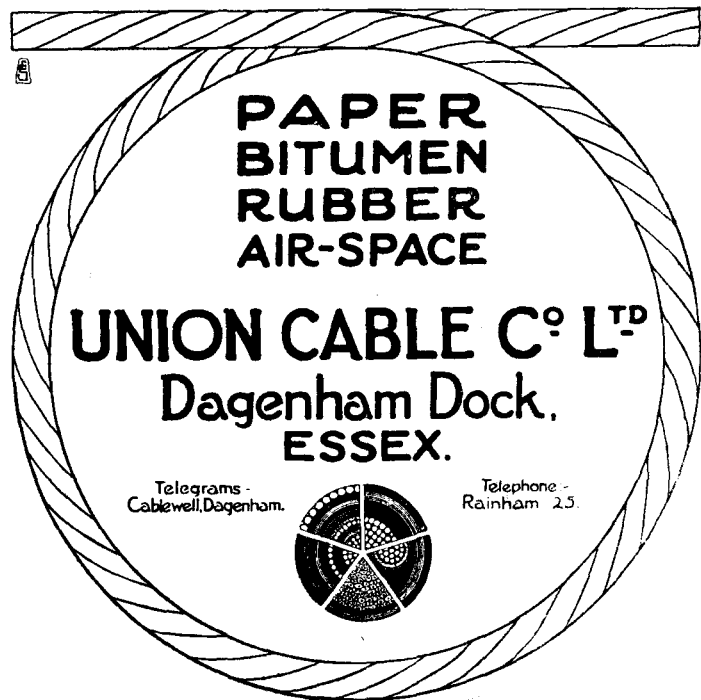
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These conditions are not required for the reception of spark signals. They are, however, required for the reception of continuous wave signals, and for the generation of oscillations for transmitting purposes, as will be explained later.

The condenser C_4 (Fig. 14) joined across the high tension battery B_2 , is to facilitate the production of the pulsations in the anode current. This condenser is kept charged by the battery B_2 , and may be looked upon as a battery of low internal resistance. As the effective resistance of the valve rises and falls as the grid potential varies the anode current is varied in a corresponding manner by the discharge from the condenser, the charge in which is replenished by a more or less steady flow of current from the battery B_2 .

Rectification.

In the receiving set just described the valve was employed to amplify the received oscillations before they were rectified by the crystal detector and so rendered audible on the telephones.

It is possible to use a valve in place of a crystal detector for rectifying the signals. When this is done an increase in the signal strength can also be obtained, if a suitable valve used under proper conditions be employed.

Referring to the diagram of the crystal detector, Fig. 10, it will be remembered that, when signals are received, oscillations occur in the closed oscillatory circuit. These oscillations cause alternating potential differences to be set up between the plates of the condenser in that circuit. The crystal detector, potentiometer and telephones are joined across the condenser, and since the potentiometer has been adjusted so that the steady voltage applied to the crystal detector is that at which the characteristic curve, Fig. 9, bends up sharply, these oscillations will be rectified, as already explained, and a sound will be produced in the telephones.

The crystal detector characteristic curve shows the connexion between the voltage applied to the crystal, and the current through the crystal and telephones. The action of the detector depends on the existence of the sudden bend in the curve. The characteristic curve for a valve, Fig. 13, shows the connexion between the voltage applied to the *grid* and the current flowing in the *anode* circuit. It will be seen that there are two bends in this curve, one at about -2 volts grid potential, and one at about +2 volts grid potential. If the grid voltage be adjusted to -2 volts a very small anode current will flow. An alternating voltage superimposed on this steady voltage will cause a considerable increase of current when the voltage pulse is in the positive direction, but there will be only a slight diminution of current when the voltage pulse is in the negative direction. Thus the effect in the anode circuit when an alternating potential is applied to the grid will be similar to that produced when an alternating voltage is applied to the crystal. Unidirectional pulses of current will be set up in the anode circuit, and these can be caused to effect a telephone, as in the case of the crystal detector.

If the grid voltage be adjusted to about +2 volts, then a negative voltage pulse on the grid will cause a considerable decrease in the anode current, while an equal positive pulse will cause only a slight increase in the anode current. An alternating potential applied to the grid will thus produce pulsations in the anode current below its normal value. A telephone in the anode circuit will be effected by the diminution in the current, and the signals will be reproduced. It must be remembered that a sound is produced in a telephone by either an increase or a decrease in the current flowing through its coils.

The connexions of a receiving set using the method just described, which is known as "anode rectification," are shown in Fig. 15. The arrangement of the various oscillatory circuits is similar to that already described. For simplicity only the aerial oscillatory circuit and one closed oscillatory circuit are shown. An intermediate oscillatory circuit, similar to that shown in Fig. 14, could of course

be introduced. The grid of the valve is joined to one side of the condenser, C_1 , of the final oscillatory circuit, the other side of this condenser being joined to the slider of a potentiometer R_1 . B_1 is the filament heating battery, and B_3 is an extra battery joined in series with B_1 . The potentiometer resistance R_1 is joined across both B_1 and B_3 . The addition of B_3 enables potentials lower than that of the negative end of the filament to be applied to the grid.

By this means a sufficient range of voltage is available on the potentiometer to enable either bend in the characteristic curve to be used, as may be desired.

The positive pole of the high tension battery B_2 is joined through the telephones to the anode of the valve. The negative pole of B_2 is joined to the negative terminal of the filament.

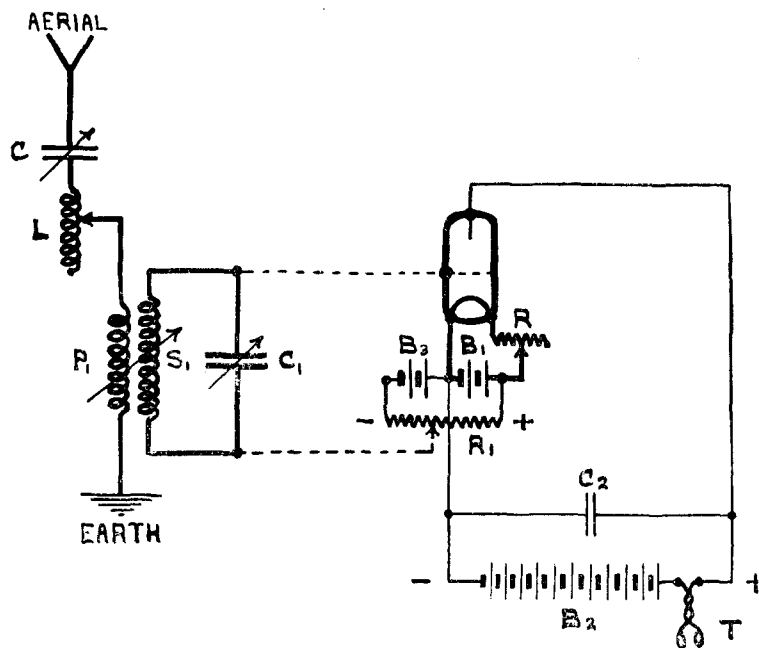


FIG. 15.—ANODE RECTIFICATION.

Across both the high tension battery and the telephones is joined the condenser C_2 . When signals are received the alternating voltages across C_1 will be applied to the grid, and, as described above, the anode current will be caused to pulsate. As explained in the case of the high frequency amplifier, Fig. 14, these pulsations will actually be supplied by the condenser C_2 joined across the high tension battery, and the charge in this condenser will be adjusted by a steady flow from the battery. Since the telephones are joined in series with the battery, the change in the current through them due to this adjustment of the charge in the condenser C_2 will cause a sound, and so the signals can be read.

In the crystal detector the energy of the received signals is directly applied to the telephones. With the valve detector just described the energy applied to the telephones is drawn from the high tension battery, the received signals being used only to control the supply of this energy. Consequently, with proper adjustments, considerably greater energy can be applied to the telephones by the use of a valve detector than would be possible with the crystal detector, a corresponding increase in the strength of the signals being obtained.

In Fig. 15 the voltage applied to the grid is that due to the incoming signals alone. It is, of course, evident that a high frequency amplifier could be applied to the oscillatory circuits, as in Fig. 14, to increase the voltage applied to the grid and so to increase still further the loudness of the signals in the telephones.

The
Telegraph and Telephone Journal.

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

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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. VII.

SEPTEMBER, 1921.

No. 78

OUR SEVENTH VOLUME.

THE present issue completes our seventh volume, recording the progress of a year during which much sharp criticism has been continuously levelled at the Post Office and all its works, and more especially at the Telephone Service. Criticism is doubtless good for our moral health, provided it be fair. Unfair criticism, and it has been plentiful, we have endeavoured on occasion to rebut; but with a Parliamentary Enquiry sitting on the telephone question, many points on which we should have liked to touch, we have, perforce, as a semi-official journal, had to consider as *sub judice* and to leave alone. Amidst a clamour on the whole unfriendly and discouraging, the whole staff of the Post Office have one aim in view, namely, the improvement of the service, and reference to our pages will show that a gradual reversion to pre-war standards of operating has been achieved, that the system has steadily increased, notwithstanding set-backs due partly to the trade depression consequent on the long-extended coal strike and the cessations due to the new rates. As far as can be estimated from the latest returns the number of telephone stations at the end of July will show an increase of about 25,000 on the total at July 31, 1920.

In the Telegraph Service many pre-war facilities have been restored to the Press and the public. The Anglo-Continental Service has been extended, the channels to Holland have been increased, and direct circuits provided to Dresden, Prague and Leipzig. Siemens fast speed apparatus has been introduced on the London-Berlin Service, and Baudot working on the London-Hamburg and London-Berlin lines. Direct wireless working between London and Berlin has also been successfully established, and it is hoped shortly to open a high-speed Wheatstone wireless service to Cologne. Meanwhile experiments are proceeding for the application of tape-perforating on the Anglo-Continental Service.

We have to record with great satisfaction a steady flow of interesting contributions from all grades of the staff. Our articles have come from the pens of high administrative and engineering officials, traffic officers, clerks, engineers, contract officers, telegraphists and telephonists of all ranks. This is a gratifying fulfilment of the scheme of the JOURNAL which was to form an open court for discussion and exchange of opinion by all members of the staff. Wireless questions, as is naturally, since they loom so large in the prospect at present, have played a greater part in our pages than heretofore, while we have endeavoured to keep our readers informed of the principal happenings in the telephone and telegraph services abroad. As regards the former it will have been observed that, as a result of abnormal economic conditions everywhere, greatly increased rates are the almost universal rule. We have regularly recorded the sports and social doings of the staff, and especially the endeavours in the cause of charity which are so much to the credit of the telephonists.

We look, therefore, to the future with every confidence, and trust that our contributors and well wishers will not relax their efforts in bringing matters of interest and instruction to our notice. We should like to see the JOURNAL circulate more extensively in the smaller provincial towns, especially those which have no District Manager of Telephones. We feel assured that telegraphists in the smaller places would find much to interest them in the JOURNAL; and, above all, it is our desire that its space should not appear to be monopolised by London and the larger cities.

HIC ET UBIQUE.

THE Leaffield Wireless Station, Oxfordshire, was opened on Aug. 18. The station, which has been entirely designed by the Post Office, will communicate with the corresponding station at Abu Zabal, near Cairo. The Postmaster-General sent the first messages from the station to all British and foreign telegraph stations within range. Within half-an-hour replies were received from Malta, Paris, Christiania, Posen, Prague, Denmark, Budapest, Rome, and Berlin. It is hoped to have a descriptive article on the Leaffield station in an early issue of the JOURNAL.

MR. V. M. BERTHOLD, of the American Telephone & Telegraph Co., has kindly sent us a short history of the telephone and telegraph in the Argentine Republic which he has written. The pioneer of land telegraphs in that State was the Western Railway who opened a short line in 1857; and a submarine telegraph to Monte Video was opened in 1866. Communication between Buenos Aires and Rosario was established in 1868. The total telegraph mileage in 1919 was 268,863 km. Telephone service was opened by private companies in Buenos Aires in 1881, but in 1886 the companies amalgamated and were taken over by an English company, the United River Plate. This Company now has about 80,000 stations, and a Co-operative Society about 8,000.

THE new German telephone rates to which we referred in our last issue have been approved by the Reichstag and will come into force on Oct. 1 next. We have also received full particulars of the new Austrian rates. In Vienna a subscriber making 40 calls a day pays 36,000 kronen, making 24 calls he pays 14,400 kronen, and making 12 calls a day 6,840 kronen. It seems useless to try and convert these charges into English currency at the present fluctuating

rates of exchange, but if the krone is worth only a halfpenny in spending-power to the Viennese subscriber, he pays £75 a year for a service including 40 calls a day, or £14 5s. for 12 calls a day.

WE observe that Capt. Walter Elliot, M.P., has suggested the provision of jazz-bands for the recreation of jaded telephonists and other postal workers. Can it be that Capt. Elliot has dipped into No. 53 of the JOURNAL and lighted on the verse—

“That Illingworth foldeth his hands
While his flappers are flirting, or follow
The lure of Jazz-bands!”

Or were we prophetically inspired in 1919?

SOME of the contemporaries, commenting on the recent tax on wireless plant in France, adopted different methods of converting the charge (10 francs) into British currency. The *Daily Mail* and the *Evening Standard* arrived at results of 8s. 4d. and 8s. respectively, while *The Times* quoted 4s. 5d. The calculations being made on the same day (July 23) are strictly comparable; and Smith Minor is also anxious that his “pot shot” may be regarded as a serious calculation.

Our readers are probably aware that the Madrid International Conference adopted a mint par rate of exchange of frs. 25.18²⁵ (gold)=£1. And on this basis, francs 10=7s. 11.3d.

WHAT ZAZA SAID TO ADRIAN.

In the House of Commons yesterday, the Postmaster-General told a story against the telephone system of a much-worried Member of Parliament who crawled home through the dawn, very tired after an all-night sitting. He had just tucked himself comfortably under the blankets when the telephone bell began to ring downstairs. Cursing, he answered it and received the message in a feminine voice completely unknown to him: “Adrian, I am now ready to come home.” “Who are you?” he asked. “I am Zaza,” said the lady. The Member never knew who Zaza was, but Mr. Kellaway said his story illustrating the difficulty of distinguishing between nine and five in a telephone number during the early hours of dawn.—(*Northern Daily Mail*.)

Oh, never since romance began
A mystery our soul has vexed
Like that suggested by the text:
What Zaza said to Adrian.

We have a Woman and a Man,
A pair of Telephones—but that
Yields little clue for guessing at
What Zaza was to Adrian.

In vain the brief remark we scan:
“I am now ready to come home,”

For who could make a decent poem
On Zaza's words to Adrian?

Had she eloped with Florestan,
And, harrassed by repentance wild,
Bethought her of her blue-eyed child
And telephoned to Adrian?

Conceive her feelings, if you can,
When in the dawn, long after two
Some Member bellows: “Who are you?”
Some Member, and not Adrian!

Or was she merely of that clan
Who dance all night, and then expect
A toil-worn husband to collect
His Zaza—hapless Adrian!

We give it up; and rather than
Weave unsubstantial fictions round
A cross-connexion, say: “Confound
What Zaza said to Adrian!”

W. H. G.

TELEGRAPHIC MEMORABILIA.

STRANGE are the vicissitudes of International Telegraphy! It is an interesting comment on the condition of certain parts of Europe that, as one writes, one of the most reliable telegraphic routes between this country and Italy is actually that through Berlin and/or Frankfurt Main, the former for preference. This has very largely been made possible by a steady improvement in Baudot working between London and the German capital, and some excellent results between the two cities by means of the Siemens' system. Batches of Italian or Swiss traffic perforated in London, are run through a Siemens transmitter here prefaced by a note that the next 40, 50, or 60 telegrams, as the case might be, are destined for re-transmission. Berlin then brings his re-perforator mechanism into circuit, a new tape is automatically perforated which is taken to the Zurich circuit where the entire series is run into Switzerland. Beyond this point there are, it is understood, not infrequently considerable line difficulties, but the transmission through German territory into Switzerland has recently repeatedly proved a very considerable improvement upon the normal route *via* France. Obviously the latter, when workable, is to be preferred, and is quite capable of carrying the traffic now that London has direct communication by Baudot to four Italian cities as a normal daily program. Unfortunately of late it has proved a program and very little more owing to the unsatisfactory condition of the lines abroad.

The staff wastage, the fret, the wear and the tear upon the telegraphists whose duty it is to manipulate under the conditions of intermittently interrupted lines is a phase of international working to which more attention should perhaps be given. It could be easily proved that the time taken to transmit telegrams under conditions such as the writer has in mind represent the face value of the telegram dealt with twice or three times over, while the operator's *average* gives but the poorest indication of the energy and patience expended. It is one of those cases where figures tell only part of the truth.

Opportunity has been afforded for perusal of a Siemens telegraphic development under the name of the *Pendelfeder*, which appears to be an off-shoot of the Siemens telegraph system proper, somewhat after the principle of the “stop-start” device followed up by the Western Electric in the application of their system to small subscribers or private renters. The mechanical portion is extremely ingenious.

Baudotistes in these islands are familiar with the term of “All up,” which is an indication that synchronism has been lost, and that transmission is to cease temporarily. To the supervising staff the cry is by no means a comforting one, nevertheless, many have made the enquiry as to the origin of this technical phrase which appears to have no connexion with any portion of the apparatus. The explanation is simple. When the Baudot was first introduced into England the French instructor indicated by an upward movement of his hands that all the key telegraphists were to stop transmission. In imitation of the gesture all hands went up in the air, and the phrase “all hands up” soon followed. This was quickly reduced to “all up” and has so remained as a convenient form of warning and command.

A correspondent sends the following appreciation:

The C.T.O. lost a familiar figure and an officer of wide experience when Mr. W. J. Bond took farewell of the office on July 10.

He entered the Service Sept. 4, 1875, and as was the custom in those days, was quickly in the midst of the fray, attending his first race meeting at Newmarket on completion of one year's service.

From that time onward his experience was a wide and varied one. At one time or another he has taken charge of every Division (except possibly the old F.G.), passing through all grades until reaching that position of dignity, Assistant Controller, Provincial.

He was in every sense of the word well known to all and had the ability to perform his official duties without losing sight of the fact that his associates of whatever rank were of the same human family. He retires with the goodwill of a large circle of colleagues and sincere wishes for a long period of good health in which to enjoy the pension earned by his lengthy service.

With 45½ years' service to his credit, Mr. Charles Faunch retired on his 60th birthday, Aug. 18. Starting from the bottom rung of the ladder he had to climb up by the slow stages of those days, of Third, Second and First Class Telegraphist before he could “get out of the rut.” Promoted Overseer, 1897, it was nine years before the next stage, finally reaching the Superintendent Class A in 1918, and B the succeeding year. Our friend has thus served under five Controllers, viz., Messrs. Fischer, May, A. Eames, Newlands and Lee. Steady conscientious hard work has been the keynote of “Charlie's” official career added to which a kindly, cheerful disposition, made him one of the most charming of colleagues and the most tolerant of friends.

The London *Times* was good enough to publish the following appreciative paragraph:—

Lord Northcliffe's speech before the Canadian Club at Vancouver came to us through the Imperial Cable in the short time of 45 minutes, which, in these days of telegraphic delay, is a great achievement for that service.

The meeting of the Canadian Club in Vancouver was held at 1 o'clock in the afternoon—that is, 9 o'clock our time. A start was made with telegraphing the message at 2 o'clock (10 p.m. our time), and the full message was received in London at 10.45 (2.45 in Vancouver).

The deeply interesting account of the Imperial Wireless Station, at Leafield, Oxfordshire, by E. H. Shaughnessy, M.I.E.E., in the July number of the *P.O.E.E. Journal* provides much food for thought and not a little impetus to imagination. One cannot help throwing one's mind across the seas to the landing place of the first huge leap of the signal waves through space, *i.e.*, to Cairo.

What of the future of this untold wealth of possible means of communication when it is finally bridled, tuned, adapted, screened off from disturbances, and fitted with apparatus which shall soften into silence every half tone of unwanted vibration? Who can tell? Coming down to the practical side of actual facts the idea solidifies itself into one very serious thought of another nature. These power-houses, boiler, turbine, and condenser rooms, workshops, offices, turbo-generators, condensing plant, bungalows, aerial masts, &c., &c., representing thousands of pounds of capital expenditure, are all to concentrate their effort upon obtaining one single telegraphic channel, at most two, and the second channel means the erection and fitting up of another station at considerable cost. One's thoughts again turn to the ordinary submarine cable station from which it is possible to run quite a number of cables with at least two-channel circuits fitted to every cable core. With the possibilities which undoubtedly exist in wireless communications, common sense alone dictates that money should be spent on experiments but it is to be hoped that if all the hopes raised by fantastic newspaper articles are not fully realised the Government departments will not immediately be charged with the cry of "Waste" and "Wasters."

The Cable Room Annual Sports were held at the Grove Hotel, East Dulwich, on Aug. 5, and proved a complete success. The weather all but forgot to celebrate the occasion in the usual manner as it remained fine until the middle of the alfresco concert when it gave a sharp christening to the company and as suddenly altered its mind. The 1-mile walk handicap, won by Herrick (scratch), proved a tough contest, and the separate races for boys and girls were followed with the keenest interest by the onlookers and, needless to say, by the parents of the competitors. Whether it is strictly according to rule for an especially eager father to run in front of his progeny along the course with a tempting chocolate between his fingers no one seemed to question. However, it proved to be a consolation prize to the dear little toddler so the judges were not troubled! A comic cricket match, Ladies v. Gents, which lasted under thirty minutes, provided an excellent link between tea and the concert, and resulted, according to the umpire, in the Ladies declaring with 548 runs for six! As a visitor remarked, "Nothing has ever been seen like it at the Oval or Lords." It was not, however, very courageous of the sterner sex for the representative eleven to commit corporate suicide at the news!

Mrs. Wadley very kindly and gracefully presented the extremely handsome prizes. The Assistant-Controller, on behalf of his wife, thanked the staff for their appreciation of Mrs. Wadley's services, and the presentation of a gold watch, chain and compass pendant was then made by Mr. H. J. Broughton to the much respected Mr. C. F. Moody, Assistant Superintendent.

Mr. Broughton's speech was brief but struck the right note when he said: "What is the reason for the absolute unanimity with which Mr. Moody has been loved and respected in the Cable Room? The answer was given me by one of the cable room staff and I believe it to be the right one. Mr. Moody has always proved a white man." Musical honours followed, after which the pensioned recipient thanked all for their co-operation during his years of service, in a truly characteristic speech. An excellent concert and a few dances brought to a close "one of the happiest family gatherings." Naturally the *Bon Accord Orchestra* under the usual high standard maintained by Mr. Leonard Coombs, co-operated unflinchingly.

The Times states that "every private wireless station in France is to be taxed to the extent of 10 francs. Even receiving sets put together for a few shillings by schoolboys are included in the category of 'stations.'" This is not so exacting as it may appear. Some of the "schoolboy" sets put together for a few shillings have given excellent results and the technical schools of France make it possible for any interested and enterprising youngster to manufacture his own set at a comparatively fractional cost of the same or even inferior quality article pieced together by expert vendors. The writer has listened in on schoolboy sets in this country with surprising results. The youth of our own Service has taken wireless with extreme seriousness. It is no secret that in some cases it is even alleged that better results are at times obtained on certain amateur sets than upon regulation installations.

It may prove one of the drawbacks of wireless that, owing to its availability to everyone, the secrecy of the telegram is no longer inviolate, while Scotch whisky is smuggled into America by vessels fitted with private wireless sets which are thus able to communicate with their confederates on shore and befool the Customs.

Reuter's Trade Service announces that, according to the *Lokalanzeiger* Berlin, the German postal authorities and the representatives of the Mackay Co. are still negotiating for the laying of a direct submarine telegraph cable between Germany and the United States. Similar concessions are being requested by the Western Union and Commercial Cable Companies. It is also stated that certain American Companies (two at least) have plans ready for an American wireless station in Germany.

On Aug. 4, Prince Luthumirski, Polish Minister in the United States, signed a contract between the Polish Government and the Radio Corporation of the U.S.A. for the erection of a wireless station in Poland to cost three-quarters of a million sterling in order to obtain direct communication between Poland and the U.S.A.

As an indication of the tendency towards automatic transmission applied to the Baudot system, it is interesting to note that, according to *The Electrical Review*, "an order has been made restoring Patent 1902 of 1910, granted to Jules Carpentier for an improved transmitter for transmitting telegrams composed in perforations on a band by the Baudot system."

A correspondent of the *Morning Post* at Copenhagen recently stated that there is good possibility of the re-opening of telegraphic communication with Russia, via the Great Northern Telegraph Co.'s system in the near future. It is said that all the telegraph apparatus in the Petrograd office is intact and that the offices served by the land lines via Irkutsk and Vladivostok are in a position to re-open communication between Europe and Eastern Asia.

In the July number of the *Journal Telegraphique*, Berne, Mr. G. B. Serra, Engineer of the Institute of Posts and Telegraphs of Italy, continues his informative articles on the Italian system of Telegraph and Telephone Aerial line construction.

It is, therefore, evidently not due to any lack of competent students of telegraph construction theory if telegraph communication with our much respected Italian friends leaves much to be desired.

Many have been the queries raised as to the author of those specially appropriate lines quoted by the Postmaster-General, when he unveiled the C.T.O. Memorial Tablet to the Memory of our Fallen Ones. The Quatrain will, doubtless, be recalled by everyone who was then present.

"On Fame's eternal camping ground
Their silent tents are spread,
And glory guards with solemn round
The Bivouac of the Dead."

Thanks to the journalistic courtesy of the editor of *John o' London's Weekly*, enquirers are informed that "they are the last four lines of the first verse of 'The Bivouac of the Dead,' by Theodore O'Hara in R. J. Kelly's *Popular and Patriotic Poety*, published by the Catholic Truth Society of Dublin, part I. The entire poem may be purchased for the price of one penny.

We are informed that about the middle of August the Western Union Telegraph Co. sold \$15,000,000 15-year 6½ Bonds. They were offered to the public and sold at 99 within a few hours.

The laying of three new cables, Tangier to Oran, Casablanca to Oran, and Casablanca to Tangier respectively, was completed last month.

HOW TO LEARN THE MORSE CODE IN TEN MINUTES.

BY MR. TALMAN.

(Reproduced by kind permission from *Allan Glen's Magazine*, Glasgow.)

I MAY as well disarm criticism at the outset. I am inexpert in signalling, I was born before the Boy Scouts, and I could not, even to save my life, fit up an ordinary electric bell. I have never sent a message by heliograph or by flag-wagging, nor have I on any occasion tapped out the plan of escape to the prisoner in the cell next to mine. I have sent a few telegrams in my time, but never one without paying for it. With these credentials, and scorning the injunction that bids the cobbler stick to his last, I proceed to expound a new and simple method of learning the Morse code.

Ten minutes is all the time you need give to the study of this method. After one sitting you will be able to transmit messages with quite remarkable speed and accuracy, and though you will not at once be able to decipher other people's messages, there is another simple method of learning to "take off" from someone else sending.

Those of you who are expert signallers will, of course, give the superior sniff and say that this is impossible. You know the grind you had in mastering the dot-dash mystery, and you know that even after many days you had strange lapses of memory which made you forget the signal for this letter or for that. So you value your now assured command of the code highly, just in proportion to the difficulty you had in acquiring that command. Perhaps you are right. Many of your elders, at least, follow the same rule, and lay stress on the "mental discipline" involved in a study, even although the practical end achieved may show little to justify the labour of it. A short and easy method is often suspect, no matter how efficient it may be.

Now I frankly confess to a suspicion that much of the talk about the mental discipline of studies is here humbug. All real study is a mental

discipline. And for my part I prefer the mind that is avid of accurate knowledge of all kinds, and seeks it by the shortest and most direct routes. The more we economise in time and effort in our search for knowledge, the more fully will our minds be stocked, and the more varied and real will be the discipline we have undergone. Away with cant! We learn the spelling of words and the rules of arithmetic as things of practical value, not as a solemn gymnastic to make us good citizens, voting wisely and avoiding the police.

"But," someone may say, "I don't want to learn the Morse code. Perhaps I won't ever have occasion to need it." Perhaps you may not. But I know that if I saw a chance of getting at the cost of ten minutes' study a scrap of knowledge that other fellows didn't grudge spending hours and days in mastering, I would be off at once to the Bank of Time to draw out that ten minutes.

This brings me back to my title: (and please don't tell me the ten minutes are already up, for they are not begun yet). It was many years ago that I devised the scheme I am about to describe. The germ of it came to me, I am sorry to confess, during an examination when I was a school-boy. We had been discussing beforehand secret codes of communication (such is the divine foolishness of boys), but we were too ambitious, too subtle, too boyish to see that all the exam. would be taken up with signalling, and no one would have time to attend to the detail of writing. It was a grand idea! We had elaborate cypher codes, cryptograms and devices that would make a modern spirit-wallah ache with envy—but, alas, they all needed a key to interpret them, and even then the signalling code had to be devised. Morse we tried to study. The honest effort we wasted on that would, if properly directed, have given us all a hundred per cent. in every subject. But it was futile. Scientific and analytical methods applied to a grossly unscientific code left us in the air. We gave it up. Morse was all grind without any system. Euclid was easier.

In revealing to the world this shameful secret I may be accused of corrupting young minds and turning staid examination rooms into frivolous table-rapping seances; but I hasten to rebut that accusation. What with Mr. M'Quistan's new wireless installation and an enthusiastic and growing group of signalling experts in the corps, one feels that the masters ought to be protected from the diabolical ingenuity of the schoolboys. It is to arm my innocent fellows of the staff as well as to assist the boys that I now disclose my wonderful system of memorising Morse.

In the accompanying table you will find all the letters of the alphabet drawn out in block capitals, each letter accompanied by a special script form and also by its Morse equivalent. All you need do is copy and study the script forms carefully. They are all variants of standard forms of alphabet, some capitals, some small letters. In the script forms loops and straight strokes are made use of in such a way that the loops stand for dots and the straight lines stand for dashes. Try it and see for yourself. Write down the grotesque Z, for example—two straight lines and two loops, i.e., dash — dash — dot — dot. The order in which the loops and lines come in writing the script is the order for the dots and dashes.

There is no difficulty about any of the letters, except, perhaps, I, S. and O. In I the dot of the written letter stands for one of the dots of the Morse symbol; while in S (made as shown) there are three loops, equivalent to the three dots. Study this form closely. The triangle for O is not so unsatisfactory as it may seem, for if any young hyper-mathematician complains that a triangle is not equivalent to a circle, I would point out that the circle is just a special case of the triangle, with two sides missing and the third side bent round. Then think how beautifully Q follows from O!

Now for your ten minutes' course. Since the eye can picture the shape of a letter more readily than the mind can recall an arbitrary arrangement of dots and dashes, you must get the script forms clear to the eye. Write out the script alphabet carefully as often as you can during ten minutes. Do nothing else. Forget dots and dashes, and memorise the forms, paying strict attention to the order of the loops and straight lines. J, for instance, commences with the loop; Q's first move is down the left leg, then along the base to form the loop and turn upwards; X may begin with either leg, but must be written without lifting the hand, and end with an upward line.

At the end of ten minutes put away the diagram and dot-dash any message you care to compose. If you cannot transmit eight words a minute correctly and keep it up, you are below the average in intelligence. So there's a test!

A	cord	..	G	6	---	N	∩	---	U	u	---
B	B	----	H	h	O	Δ	----	V	v	----
C	c	----	I	i	..	P	p	----	W	w	----
D	d	---	J	J	----	Q	Δ	----	X	X	----
E	e	.	K	K	---	R	r	---	Y	Y	----
F	f	----	L	L	----	S	s	---	Z	Z	----
			M	∩	---	T	I	---			

LONDON ENGINEERING DISTRICT NOTES.

IN terminating his service with the Department at the end of July, Mr. Moir addressed the following letter of thanks to the staff:—

"In saying good-bye to the staff of the London Engineering District I should like to express my appreciation of the loyal and efficient service which they have rendered during my lengthy term of office as Superintending Engineer.

In war time and in peace time alike, the staff have consistently sought to maintain and uphold a standard of work and effort worthy of the Metropolitan District.

My memories of the District will always be very agreeable, and I hope that all the members of it may have a successful future."

It is gratifying to know that the efforts of the staff were appreciated by one who never spared himself in the interests of the Service.

"The King is Dead—Long Live the King."

Mr. Mellroy the new head of the London Engineering District comes with an established reputation. He will find the staff which he will in future control prepared to uphold the credit of the District in the time to come as in the past. The nation appears to be settling down at last to serious work and if this temper continues the demand for telephone service, that vital necessity of business, should be enormous. Much has already been done to overtake the arrears of construction, but much still remains to be done. Unfortunately the Engineering Department is largely dependent on builders and electrical contractors, but the difficulties which these have encountered in the past should soon disappear and a pre-war rate of delivery be established.

The cry is full steam ahead, and the slogan—one telephone per head of population.

Things are not what they seem.

Reference was made in a previous issue to a little crop of complaints from the public concerning Post Office workmen who at times appear to be idling. The facts have been stated but as the public cannot always appreciate the question arises whether recourse should be had to a little innocent camouflage. For instance, the members of a gang during the short periods when they cannot be given active employment might go through the motions of say pulling a cable through a pipe. Everyone who has had anything to do with the Army will know what going through the motions means. There might, of course, be a danger of the men breaking into a hornpipe if one of the numerous ex-service bands started playing in the neighbourhood. The men have already had some experience in going through the motions through having to empty a manhole of foul air by lowering a bucket into it several times and emptying the contents into the gutter. Members of the public watching this operation probably tell their friends how they have witnessed another awful example of Government waste—a man actually pretending to bale water out of a hole and bringing an empty bucket up each time. As an example of the spirit of unreasonableness abroad the case of a subscriber who made a recent complaint may be quoted. The gravamen was that the fitter had taken too long to do his work. An explanation was called for and duly furnished by the fitter who stated that he was continually interrupted by the subscriber who stood by him with a watch in his hand. The fitter further stated that the time taken to do the work was 2 hours 49 minutes including the time spent in listening to lectures on the telephone system."

Help Wanted.

Whilst it is not contended that historical matter connected with the development of the telephone can yet kindle the same enthusiasm and interest as say, the remains of a Roman aqueduct or a Celtic rath, one must remember that this will not be so after the lapse of centuries or even years. Would that our predecessors in the engineering line had kept this in view.

Some days since the writer in strolling over one of the Surrey Commons ran across an old windmill, which on inspection proved of unique interest to one keen on machinery. The old mill contained excellent examples of wooden gearing, an interesting if somewhat crude form of windmill governor, anent which a long controversy might be raised as to who first applied the "lift tenter." Some say Captain Hooper of Margate, others again that it was old Meikle, the Scottish millwright, but then the Scots claim most things. Incidentally this old mill, according to local information ceased to work some 30 years since and unless something is done to preserve it, will cease to exist 30 years hence. Meanwhile such examples of archaic engineering are to be found throughout the length and breadth of the country. For instance, one could cite the remains still extant, though rapidly disappearing of the Sussex iron industry. In this case the astonishing thing is that although the industry only ceased to exist about a century since, the remains and histories of the various furnaces are very meagre indeed.

To come back to telephones, it may interest readers of this column to know that one of our late colleagues, Mr. F. G. C. Baldwin, now Assistant Superintending Engineer, Newcastle-on-Tyne, is writing a history of telephony

in Great Britain, dealing particularly with the technical side. The writer believes that Mr. Baldwin has had the project in mind for some time but possibly he has been stimulated by reading the account and transactions of the recently formed Newcomen Society, a society founded to unearth records and discuss matters of historical interest in connexion with engineering generally. Hitherto it must be admitted that the history of engineering has been, to say the least of it, somewhat neglected by engineers generally. We are so busy keeping our eyes on the present and future that we are apt to overlook the past, but it is well even from a strictly utilitarian point of view, that we should appreciate what has been done by our predecessors. One's interests cannot but be stimulated by learning something of the ingenuity and characters of engineers of bygone days. Meanwhile Mr. Baldwin will be glad to receive from anyone either photographs or drawings of historic interest in connexion with telephone plant or apparatus and he undertakes to return photos, negatives or sketches if desired. Needless to state he will take great care of them.

OPEN LETTER TO A TELEPHONE SUBSCRIBER.

ALTHOUGH you have been called upon to pay increased charges for your telephone line and naturally feel aggrieved, do not make a hasty decision that because of this, you will curtail your telephone facilities, or cease altogether your service.

As a business man, presumably you have not in the past increased the number of lines rented without due regard to the needs of your business or, as a householder, routed a line without being satisfied that one was needed.

Have you ever considered the telephone in relation to the saving of office expenses and to business?

If the telephone had not been invented, think of the heavy expenditure you would have now to incur by the employment of personnel to carry messages from department to department, from branch office to branch office, to and from your clients or by the use of the telegraph. The telephone is a remarkable time saver, a fact which you have no doubt overlooked because of its every day use. On extension lines between your departments, the time value must repay the cost manyfold, because your staff lose little time in communicating with each other. Labour costs are much heavier than telephone costs.

If you curtail your telephone facilities have you considered that business may be lost because your lines may be reported engaged and an order taken by a competitor? Have you calculated the saving in travelling expenses which the use of the telephone has saved for so many years?

As a shopkeeper you are also being called upon to pay increased charges. What is the value of the telephone to you, and can you afford to dispense with it without affecting your business? I think not. The telephone leads to additional business. Your customers order their requirements from you, whereas if you had no telephone they would obtain their goods from the nearest depot. You can obtain extra stock without delay from your suppliers. By the aid of the telephone you can obtain competitive prices from the wholesale markets and thereby save working time and travelling expenses. Your name and address is printed free of charge in the Telephone Directory which is, in effect, a cheap but valuable advertisement. It is known that large repeat orders have often been obtained in this way.

As a householder, think well before you give up your telephone. It is an insurance against fire and burglary. It may repay the cost a hundredfold if a doctor can be summoned at once in case of serious illness. Your wife or housekeeper can place her household orders without leaving the house. You save travelling expenses. You can communicate at any time with business or private friends after office hours. You can communicate with any other telephone subscriber in the country. You can arrange hotel accommodation immediately if called upon to travel unexpectedly.

Think well, therefore, before depriving yourself of the advantage of the telephone; even at the enhanced charges it is the cheapest proposition in the market, and direct saving of the cost of the service may result in indirect losses in many ways.

LONDON TELEPHONE SERVICE NOTES.

Presentation to Miss Heap, I.S.O.

REFERENCE to this function at greater length than would entitle it to be included under the heading "Notes" appears elsewhere in this issue. To say that the ceremony was a success is to give it faint praise, and the Committee responsible for its arrangement are to be heartily congratulated. The stately old Hall of the Stationer's Company provided a splendid setting and the pleasures of the reunion with former colleagues helped to drive away the

sadness felt at the loss all in the telephone service sustain on Miss Heap's retirement.

* * *

Presentation to Mr. A. Moir, O.B.E.

Some indication of the regard in which Mr. Moir was held by all who worked with him can be obtained from the fact that no less than 3 presentations were made to him on his retirement. The last but not the least in the warmth of its well wishing took place in Mr. Preston's room at the G.P.O. South one morning during the closing week of July. Mr. Moir came into personal touch with many members of the L.T.S. and it was their united wish that he should carry away with him some token of their regard for his sterling merits. To this end they had purchased for him two Dunhill pipes in case, a pouch to make the most eclectic envious, and a Swan self-filling fountain pen. Mr. Preston, who has a reputation for doing these things admirably, said something of the happy relations between the Superintending Engineer's staff and his own, and attributed this condition of things largely to Mr. Moir's personal example. Several others present reinforced Mr. Preston's record, making it clear that even amongst Scotsmen and Engineers Mr. Moir was a towering figure, and thereafter Mr. Preston made the presentation. Mr. Moir replied in happy vein and departed after much vigorous handshaking, promising that the gifts of the L.T.S. should be his constant companions in his most pleasant hours.

* * *

London Contract Branch.

As is well known certain subscribers would not sign a new agreement under the Revision of Rates and their circuits were subsequently disconnected. Contract Officers called prior to the recovery of the apparatus and it is interesting to note that some 30 per cent. of these circuits were not lost to the service as the subscribers were either induced to sign the agreement or new subscribers were at once obtained to replace them.

The argument that a call by a Contract Officer in such cases would produce good results—although doubted in some quarters—has been handsomely vindicated.

It is found that quite a number of subscribers or rather late subscribers who allowed the installation to be recovered have already found that telephone service is quite indispensable and have asked to be reconnected. As the stagnation in trade and the holiday season come to an end it is anticipated that many more will have the service re-instated. While funds do not run to "fatted calves," nevertheless the prodigals will receive quite a hearty welcome.

* * *

London Telephonists' Society.

Mr. M. C. Pink has the distinction and good fortune to be the thirteenth president of the Society. It is only those who deny themselves indulgence in matters of chance who persist in the superstition that ill-luck is associated with number 13. The thirteenth session of the Society promises to be a very successful one. The presidential address takes place on Wednesday, Oct. 5, the subject being "The future development of the Telephone Service." Subsequent items in the programme of the session are:—

Nov. 1.—Debate.

"Has the telephone added to the sum of human happiness?"
Affirmative, Mr. H. Dive.
Negative, Mr. H. G. Corner.

Nov. 30.—A paper by Miss A. C. West, L.R.A.M. (Eloc.).

"The voice and its effect on the Telephone Service."

Dec. 31.—New Year's Eve Dance.

Feb. 8, 1922.—Competition papers.

March 8, 1922.—Competition Essays.

* * *

London Telephone Service Swimming Association.

The Association is holding a Grand Water Gala at Great Smith Street Bath, Westminster, on Friday, Oct. 7, at 7 p.m.

The principal events include:—

Team Race for the Pound's Challenge Cup.
Championship of L.T.S.
Diving Competition.
Traffic Officers' Race.
Open Handicap for Supervisors.
Open Handicap for L.T.S.
Learners' Race.
Lantern Race.
Polo Match.

Much enthusiasm is being shown and some really good work is being put in by those who mean to compete.

You are recommended to book your seat early, as the indications are that the demand will far surpass that of last year.

Tickets (Numbered and Reserved 2s. 4d., Unreserved 1s. 3d.) may be obtained from the Association members as under:—

Avenue	Miss Mason
Central	Miss Milbank
City	Miss Condon
Dalston	Miss C. Phillips
Clerkenwell	Miss Brain
East	Miss Brinsden
Gerrard	Miss H. Davis
Hampstead	Miss Lander
Hammersmith	Miss Campbell
Kensington and Western	Miss Penny
London Wall	Miss V. Young
Museum	Miss L. Haines
Mayfair	Miss Neile
Park	Miss Hawkins
Regent	Miss Brimsgrave
Trunk	Miss Hodder
Victoria	Miss Hill

or of Miss Tenme, (Hon. Sec.) Trunk Exchange.

Gerrard Exchange.

We are feeling very proud of Miss M. M. U. Fitzpatrick and Miss A. M. Alston (Gerrard Telephonists) who were awarded 1st and 2nd prizes respectively in the *Daily Sketch* dancing competition at Douglas, Isle of Man, in August. There were 1,500 entrants, so that the winning of the beautiful silver cup by Miss Fitzpatrick was something of a triumph for London.

Civil Service Lifeboat Fund.

This year's collection for the fund has just been completed and has secured the gratifying sum of £105 10s. which is £33 9s. in excess of the sum contributed by the London Telephone Service last year.

A Wedding.

Every month we publish a list of women who leave the L.T.S. on account of marriage, but seldom do we record the change from the single to the married state of the men of our Department. That step has recently been taken by Mr. Hubert C. S. Evans, a well-known member of the staff of the Controller's Office who came over from the late National Telephone Company. His colleagues presented him with a gift of cutlery as an outward expression of their good wishes.

Belgrave Social and Athletic Club.

A successful river trip took place on July 24th starting from Richmond at 11 a.m., the members had an enjoyable four hours on the water and on reaching Walton-on-Thames, spent a couple of hours ashore searching for ices, etc. Returning at 5 p.m. prompt (as the members who had an extra ice, and "lost the post" know full well) we concluded the day's enjoyment at Richmond at 8.30 p.m. Excellent luncheon and tea were served on board, and with the kind help of various pianists and vocalists and with the cameras on overtime, we add the second item to our list of successful summer outings. Our useful "rag cat" was once more raffled, realising the sum of 25s. which has been forwarded to the London Hospital.

We have another char-a-banc outing arranged for Oct. 2 to Windsor, and the ticket will include first class luncheon and tea. All further particulars can be obtained from the Secretary, Miss Williams of North Exchange, who will also be pleased to give information to any of the staff who are interested in the club.

PRESENTATION TO MISS A. A. HEAP, I.S.O.

ALL roads seemed to lead to the Stationer's Hall on the evening of Friday, July 22, and anyone familiar with the personnel of the London Telephone Exchanges who happened to be in the neighbourhood of Amen Corner at 6 of the clock that evening would have found him or herself under an obligation to bow almost as exhausting as that experienced by a crowned head during a royal progress. If there was an exchange unrepresented it must have been that in which the sole caretaker operator had failed to secure a substitute. Several exchanges counted their representatives by the score, and the company which had assembled to do honour to Miss Heap included many an ex-telephonist or ex-supervisor whose matrimonial responsibilities had failed to dull their memories of their former Superintendent.

It was a crowded house, and as Miss Heap was met by Mr. Preston she was greeted by burst after burst of cheering, renewed again and again as they proceeded in company to the centre apartment where the latest telephonist recruit—Miss Dick, of the City Exchange,—presented a bouquet of pink malmalsons. Miss Heap then received the guests, and for each she had some little personal greeting or joyous quip. Refreshments were served in the dining hall which, it has to be admitted, is immeasurably finer than the most lavishly decorated of exchange dining rooms. No doubt the Stationers' Company is not yet nationalised and can therefore be certified as free from anything in the nature of unnecessary expenditure—(would that the exchange dining rooms might meet a like fate). At 7.30 p.m. the sounds of the Orchestra, which had kept one's feet itching, were stilled and Mr. Preston opened the more formal part of the proceedings by calling upon Miss A. E. Cox to address the gathering. Miss Cox made a bright and happy

speech full of amusing anecdote, and justly deserved praise. She was followed by Miss Nowman, who was no less happy in her account of the hopes and fears that beset her in the fateful "transfer" days of 1912 when a first hand acquaintance with Miss Heap fulfilled all her hopes and banished all her fears. She finished with a quotation from an early Superintendent of Buildings, one with a great reputation for wisdom in which he asserts that "he who worketh with diligence shall stand before Kings." This was understood to be graceful reference to Miss Heap's curtesy when receiving the Imperial Service Order and was greeted with acclamation. The Chairman then called on Miss Liddiard, who had pleaded to be allowed to add her tribute to the work of Miss Heap and a noble tribute it was. The Assistant Controller Mr. J. F. Edmonds, then added his testimony to Miss Heap's whole-hearted devotion to her duties, and if one had some difficulty in appreciating the precise application of the story of the cook's choice of hymn it is probably due to one's limited knowledge of Miss Heap's circle of acquaintance amongst the forces of law and order. Mr. Edmonds was followed by Mr. Kidner, Assistant Secretary in charge of the Telephone Branch of the Secretary's Office, who made jealous many a member of the Traffic staff of the L.T.S., as he described how Miss Heap was known to him by reputation even before he assumed his present responsibilities in the field of telephones. After Miss Webb had read messages from Colonel Sir Andrew Ogilvie, Mr. John Lee and others expressing regret at their inability to be present, Mr. Preston entertained the audience with some reminiscences of the earlier days of the P.O. Telephone Service in London with their indelible imprint of Miss Heap. He finished with an earnest and well deserved acknowledgment of all that she had accomplished on behalf of the women of the London Telephone Service. He then handed to Miss Heap a single stone diamond ring, a banker's draft for £100 and an album containing the signatures of those contributing and numbering between two and three thousand.

Miss Heap replied in a speech full of kindly wit, sound advice and appreciative acknowledgment of this latest tribute from those who had learned to regard her and whom she regarded with feelings of a very warm and loving character. It is difficult to realise that Miss Heap has gone—possibly because her successor has not yet been proclaimed—but as the realisation comes to each and everyone, they think of her in terms which can best be summarised in a quotation from Richard II. that with her it shall be the case that—

"Each day still better other's happiness,
Until the heavens, envying earth's good hap,
Add an immortal title to your crown."



EFFECTIVE METHOD OF PRESENTING "A" OPERATOR "BREAKING IN" ON ORDER WIRE.

THE BAUDOT.—XXIV.

By J. J. T.

WE now come to the *moderator* (Figs. LXVII, LXVIII) which maintains the receiver at a "running speed slightly higher than that of the distributor which from Rings 3 and 6 automatically transmits a checking or braking current from a local battery of 40 volts" as mentioned in Article XXI. It is made up, broadly speaking, of two parts. Number one is a simple octagonal metal block W (Figs. LXVII, LXVIII) through which are drilled two holes permitting of the passage of a pair of guiding rods RR'. To each of the opposite sides *a*, *a'* is fitted a small screw pin upon which the looped ends of the steel spiral springs S, S' are respectively hooked. The block W is capable of sliding easily up and down the rods RR. T is a thin flat spring screwed to W, and fitted with a tow brake at its free end. When the moderator is placed in position on the receiver axle A¹, which latter extends rearwards beyond the receiver casing for this purpose the tow brake of T comes into contact with the polished surface of a brass saucer C (Fig. LXVII), as the centrifugal force developed throws out the block W along the guiding rods RR'. By means of a

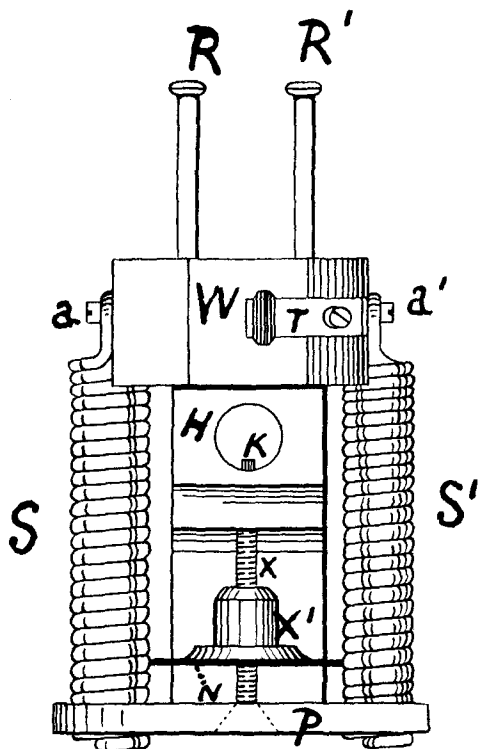


Fig. LXVIII.

notched screw L (Fig. LXVII) the entire moderator may be fixed in varied positions on the extension A¹¹ of the axle A¹. Thus the nearer the moderator approaches the saucer C the sooner will the tow brake commence its braking effect and the greater the distance between the brake and C the later will be the action of the brake as the centrifugal force developed will in the extreme case need to be sufficient to move W out to a point along RR' opposite the outer edge of C. What may be termed the fixed portion of the moderator consists of a metal block H (Fig. LXVII) through the centre of which is drilled a hole sufficiently large to fit on to the axle extension A¹¹. A narrow groove is cut along A¹¹ parallel to its length and into this groove slides the catch K when

the moderator is pressed along A¹¹ into position. This device, therefore, holds the moderator firmly upon A¹¹, during rotation, the screw L maintaining it in its longitudinal position upon the same as already mentioned. Into the upper side of the block H are firmly fitted the guiding rods RR' along which W. moves so that when the moderator is at rest the tension of the springs SS' acting upon W at one end and a flat steel spring tension-piece N at the other (the ends of which are thrust between two of the spirals

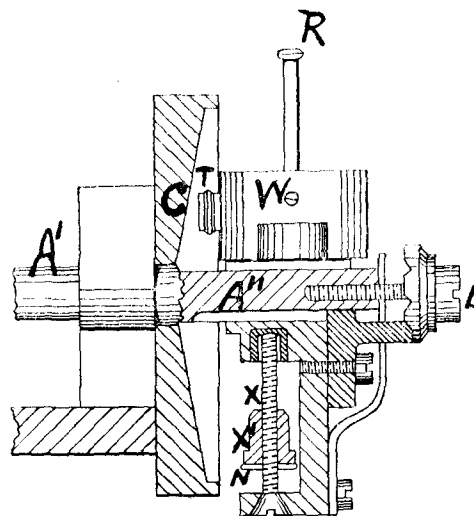


Fig. LXVII.

of their respective springs), the block W is brought to rest against the upper side of the block H. A long screw X carries the tension-piece N and the cross bar P at one end, and at the other is screwed into the under side of H. X' serves as a metal sliding-block or guide to the tension-piece N. In practice no adjustment of this latter need be made. The small adjustments of speed necessary are to be obtained by unhooking the springs S, S' from their respective pins *a*, *a'*, and adjusting their length, holding the looped end of the springs and screwing each (one-half convolution at a time) into the cross-bar P, so that a lesser number of convolutions become active on the tension-piece N, *i.e.*, the tension increases and with the tension the speed.

The process should of course be reversed if it be desired to decrease speed. The complete adjustment of the receiver speed, therefore, comprises: (1) the correct number of spirals of the moderator in play so as to give a slightly higher number of revolutions than that of the distributor brushes; (2) the correct distance of the moderator on A¹¹ from the saucer C, so that the braking effect is neither too abrupt or too weak; (3) a similar fineness of adjustment of the electro-magnet brake B in relation to the brake wheel BW (Fig. LXV).

(To be continued.)

SPANNER IN COW'S STOMACH.

A piece of telephone wire which had penetrated its heart and an iron spanner in its stomach were some of the discoveries made by a post-mortem examination of a cow at Hathersage, Derbyshire, which had been unaccountably ill.

It is thought that the spanner had been used by men repairing the local telephones.—*Daily News*.

A cow there was, in bovine rage,
That turned from grass and thyme and sage,
And in her ire
Eat with some wire,
A spanner down at Hathersage.

D. S. A.

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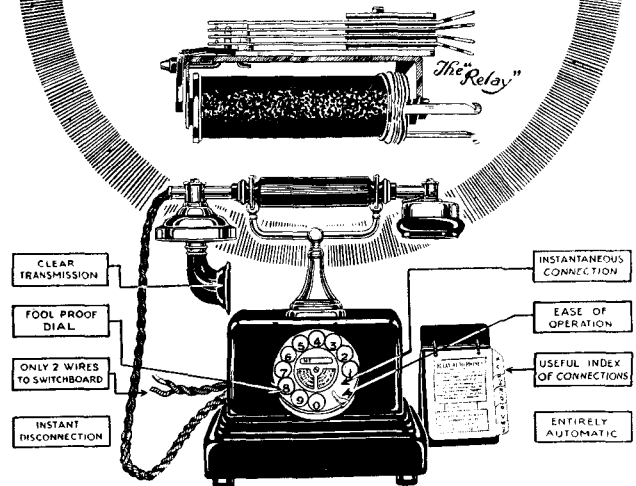
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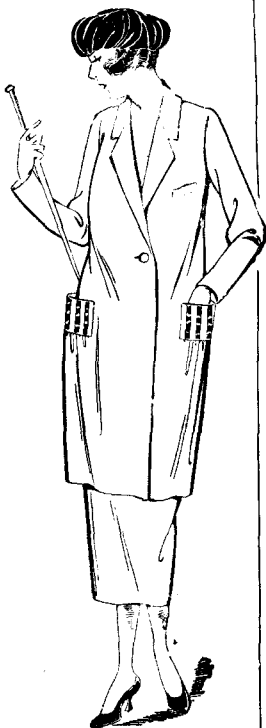
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REVIEWS.

"The Henley Telegraph," organ of W. T. Henley's Telegraph Works Co., Ltd., and of which we have seen an odd number or two, without doubt, contains many articles of interest, not only to those immediately concerned with the progress and welfare of the firm but to others outside that restricted *clientele*.

"Appareils et Installations Télégraphiques." Par E. Montoriol Inspecteur des Postes et Télégraphes, Professeur à l'école Supérieure des Postes et Télégraphes, Paris.

This admirable work of over six hundred pages with its modest preface by M. Blondel, published by the well-known firm of Baillièrre et fils, as one of the many useful volumes of the Encyclopédie d'Electricité Industrielle is a pleasure to review. The type, the paper, the sketches and the diagrams are excellent. As one would expect from the pen of M. Montoriol, the writer has handled his subject in a masterly manner, and with his usual thoroughness. The book apparently is also to form part of the *Bibliothèque des Annales des Postes-Télégraphes-Telephones* and is "specially devoted to apparatus of French construction." While this latter aim has been well and consistently kept in view throughout the volume, there is no neglect of foreign apparatus, and generous tribute is accorded to the labours of telegraph engineers of other lands. Mere mention of a few of the names to which M. Montoriol refers from time to time are sufficient proof of the authors catholicity in this direction. Heaviside, Pupin, Vaschy, Morse, Barbarat, Varley, Wheatstone, Creed, Picard, Mercadier, Van-Rysselberg, Dejongh, Muirhead, Baudot, Pollak - Virag, Murray, Belz, Hughes, Brahic, Siemens, the British Post Office, Western Union, and Western Electric are all brought into the picture to obtain a correct historic perspective. Automatic transmission by the Wheatstone system alone occupies eighteen pages, and over seventy are devoted to Hughes apparatus for example. Although both Murray and Siemens' high speed systems are dismissed with but very few words, he has found space to refer to Siemens' and Halske's Telescripteur, the Telewriter, the Telephotographic system of Korn and Bellin, the Telautograph of Jordery, Wheatstone's A B C, and to Thompson's mirror and siphon recorder, devoting an equal number of pages to Carpentier's *enregistreur à siphon*, an ingenious modification of the former's apparatus, more suitable for the working of relatively short submarine cables. The P.O. standard relay has due attention, together with the modified form of Baudot relay (1915) which at that date applied the "carriage" adjustment to the French relay.

The Baudot, quite naturally, has pride of place in this volume, and itself forms a work of reference on this well-known and widely-used system.

On page 274, M. Montoriol has a good word to say for the phonic wheel with the reserve that, "*il n'est pas aussi parfait que le régulateur Baudot*" though frankly admitting that it is sufficiently so and that there is a decided advantage in being able to change the speed without stopping the distributor especially in view of the approaching possibilities of automatic transmission.

One particularly interesting item of information appears on pp. 348-9. It is with reference to the abandonment of the "double" and "triple" types of forked Baudot decided upon by the French Administration in the near future. The writer says:—"Les installations doubles et triples échelonnées sont appelées à disparaître dans un avenir assez prochain; en effet, dans un but d'unification du matériel, l'Administration a décidé de les ramener toutes au type quadruple, quitte à n'utiliser que le nombre de secteurs strictement nécessaires."

Duplex (differential and bridge), diplex, simultaneous telegraphy and telephony, are all dealt with as far as the restrictions of space would necessarily permit in the case of a work of this kind.

Batteries, primaries and secondaries with the regulations for their maintenance and the arrangements for the distribution of their power as fixed by the French Administration are variously dealt with together with a very good description of the Western Union Dynamo-electric system of supply. The utilisation of the C.B. system in French offices has due attention, while a table of "Hourly Outputs" of the various telegraph systems, according to French calculations and experience, proves an interesting item upon which, however, there will possibly be some disagreement outside of French territory.

For page-printing telegraphy, M. Montoriol has no use and sees no justification of expenditure. In this, as our readers know, he is not alone. He is, however, insistent upon the advantages of Baudot retransmitters and says prophetically that "on the day when lines are constructed completely immune from exterior perturbations, if we will, we may have direct Baudot communications such as Paris-Saigon or Paris-Vladivostock at the same speed, i.e., 180 r.p.m." We hope one day to have unperturbed wires to Lyons, Milan, Zurich, &c., &c., then may your prophesy prove true, *cher collègue!*

J. J. T.

SELECT COMMITTEE ON THE TELEPHONE SERVICE.

RESUME OF EVIDENCE (*continued*).

Mr. T. H. RYLAND was examined on behalf of the Farmers' Union on July 18. He thought that more extensive propaganda of the rural rate was required. He said that farmers disliked party lines, and thought they should be provided with direct lines, the service being established independent of the cost. He referred to the high rural development of Canada and the United States where galvanised iron wire was generally used instead of copper wire.

Mr. ROSS JOHNSON (Bristol Chamber of Commerce) was next heard (July 20). He desired that Avonmouth should be included in the Bristol area. He was of opinion that the proposed charges would result in a smaller use of the service and defeat their purpose, but agreed that the service must be self-supporting.

The next witness (July 27) was Mr. W. B. PINCHING of the Post Office Engineering Factories. He described the class of work performed at the various factories, and suggested that the staff ought to be transferred from the control of the Stores Dept., to that of the Engineer-in-Chief. He thought that research and experimental work would be more effective if carried out at the factories, but that the manufacture of plant was best left to outside firms.

Sir D. M. STEVENSON, formerly Chairman of the Glasgow Corporation Telephone Service, also gave evidence. He gave information of the development of Glasgow during the period of competition. He quoted some pre-war Danish rates, and some Norwegian figures which were not up-to-date. He thought the present British charges ridiculously excessive, and thought the Glasgow Corporation could provide unlimited service for £13 6s. 8d.

The Committee is adjourned, and proposes to publish the evidence together with an interim report.

OBITUARY.

THE LATE MR. J. P. HASLEM.

Mr. Haslem, Clerical Officer, Traffic Branch, P.O. Telephones District Manager's Office, Victoria Street, Blackburn, died on Sunday, July 31 1921, after about a week's illness. The funeral took place at Tonge Moor, Bolton, on Wednesday, Aug. 3, 1921. He was a member of the Bolton Staff and came to Blackburn on the amalgamation of the two districts in 1916, and was very much respected throughout the district.

LAWN TENNIS.

We congratulate Mr. A. C. BELGRAVE (of the Secretary's office) on winning the Isle of Wight Lawn Tennis Championship on Aug. 13, when he beat Mr. C. O. TUCKEY at Ventnor, winning by (1—6, 6—2, 10—8).

CRICKET MATCH.

STORES DEPARTMENT v. SECRETARY'S OFFICE.
at Chingford, Aug. 10, 1921.

RESULT.

Stores Department won by 3 wickets.

Secretary's Office.

C. R. Young, c. Colling, b. Carr	1
D. O. Lumley, c. Adamson, b. Vidley	36
A. O. Beaton, b. Bowes	11
C. L. K. Peel, b. Green	21
H. G. G. Welch, b. Green	8
T. Scholes, st. Clancy, b. Nudd	3
G. H. Taylor, b. Bowes	12
G. O. Wood, lbw., b. Nudd	3
R. L. Rixon, c. Hines, b. Nudd	0
G. H. Bentoo, b. Bowes	0
F. J. Pearce, not out	2
M. F. Allan, b. Bowes	0

Extras ... 8

Total 105

Stores Department.

W. P. Hines, c. Lumley b. Peel	6
J. Collins, c. Rixon b. Beaton	23
D. P. Dell, b. Wood	20
T. Bowes, b. Young	9
A. Clancy, c. Lumley, b. Beaton	16
R. B. Green, st. Peel, b. Lumley	26
H. C. Jolly, st. Lumley, b. Young	9
E. Carr, not out	33
L. D. Strachan, st. Peel, b. Lumley	4
F. R. H. Vidler, st. Peel b. Lumley	16
F. W. Nudd, did not bat	—
T. L. Adamson, did not bat	—

Extras ... 15

Total (9 wkts) ... 177

CALENDAR OF COMING EVENTS.

Sept. 1.—Cricket. W. Norwood Social v. Cable Room, Dulwich Park.
" 6.— " News Division v. Cable Room, Dulwich Park.
" 7.— " Battersea Traders v. Cable Room, Dulwich Park.
" 13.— " Married Cables v. Single Cables, Dulwich Park.
" 14.—Imperial Swimming Club. (Trunk Exchange) Gala at Holborn Baths.
" 15.—Cricket. Cable Room v. Ilford, Ilford. Last match of the Season
Oct. 2.—Belgrave Social and Athletic Club. Char-a-banc trip to Windsor. Start at Manor House N., 10 a.m.
" 5.—London Telephonists' Society. Presidential address by Mr. M. C. Pink—"The future development of the Telephone Service."
" 7.—L.T.S. Swimming Association. Grand Water Gala, Great Smith Street Bath, Westminster, 7 p.m.

G.P.O. ARTS CLUB.

EXHIBITION ANNOUNCEMENT.

ARRANGEMENTS are in hand for holding an Exhibition at Mount Pleasant Post Office, London in October next.

The Exhibition will consist of original Paintings, Drawings, Etchings, and Pictorial Photographs, Art Needlework, Metalwork, Jewellery, and other Works of Art of original design by members of the Club.

Officers of all Departments desirous of participating are invited to forward a stamped addressed envelope for particulars of membership and members are requested to send their present addresses to the Hon. Sec., Chas. U. Cooke, 369, Essex Road, London, N.1.

The Club was founded in 1906 for the purpose of encouraging the production of Works of Art by officers in all grades and department of the Postal and allied services. Annual exhibitions, monthly meetings, competitions, sketching excursions, practical working demonstrations, &c., were held successfully until the abnormal conditions prevailing in 1915 brought the main activities of the Club to a temporary close.

The difficulty of holding central meetings still exists, but it is hoped that that the annual exhibition, the most popular and successful feature of the work of the Club in the past, will be continued with even greater success, and, that in time, when greater facilities arise, the full activities of the Club will be resumed.

PERSONALIA.

LONDON TELEPHONE STAFF.

The following resignations took place on account of marriage :—

Miss H. E. WOOD, Assistant Supervisor, Class II, of Bromley Exchange.
Miss M. A. CURTIS, Assistant Supervisor, Class II, of London Wall Exchange
Miss E. M. FULLER, Assistant Supervisor, Class II, of Museum Exchange.
Miss N. AYRES, Telephonist, of East Exchange.
Miss E. M. BARNES, Telephonist, of East Exchange.
Miss M. E. CLARKE, Telephonist, of East Exchange.
Miss W. BUTCHER, Telephonist, of Hammersmith Exchange.
Miss K. MEAD, Telephonist, of Holborn Exchange.
Miss M. J. BROWN, Telephonist, of Holborn Exchange.
Miss V. COPELIN, Telephonist, of Holborn Exchange.
Miss F. E. JOBSON, Telephonist, of Holborn Exchange.
Miss E. H. HARVEY, Telephonist, of Hornsey Exchange.
Miss E. M. EVANS, Telephonist, of London Wall Exchange.
Miss L. M. MANLEY, Telephonist, of London Wall Exchange.
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Miss J. E. BENNETT, Telephonist, of London Wall Exchange.
Miss G. A. DAWSON, Telephonist, of Museum Exchange.
Miss J. Tuddenham, Telephonist, of Paddington Exchange.
Miss M. CROFT, Telephonist, of Paddington Exchange.
Miss N. L. GURNEY, Telephonist, of Park Exchange.
Miss E. M. REYNOLDS, Telephonist, of Park Exchange.
Miss M. M. BLACKBURN, Telephonist, of Dartford Exchange.
Miss B. A. MONK, Telephonist, of Romford Exchange.
Miss SLEAP, Telephonist, of Trunk Exchange.
Miss HOPKINS, Telephonist, of Trunk Exchange.
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Miss J. A. PARGETER, Telephonist, of Victoria Exchange.
Miss A. BROWN, Telephonist, of Victoria Exchange.
Miss E. PENNEY, Telephonist, of Victoria Exchange.

There were no promotions during July.

SOUTHAMPTON.

At Southampton on July 22, Miss Gibson, Assistant Supervisor Class I, who has been promoted to Supervisor at Sheffield, was presented by the staff, with a beautiful gold wrist watch on a gold bangle. The Postmaster, supported by the District Manager, and Traffic Officers, made the presentation. The Postmaster and District Manager spoke of the efficient manner in which Miss Gibson had carried out the duties of officer in charge of the Exchange and the happy relations which existed between her and both supervising officers and staff of all sections. Members of the staff voiced the feelings of esteem which they had for Miss Gibson. Miss Gibson in acknowledging the gift expressed her great appreciation of the kindness and help she had received from all.

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