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## HISTORY OF THE ANGLO-CONTINENTAL TELEPHONE SERVICE.

(*Continued from page* 135.)

It had been proposed by means of the Lille circuit to serve not only the North of France, but eventually Brussels. Experiments which had been carried out on the Anglo-French lines early in the year 1897 showed that satisfactory speech could be obtained between London and Brussels and even Rotterdam. Indeed, the establishment of telephonic communication between London and Brussels or Antwerp *via* Lille was agreed upon in 1900; but before the Anglo-French convention of 1902 took actual shape, Treasury sanction had been received for the provision of a direct Anglo-Belgian cable. A contract for laying the cable was placed in 1901. On laying it, however, faults were discovered in certain portions of the cable, and it had ultimately to be entirely rejected. Arrangements were made with the contractor, with the approval of the Belgian Administration, for the manufacture and laying of an entirely new cable in 1902. The cable which contained 2 circuits (one of which was superimposed for telegraph working) was laid between St. Margaret's and La Panne in April, 1902, and communication between London and Brussels was opened in June, 1903, and extended to other towns in both countries in October of the same year. The total cost of the cable was £31,374, of which the Belgian Government paid half, viz., £15,687; the land lines cost £16,733, whilst its maintenance was undertaken by Great Britain at the joint cost of both countries. The cable, which was 47.28 knots in length, contained a weight of 160 lbs. of copper and 300 lbs. gutta percha per nautical mile. A convention between Belgium and the United Kingdom was signed at Brussels on Nov. 21, 1902, fixing the tariff between those places in Belgium and England and Wales which could communicate by telephone at 10 francs.

As the traffic between England and France steadily increased, the provision of 4 additional circuits was suggested to the French Government in June, 1907, and it was agreed that each Administration should lay another cable. The contract for the British cable was let to Messrs. Siemens, and a coil-loaded cable containing 2 circuits was laid between Gris-Nez and Abbot's Cliff in 1910. The French cable was laid between the same points in 1912. It also contained 2 circuits, was continuously loaded, and weighed 300 lbs. copper and 300 lbs. gutta percha to the nautical mile. Increasing traffic also necessitated the provision of additional circuits to Belgium, and in 1911 a new coil-loaded cable containing 2 circuits was laid by Great Britain between St. Margaret's and La Panne at the joint expense of both countries.

After the provision of the two additional loaded cables to France, a new agreement with that country was executed on Feb. 5, 1912, under which the charge for calls from London to Paris was reduced from 8*s.* to 4*s.*, and both countries each divided into 3 zones, the charges between which were correspondingly lower than the rates then current. The night charges were also reduced, and a system of night subscription calls was introduced. By 1913 the service was extended to all the principal towns in England and to some 250 places in France.

As soon as these cables were laid, speech trials between London, Geneva and Basle were satisfactorily held, and as the French were willing to facilitate telephonic communication with Switzerland *via* France, no time was lost in negotiating an agreement between the three countries. It was signed towards the end of 1913, and service between London, Basle, Geneva and Lausanne was opened on Jan. 1, 1914. It was withdrawn from the public along with all Anglo-Continental telephone service on the outbreak of war. For the same cause the projected Anglo-Dutch service did not come to fruition. Agreement with the Netherlands Government was reached, the rates were fixed and the cable (to be laid between Aldeburgh and Domburg in Zealand) was actually in process of manufacture when war supervened. The prospect of laying it across the North Sea in that troubled period was remote, and the cable when completed was used to supply Admiralty and War Office communications across the Channel. The war also put an end to the negotiations which had been going on with the German Government relative to the provision of a direct telephonic communication, either by a cable to Emden, which that Government had suggested in 1910, or alternatively by a cable to Walcheren and overland lines to Germany *via* Holland.

The average monthly Anglo-French telephone traffic, which as we have seen averaged 3,018 calls a month in 1892, and 4,764 in 1895, reached a monthly average of 7,787 in the year ended March 31 1912, 9,867 in 1913, and 11,735 in 1914. In the July immediately before the commencement of hostilities 19,963 calls passed between England and France over the 9 circuits then working.

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II.—(1914-1919).

During the early part of the war the whole of the Anglo-Continental telephone circuits were reserved for the use of the Admiralty, the War Office and the War Cabinet, except only one circuit from the London Trunk Exchange to Paris and one to Boulogne, and even the use of these was restricted to calls on official business, either from Government offices or from the offices of firms employed on Government work. The number of cables across the Channel was soon increased. Military exigencies are always for obvious reasons more rapidly satisfied than civil needs, and during four years of war no less than 15 additional channels of speech were provided between England and France, while 23 years had been required to bring into being the existing nine. On the outbreak of war most of the latter were, as already stated, set aside for communication between the War Office and the Base Offices and the Headquarters of the Expeditionary Force, but when the British Army moved into Picardy and Western Belgium after the Battle of the Marne it became necessary to provide direct communication with that district also, and circuits were promptly run to the cable heads at the French coast towns. On the occupation of Belgium by the Germans one of the Anglo-Belgian cables was diverted to Dunkirk, but the older unloaded cable developed a fault and was not repaired during the course of the war. Three additional circuits to Dunkirk were provided by a new cable from Dover in 1917 and used partly for Admiralty purposes and partly to afford communication with the headquarters of the Royal Naval Air Service in France in order that information and assistance might be obtained in connexion with enemy air raids on England.

The difficulties involved in immerging cables in the English Channel in war time under the constant threat of peril in the heavens above and in the waters beneath can readily be imagined, but the zeal and courage of the engineers and their assistants were always equal to the occasion. The following extract from a report of the Engineer-in-Chief in the laying of the Dunkirk cable gives some indication of the dangers involved:—"The landing of the shore end at Dunkirk gave rise to considerable difficulties owing to the rough but shallow water, in which even a barge was unable to work. As a consequence sailors had to be employed to drag the cable over a bank for a distance of half-a-mile. An attempt was made to do this with 250 men but the number had to be increased to 850 before the operation could be performed. While this work was in hand an aerial combat between British and German aircraft was in progress overhead. The final operation in putting the cable through was the joining of the British and French sections in mid-Channel. The *Mersey* tried to make the joint last night but the weather was too boisterous. Fortunately it moderated sufficiently to enable the vessel to leave the harbour at 12.30 p.m. to-day, pick up the two ends, and join them together."

In the December of the same year a cable containing 3 circuits (one superimposed) was laid between Dover and Sangatte and provided the naval and military authorities with additional circuits to Calais, and connected the War Office with Versailles. By this time the lines of communication in the North of France formed an extensive trunk wire system by means of which G.H.Q. was not only directly connected with England *via* Calais, Boulogne and Dunkirk, but also with the various army headquarters and with Paris.

In May, 1918, two cables were laid between Dungeness and Audrecelles, providing 6 more circuits (2 by superimposition) and were used chiefly in connexion with the Dover Patrol and the transport services. Thus not only were the governments in London and Paris placed *in oral communication touch with each other*, and the War Office with its armies in the field, but, by degrees, all arms of the service were put in possession of the incalculable advantage of regular telephonic connexion with England.

At the conclusion of the armistice the requirements of the Peace Conference at the Astoria Hotel, Paris, were served by six direct circuits from London, three of which were obtained by utilising existing lines and three by means of a further new cable between Dover and Sangatte, laid in November, 1918. At this time there were 22 circuits working between England and France, nine of which terminated at Paris, four at Dunkirk, three at Boulogne, two at Calais, one at Versailles, two at G.H.Q., and one at the American Headquarters in France. One of the G.H.Q. circuits was subsequently extended to Cologne until the re-opening of the public service to France. This constituted the only direct telephonic communication which has ever existed between England and Germany, although satisfactory speech trials were made in 1913 *via* Belgium between London, Cologne and Frankfort, and, later in the same year with Berlin.

*(To be continued.)*

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## THE SUBSCRIBER AND HIS SWITCHBOARD.

By D. HOWIESON (Glasgow).

"MAN is born unto trouble as the sparks fly upward," says the Scripture, and it would appear that those who have made the telephone business their vocation in life come in for a large share of this mundane joy. It is not only the members of the public who seem to have a telephone twist in their natures that cause the telephone officials' hair to whiten or fall out prematurely, but generally speaking the average members of the telephoning public are ignorant of the most elementary principles of modern telephony and in their lack of knowledge cause difficulties to themselves and those responsible for the service. A certain ecclesiastic of high standing visited one of our modern exchanges in order to extend his knowledge of worldly matters, and in the course of conversation stated he was surprised that the telephonists were not running about the switchroom making connexions. He was asked how he thought telephone connexions were established, and in reply stated that he imagined the operators had to run from one part of the room to another with a wire and hook it to the required subscriber's line. This method would be rather worse than a 10,000 multiple, and there would likely be a few casualties in the course of a day. Between this rather elementary point of view and that of the subscriber who imagines that by some mysterious process his connexion should be through in the twinkling of an eye with no trouble at all, there is a large field of various hypotheses as to what is really happening from the time the exchange is called until the clear is given. Of course we ignore the general skit on telephone operating contained in funny periodicals and on the stage, unless it is to laugh with the crowd at a few of our own short-comings.

A certain amount of propaganda work which we term the Education of Subscribers has been carried out, but there is still a large and ever-changing field to cover, and before we have a telephone-using public who are fully alive to the possibilities and impossibilities of the telephone much time will require to be given to this phase of the work, and every opportunity should be taken to induce subscribers to visit telephone exchanges so that their outlook on telephone matters may be enlarged.

One of the principal difficulties in connexion with the public use of telephones is the inefficient operating at subscribers' switchboards, more especially on the smaller types where there is no proper operator delegated for this work, but any member of the staff makes the connexion as circumstances permit. The trouble caused at such switchboards is incalculable, and the pity of it is that the trouble is generally thrown back on the long-suffering telephonist, who has therefore to stand the abuse for her own as well as the subscribers' errors from the present public point of view. A subscriber called at the Traffic Office one day storming and fuming that his clients were being constantly told his number was "no reply." A watch was being kept on his circuits in the exchange at the time, and while the subscriber was being interviewed word came through that no reply could be obtained on both his lines. An officer ran to the subscriber's premises which were near at hand, and found both exchange indicators down, the bell switched off, and, to make matters worse, the switchboard accommodated in a cabinet with the door shut. Needless to say, a satisfactory explanation was given to the subscriber. Before being enlightened, however, he held the view that the trouble was due to carelessness on the part of the telephonists.

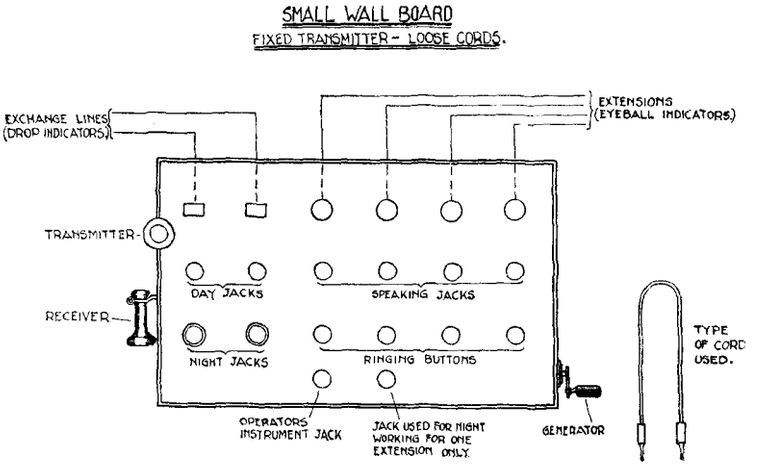
Before the amalgamation of the National Telephone Company with the Post Office there were two telephone services in Glasgow, viz., the National Telephone Company, and the Post Office, and the larger users subscribed to both systems. Intercommunication between the two services was allowed. This produced some very complicated apparatus at the subscribers' premises, and when it was necessary to pay a visit to such a place when difficulty was being experienced in the exchange through the subscriber's faulty manipulation of his apparatus, the heart of the visiting officer would almost stop when he saw a goodly portion of the wall decorated with switchboards, switches and cords, a position of affairs which render the working very difficult. It was sometimes a rather awkward predicament to be in when the subscriber asked the visiting officer to show him how to work the apparatus simply, and a certain amount of ready wit had to be conjured up in order to keep the subscriber's attention off the apparatus until the eye could take in what was involved in the various items plastered on the wall. These anomalies have been almost entirely cleared out now and up-to-date switchboards have been installed with all the lines terminating on one board. An opportunity has thus been afforded to endeavour to get subscribers to take an intelligent interest in the working of their switchboards, which until this unification took place was in many cases more than could be expected owing to the complicated apparatus. In this connexion subscribers have been invited to allow their switchboard operators to be thoroughly trained where this was necessary, and in cases where there were no fixed operators, recommendations to have a properly trained person at the board have been agreed to in many cases when the advantages have been demonstrated. The result has been a distinct gain to the service as a whole, for trouble at a few subscribers' ends does not stop there but re-acts on the exchange service. Some subscribers put forward the plea that if they do not work their switchboards properly the trouble is their own. This is a fallacy, as the result is that the delinquent board becomes a minor wave centre and radiates difficulty all round, as our old friend, the stone, dropped in the pond radiates the wavelets.

On the whole there is not a great deal of trouble experienced with large subscribers' switchboards where there is a trained operator, and if any difficulty arises it can be rectified quickly. Cases of difficulty generally found in connexion with this class of switchboard are those where the operator is too busy, where the operator has to take telephone messages, in shortage of cord circuits, and in friction between the subscriber's and department's operators. The first two points usually show themselves in slow answering and clearing, and the third point in slow answering. Such cases and those of friction are reported to the Traffic Office for investigation, and a judicious interview with the subscriber, or the subscriber's operator generally puts the matter right so far as they are concerned. Cases of friction between the subscribers' operators and the exchange staff are not frequent and the relationship, if not cordial at times, is nevertheless tolerable.

With smaller subscribers' switchboards, however, as already stated, there is a considerable amount of difficulty experienced such as slow disconnexion, slow attention, too much telephoning at the switchboard, faulty manipulation and indifferent salutation. Slow disconnexion causing permanent glow in the exchange is a source of a lot of trouble, not only to the subscriber involved but also to any of his clients calling him up. In the Glasgow Central Exchange there is sufficient work in plugging up and looking after such cases to keep a telephonist employed during the busy hour. Lists of defaulting numbers have been kept and the subscribers involved have been visited, but any improvement by such means has been only temporary. The most efficacious method of combating this trouble has been to adopt what we might term worrying tactics. If a subscriber leaves a line P.G. and has another disengaged line at the time he is rung on the disengaged line and asked to clear the defaulting line, and favoured with a few aphorisms on the working of his switchboard. Some improvement has been effected by advising subscribers to set apart definitely a member of the staff to attend to the switchboard and when not required for this purpose some office work can be done sitting near the switchboard. It is surprising, however, to find some subscribers taking umbrage at what they term interference with their business. Slow answering at subscribers' switchboards is another phase of trouble frequently caused where there is no one directly responsible for the answering of the telephone. In some premises it would appear as if the telephone, being nobody's particular business, was left to look after itself. When they waken up to answer the call and obtain the "A" operator who states that there is no one on their line, they complain of false rings or cutting off. A further difficulty experienced with small switchboards is the trouble caused by the large amount of telephoning which takes place at the switchboard instead of switching through to an extension and leaving the board for switching purposes. Cases have come to light where long conversations have taken place at the switchboard and other calls have been ignored during the conversation, giving rise to unsatisfactory cases of no reply. Indeed the exchange is conveniently blamed for no reply calls in numerous similar instances and also in cases where the office staff has been out or the bell switched off. A case came under observation where a subscriber spoke for 40 minutes on one line and ignored completely all attempts to gain his attention on his second line. The connexion was maintained to see what would happen and the evidence collected overwhelmed the complainant. Faulty manipulation at the smaller boards causes some of the cut-off trouble of which we hear a lot in these days of C.B. working. The modern switchboard does not cover up the subscriber's shortcomings as did the magneto types, and the point of holding the exchange while switching through to an extension is a matter which appears beyond the judgment of certain telephone users. In listening to conversations it is surprising to find the extent to which "halloaing" goes on before actual conversation begins. Instead of boldly announcing the name of the firm it would appear to be a case of who would be last to give the name or business away. This may be Scotch "cannyness" in the case of Glasgow subscribers, but it does not make for efficiency, and many a trunk conversation could be materially reduced in time if the subscribers would announce their names when the connexion is made. It would appear that unless the voice was "weel-kent" the subscriber was diffident about giving his name away.

These are a few of the troubles associated with the working of subscribers' switchboards. It must not be taken, however, that all switchboards come under this category as there are many where the working is efficiently carried out. In such cases there is generally an absence of complaint and it often happens that a good private branch exchange operator saves us from trouble made by the exchange staff in her capacity as intermediary between the subscriber and the exchange. It is contended, however, that the number of cases of faulty working at subscribers' switchboards is much too high in these enlightened days, and that subscribers have not yet on the whole realised the importance of the proper working of telephone apparatus and the gain in quick answer and disconnexion.

The work of educating subscribers is met in this district by getting the exchanges to report cases of difficulty to the Traffic Office. An officer calls at the subscriber's premises and investigates the working, giving the necessary advice and help. An opportunity is given to the subscriber to visit his exchange accompanied by a Traffic Officer. The greater a grumbler the subscriber is, however, the less inclined is he to make the visit, as he frequently thinks that he will get a hostile reception. He is calmed, however, by the assurance that we will not give his name away. Some of the testing telephonists have been taken round subscribers' premises where there are different types of switchboards and the working thoroughly explained to them so that they can be in a position to give the subscribers any assistance in explaining the working of their boards if any difficulty comes under their notice at the testing positions. Sets of simple diagrams of subscribers' switchboards with working explanations are in course of preparation for the use of the testing telephonists. As an example of the nature of the diagrams and explanations, the following shows the small C.B. Wall Board, fixed transmitter type which is fairly common in this district.




To answer Exchange line: Insert one end of loose cord in Exchange jack and other end in Operator's instrument jack and carry on conversation.

To put Exchange line through to an extension:—Keep one end of cord in Exchange line jack; withdraw other end from Operator's speaking jack; take another pair of cords and insert one end in Operator's speaking jack and the other end in the extension jack required. Press small white button under extension jack and turn generator handle. (White button should be kept depressed while ringing with generator). When extension answers Operator explains who is calling and then withdraws plug in extension jack and inserts loose end of cord that is in Exchange jack. When conversation is finished P.B.X. Operator receives "clear" on eyeball indicator. After conversation is finished, plugs should be withdrawn at once, otherwise a P.G. is received in Exchange. One end of a cord left in an Exchange jack also causes a P.G. (permanent glow).

Extension to Extension:—Take a loose cord and insert one end in Operator's speaking jack and the other in extension calling. Procedure should then be the same as Exchange to extension. When conversation is finished, eyeball indicator "clear" is given.

Night Working. If it is necessary to leave an extension through to Exchange at night, special wiring arrangements have to be made. In such cases there is a special jack for the Exchange line and extension concerned as shown on sketch. A loose cord is inserted in the night Exchange jack and the night extension jack.

The other diagrams include large floor boards, cordless boards and the bell set 4 switch. The testing telephonists display the greatest interest in the work of educating the subscribers, and it was on their own initiative that they were taken to see the subscribers' switchboards.

Such are some of the methods taken to endeavour to bring the Telephone Service up to as high a state of efficiency as possible. The service is comparable in a small way to the position of affairs in the world of trade. When a section of the trade community gets out of joint or a stoppage occurs the effect is evinced in varying degrees in the other sections, and so in the telephone community all parts of the machine require to run smoothly, and the subscriber and his switchboard have their share in the work in order that the maximum efficiency may be attained.

## MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.SC., M.I.E.E., FELLOW I.R.E.

### RECEIVING APPARATUS.

*Crystal Detectors.*

WE have now completed our brief preliminary survey of the field covered by modern wireless telegraphy and telephony, and can proceed to deal more fully with the various points which have been touched upon therein.

It will be convenient to vary the order adopted in the foregoing sketch, and to deal first with receiving apparatus.

It has been explained that the usual method employed to detect the oscillatory currents set up in the receiving aerial by spark signals is by cutting off from the telephones one half of each oscillation, and causing the other halves to blend together to produce a brief uni-directional current through the telephones. The process is called "rectification." The train of waves corresponding to each spark will thus produce a single pulse of current through the telephones, and cause a click to be heard. The successions of clicks so produced at the receiving end when long or short series of sparks occur at the sending station will be heard as long or short continuous sounds, and so the signals can be read.

Rectification is usually accomplished by making use of a property possessed by certain pairs of substances in contact with one another, by which a current of electricity is allowed to pass across the contact in one direction with comparative ease, but can only be sent across the contact in the opposite direction with considerable difficulty. To express the matter in technical language, the contact possesses "uni-lateral conductivity" (conductivity being the opposite of resistance, the property by which a substance opposes the flow of electricity), and as a consequence a greater driving pressure, or "electro-motive force," is required to send a current across the contact in one direction than in the other. It therefore follows that for electro-motive forces of *equal* magnitudes, applied across the contact first in one direction and then in the other, the currents which these electro-motive forces will produce will be unequal, the current in the direction in which the conductivity is good being much greater than that in the opposite direction. Since one or both of the substances used in these rectifying combinations are crystalline, the arrangements in which they are employed are known as "crystal detectors."

To investigate the electrical behaviour of any crystal detector, electro-motive forces of gradually increasing strength are applied across it in one direction, and the magnitude of the currents which are caused to flow by the various electro-motive forces are noted. The direction of the electro-motive forces is then reversed. They are increased in strength step by step as before, and again the currents corresponding to the various values of electro-motive force noted. The results are then plotted on a diagram, as in Fig. 9. Distances to the right or left of a vertical line represent to some scale the values of the electro-motive forces applied in one direction or the other, while distances measured upwards or downwards from a horizontal line represent the strengths and directions of the currents. Thus each observation of an electro-motive force and its corresponding current can be represented on the diagram by a dot placed in the proper position with reference to the two datum lines. The unit in which the electro-motive forces are expressed is the volt, while the currents, being very small, are expressed in milliamperes or even in microamperes. When the dots thus obtained by altering the electro-motive force by steps from some value in one direction through zero to some value in the opposite direction are joined by a continuous line a curve is obtained by means of which the strength of the current corresponding to any electro-motive force between the limits taken can be obtained. Such a curve is called the "characteristic curve" of the particular combination under investigation.

The combination most generally used now-a-days for a crystal detector consists of a small disc of polished steel, against which is pressed a crystal of carborundum. The characteristic curve

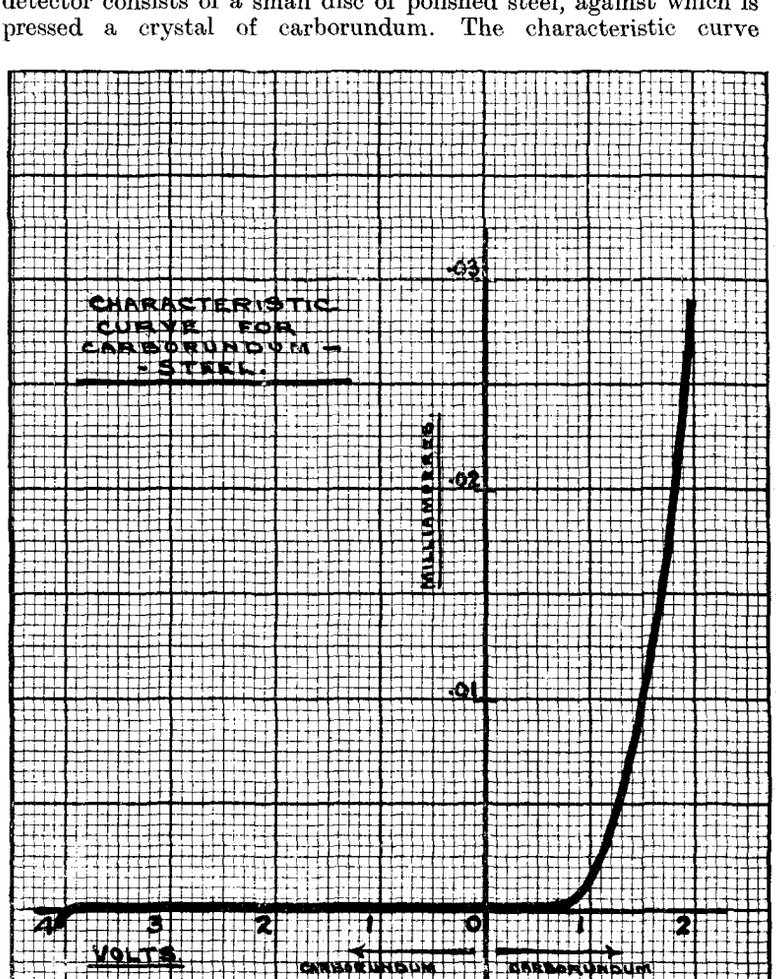



FIG. 9.—CHARACTERISTIC CURVE FOR CARBORUNDUM-STEEL COMBINATION

for such a combination is shown in Fig. 9. Suppose the electro-motive force to be applied across the contact in such a direction as to endeavour to send a current from the carborundum to the steel, that is, that the potential of the carborundum is made positive with regard to that of the steel. Then, as soon as the difference in potential between the corborundum and steel reaches 0.8 volts a current begins to flow, and increases in strength rapidly as the potential difference is made greater. If, however, the electro-motive force be applied in the reverse direction, the carborundum being made negative to the steel, no current will flow until the potential difference reaches nearly 4 volts. A potential difference of 1.5 volts with the carborundum positive to the steel will set up a

current of 0.01 milliamperes, while with an electro-motive force of the same amount in the reverse direction no current at all will pass. But although current can be sent across the contact from carborundum to steel so much more easily than in the reverse direction, the potential of the carborundum above that of the steel must be at least 0.8 volts, or no current will flow. This is a drawback to the simple carborundum-steel detector, as it means that this detector will only act as a rectifier when the amplitude of the alternating voltage applied to it exceeds a certain minimum amount, which, in the case of the detector to which the curve in Fig. 9 refers, is 0.8 volts. Below this amplitude of applied alternating voltage the detector acts as a block to currents in either direction.

It is, however, easy to overcome this difficulty. If a steady electro-motive force of 0.8 volts be applied from carborundum to steel we shall have the combination in the state represented by the point on the diagram at which the current curve is just beginning to rise. Suppose now we superimpose an alternating potential difference on this steady potential difference. When the pulse of the alternating voltage is in the same direction as the steady voltage the total potential of the carborundum above that of the steel will be increased, and, as the curve shows, a current will flow through the detector no matter how weak the applied alternating voltage may be. When the pulse of the alternating voltage is in the opposite direction, the total voltage applied to the detector is diminished or even reversed, and unless the amplitude of the alternating voltage be greater than about 4.8 volts no current will flow through the detector.

Thus the pulses of the alternating voltage in one direction will send current pulses through the detector, while the voltage pulses in the opposite direction will have no effect. An indicating instrument for direct currents joined in series with the detector will therefore be actuated by the rectified current set up when even a very weak alternating voltage is applied.

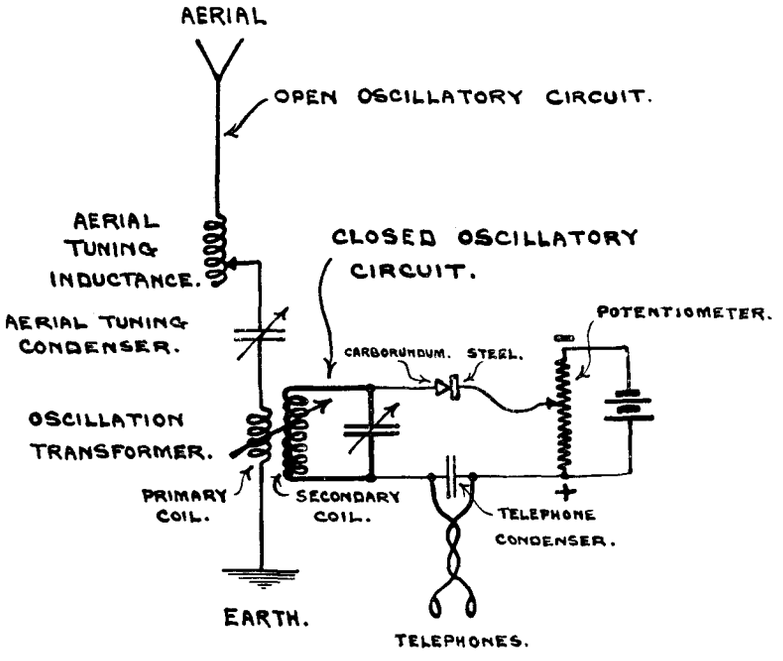



FIG. 10.—RECEIVING SET USING CRYSTAL DETECTOR.

*Receiving Set.*

The manner in which the crystal detector is used for the purpose of receiving wireless signals is shown in the diagram, Fig. 10. The open oscillatory circuit, consisting of aerial tuning inductance and aerial tuning condenser, has also included in it the primary coil of an oscillation transformer. This instrument consists of two coils placed near to one another so that oscillations in one coil, the primary, will induce oscillating impulses in the other coil, the secondary. This latter coil is joined in series with an adjustable condenser, so forming a closed oscillatory circuit. The arrows across the condensers in the diagram indicate that their capacities can be varied, and the arrow across the two coils of the oscillation transformer indicates that the "coupling" between these coils can be altered, that is, that the magnitude of the effect produced in the secondary coil by a given strength of alternating current in the primary coil can be varied. The open and closed oscillatory circuits are both adjusted so that their natural frequencies are the same as that of the incoming waves. This process is called "tuning" the circuits to the incoming waves. These waves will therefore set up oscillations in the open oscillatory circuit, and these oscillations will act on the closed oscillatory circuit by means of the coupling between the coils of the oscillation transformer and so the closed oscillatory circuit will also be set into oscillation. As the charges swing to and fro in the closed oscillatory circuit first one plate of the condenser and then the other plate will be charged positively, the opposite plate being, of course, charged negatively.

The crystal detector is joined across the plates of the condenser in series with the telephones, and consequently the alternating potential difference set up between the plates of the condenser will tend to set up currents through the detector and telephones, first in one direction and then in the other. By means of the potentiometer shown in the diagram a steady electro-motive force, which can be adjusted to any desired value within limits, is applied to the detector. A "potentiometer" consists of a high resistance joined across the poles of a battery, and through which, therefore, a weak current is flowing. There is thus a fall of potential down the resistance, in the same way that there would be a fall of pressure along a narrow pipe through which water was being forced by a pump. The further along from the high pressure end of the pipe one went, the lower would the pressure be. Similarly, the further one goes along the resistance from the high potential end the lower is the potential. The high potential or positive end is joined to the carborundum through the telephones and the secondary of the oscillation transformer, while a wire joined to the steel can be moved along the resistance till a point is found at just the correct potential below that of the positive end to bring the detector into the state indicated by the upward bend of the curve in Fig. 9. The alternating electro-motive force across the plates of the condenser is superimposed on the steady electro-motive force from the potentiometer, and thus the total electro-motive force applied to the crystal contact will be alternately greater and less than that from the potentiometer alone. When the steady electro-motive force is adjusted to the proper value, a very small alternating voltage will cause a rectified current to flow through the detector and telephones, as explained above. Consequently, for each train of oscillations set up in the closed oscillatory circuit a series of unidirectional pulses will flow through the detector. These pulses are not sent directly through the telephones, but a condenser, known as the telephone condenser, which is joined up across the telephone leads, stores up the separate pulses, which are then discharged in a single longer pulse through the telephones, so producing a click. The various steps in the process are shown in diagrammatic form in Fig. 6.

It should be mentioned that with certain samples of carborundum the uni-lateral conductivity is in the reverse direction to that described above, current flowing more easily across the contact when the potential of the carborundum is lower than that of the steel. The principle of the action of the arrangement is however, unaltered.

*Thermionic Valves.*

The simple crystal detector, although still very widely used, is rapidly being superseded by detecting appliances in which use is made of the apparatus known as the "thermionic valve." These valves enable the sensitiveness of receiving apparatus to be much increased, and therefore the range over which communication can be carried on to be greatly extended. They have further important applications which will be explained later.

The thermionic valve is a remarkable example of the application to every-day purposes of phenomena which, when first discovered, appeared to be of no practical importance whatever. It consists of a small glass bulb, from which the air has been very fully exhausted. A filament, usually of tungsten, is placed inside, and has its ends brought out through the walls of the bulb. By joining the ends to a battery, a current can be sent through the filament and cause it to glow. The arrangement so far is simply a small electric lamp.

Opposite to the filament a metal plate is supported by suitable means. This plate is called the "anode" of the valve.

Between the anode and the filament is fixed a partition of wire gauze, known as the "grid" of the valve.

Both anode and grid are provided with wires led through the wall of the bulb. By means of these wires electrical contact can be established between the anode or the grid and external apparatus.

The relative positions of the different parts of a valve are shown in Fig. 11. There are several types of valve in use, and the actual arrangement in any particular case varies according to the type of valve considered. The principle, however, is the same in all.

If such a valve, having its filament made to glow by the current from a battery $B_1$ (Fig. 12), have another battery, $B_2$, known as the "high-tension" (H.T.) or "anode" battery joined up as shown, with its negative pole connected to the filament, and its positive pole joined to the anode, then it is found that a current, called the "anode current," will flow from the battery $B_2$, as indicated by the arrows, the circuit being completed through the apparently empty space inside the valve between the anode and the filament. This current can be measured by a suitable instrument A joined in the circuit. Why this current should flow across the gap between anode and filament will be explained later; for the present it may be taken for granted that such is the case.

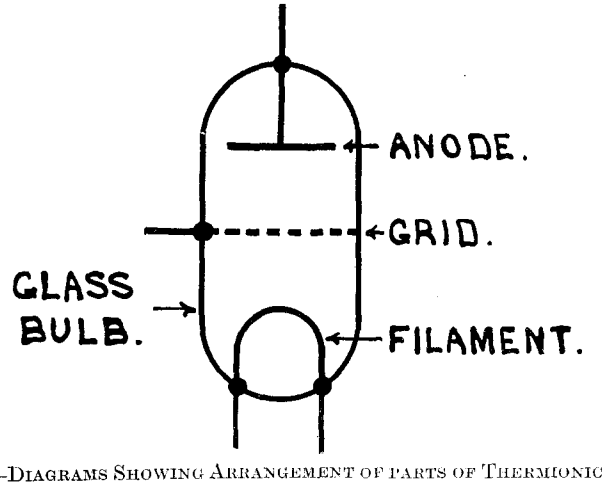



FIG. 11.—DIAGRAMS SHOWING ARRANGEMENT OF PARTS OF THERMIONIC VALVE.

It will be seen that, in its path from anode to filament, the anode current flows across the grid. It is found that the strength of the anode current depends not only on the electro-motive force of the battery $B_2$, as would naturally be expected, but also upon the difference of potential between the grid and the filament. By varying the potential of the grid the strength of the anode current can be altered, although the electro-motive force of the battery $B_2$ is kept constant.

It is from this fact that the name "valve" is derived. The apparatus acts like an electrical tap, the amount by which the tap is opened being governed by the potential of the grid.

The exact way in which the anode current depends on the potential of the grid can be ascertained by joining to the grid a potentiometer, consisting of a battery $B_3$ with a resistance across its terminals, as shown in Fig. 12. The centre point of the battery $B_3$ is joined to the negative end of the filament. The potential, or electrical pressure, at this point in the battery will, of course, be half-way between the potentials of the positive and the negative ends of the battery. The potential of the middle of the potentiometer resistance will also be half-way between the potentials of its ends, and will therefore be the same as that of the middle point of the battery.

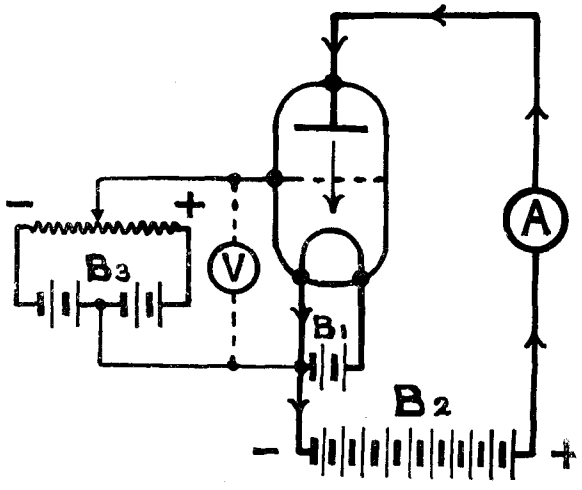



FIG. 12.—DETERMINATION OF ANODE CURRENT-GRID VOLTAGE CHARACTERISTIC OF VALVE.

Hence, when the potentiometer slider is in its middle position, the grid will be brought to the same potential as that of the negative end of the filament, while, by moving the slider to the right or left of the middle position, the grid potential can be made greater or less than that of the negative end of the filament.

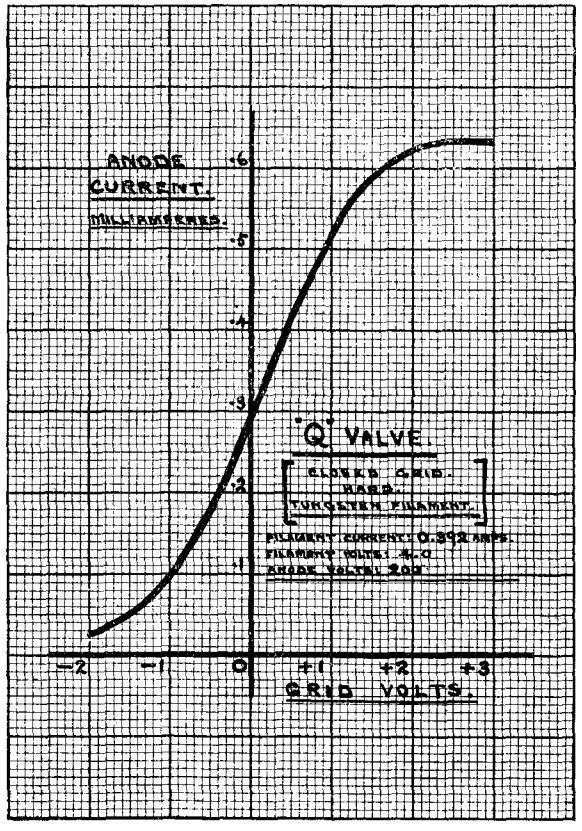



FIG. 13.—ANODE CURRENT-GRID VOLTS CHARACTERISTIC FOR "Q" VALVE

A voltmeter, V, joined between the grid and the negative end of the filament, enables the difference of potential to be ascertained.

Keeping the anode battery $B_2$ unchanged, we can now vary the grid potential from some negative value to some positive value with reference to the negative end of the filament, and for

each particular value of grid potential the corresponding value of the anode current can be noted. The results obtained can then be plotted on a diagram in the same way as has already been explained in connexion with the investigation of the action of crystal detectors, and the "characteristic curve" for the valve thus obtained. Such a curve is shown in Fig. 13. This curve should really be given its full title, "anode current—grid volts characteristic curve," as there are other characteristic curves which can be drawn to show the connection between the values of other pairs of quantities concerned in the action of a valve.

It should be noted that the connexion between grid potential and anode current shown by the curve only holds good for the conditions specified. If the electro-motive force of the battery $B_2$ be altered, or if the temperature of the filament be changed by varying the current from the battery $B_1$, the curve obtained will be different. For the particular conditions of filament temperature and anode battery voltage for which the curve was plotted, however, the anode current corresponding to any particular grid voltage can be at once obtained from the curve.

For understanding the manner in which a valve is used for the purposes of wireless telegraphy the fact that the anode current varies with the grid potential in the manner shown by the characteristic curve can be taken for granted. The results indicated by the characteristic curve, however, depend on the actions which take place inside the valve, and, as a matter of interest, a brief account of these will be given.

*(To be continued.)*

## SELECT COMMITTEE ON TELEPHONE SERVICE, 1921.

RESUME OF EVIDENCE *(continued)*.

*On May* 11, Mr. J. WALTER CLARK gave evidence on behalf of the National Chamber of Trade. He said that a questionnaire issued to members of that body resulted in a preponderance in favour of the message rate. They thought the proposed charges excessive, and wanted, if possible, to see a telephone in every house. He was of opinion that the rates for the provinces should be much cheaper than those for London.

Mr. R. A. DALZELL gave evidence on *May* 25 and 30. He amplified the Secretary's sketch of the Post Office organisation, and described the relationship of district managers to surveyors and postmasters. He dealt with the training of operators, their duties and loads, and the proportion of supervisors to operators, and in giving an explanation of wrong number troubles stated that on the magneto system subscribers failed to ring off in the case of nearly 16 per cent. of the calls made. On the 30th the Committee returned to the subject of the Executive Control of the Secretary, and Mr. Dalzell gave his opinion that the machine as now constituted was running very smoothly. He explained that the Post Office organisation was necessarily more complex than that of the National Telephone Company, and said that the establishment of a distinct organisation for telephones would be enormously more complicated and would increase expense. After defending the contention that working costs do not necessarily decrease with development, he explained the operating costs per message and why it was necessary to make a special charge for continuous service in certain small exchanges.

Mr. T. HOLME and Councillor OMBLER, representing the Hull Corporation, were called in and examined on *June* 6. They explained the Hull rates and admitted that a flat rate was better suited to a small system than a national one. They also endorsed the Post Office contention that an increase in the number of subscribers did not mean lower cost per subscriber. They described the organisation of the Hull telephone system. They had made a profit up to two or three years ago and were now raising their rates to meet the present loss.

Mr. FRANK BIRD gave evidence on *June* 8 on behalf of the Newspaper Society. He was strongly in favour of flat rates and claimed that newspapers did not overload their lines, which they had in excess of their actual requirements. He complained that the rentals of private wires were prohibitive. He thought that the Post Office was not run on business lines, and complained of over-supervision, but he admitted that he had never visited an exchange, and that his knowledge of business matters was confined to newspapers. He admitted, when pressed by the Chairman, that possibly his estimate of 10,000 calls as a reasonable load for a line too high, but thought that a load of 5,000 was low.

*On June* 13, Mr. G. L. HARDING, Surveyor for the South Wales District, was examined. He explained fully to the Committee the responsibility of surveyors with regard to the Telephone Service, and in what circumstances district managers referred to him, and in what cases they corresponded directly with headquarters, with the Accountant-General and with the Superintending Engineer. He stated the responsibility of postmasters with regard to staff, and gave a sketch of the general duties of the surveyor and his staff, their system of visiting districts, and the matters under their special control.

Mr. B. WAITE, District Manager of the Cardiff and Newport Districts followed, and informed the Committee of the duties of the contract manager, chief clerk and traffic superintendent who assisted him. He confirmed the opinion of the previous witness that the present system of control was the most economical, and said that for staff work to be performed in the district manager's office would necessitate two sets of staff. He explained the relations of the district manager with the postmasters, and described the former relation of district managers in the National Telephone Company with the provincial superintendents, who were telephone experts, and who were consulted on some of the matters on which surveyors were now consulted. Mr. Waite thought it would be desirable to have at the head of a district an administrative officer who controlled also the engineering department.

## A FEMININE PLAINT TO THE EDITOR.

It seems you accuse us of slacking
Where buying the JOURNAL's concerned,
In "Noblesse Oblige" we are lacking,
Its learned discourse we have spurned.

But, prithee, kind Sir, can you wonder?
The poor frivolous feminine mind
Is assuredly set poles asunder
From magnetos and all their dull kind.

The phrasing's pedantic and solemn,
The articles learned and slow,
Oh, will you not give us a column
On "Things that we'd *all* like to know?"

A cartoon to liven the pages,
Instead of a diagram sketch,
Some cryptic and witty adages,
A short story or two that will "fetch."

We promise you we'll buy the JOURNAL
If you'll give us a few Beauty Aids,
We'll all be subscribers eternal
For receipts to make jams—marmalades.

And, if all this prosiness quitting,
Our interest you would arouse
Then give us a pattern of knitting,
Or cami—ahem! or a blouse.

'Tis a masculine book and 'tis "stuffy."
To *us* it seems woefully dry,
Let it go! Be a little more "fluffy"
*Please*, Editor dear, won't you try?

DOROTHY TURNER.

Regent Exchange, June 10.

[Reflect, dear correspondent, what you ask
And judge if we be fitted for the task
To counsel beauty, in its hour of need
With toilet tips which may—or not—succeed.
Back to the cheek to call the vanished red
Or ebon tress to some fair moulting head!
Think if our scanty pages have the space
Or, if they had, whether they be the place
For those high matters, which, much better done
In *Home Bits* may be read by everyone?
Though operating curves we sometimes print
We can't give diagrams of . . . what you hint!
Nor can we draw, in tales replete with "grip"
Strong silent heroes with clean-shaven lip.
But seriously, we would bid you try
To read those papers which you deem so dry,
Much that looks dull of interest you'll find
If you approach it with enquiring mind,
Or, better still, O lady-readers, write!
Your views, your thoughts, your letters we invite
Which gladly we shall print, if they suggest
Some little telephonic interest.

EDITOR, "T. & T. J."]

The
# Telegraph and Telephone Journal.

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

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

*Managing Editor* - - W. H. GUNSTON.

## NOTICES.

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

VOL. VII. JULY, 1921. No. 76.

## THE REVISED TARIFF AND REGISTRATION.

THE new tariff has brought into the limelight the question of call registration. Directly touching as it does the financial interests of the subscribers, this, the penultimate step in the operation of a call, has always been the central point of attack in public criticism of a message rate tariff. It is true that repeated investigations by representative bodies of business men have shown that the system of call recording followed at register exchanges is as accurate as any humanly operated system can be; but the very fact that in the last resort the human agent and not the machine controls the mechanism which registers a call makes it only natural that even the most reasonably minded subscribers should expect the administrative machinery to provide some safeguards against overcharge.

Such subscribers should find much to allay their anxiety in the recently issued London Traffic Instruction on call supervision in relation to accuracy of registration, the principal points of which have been embodied in a printed leaflet distributed to every London telephonist. The central idea of the instruction is to give expression to the subscribers' point of view; for, so far as the routine of operating is concerned, the new tariff does not introduce any change either in the incidence or frequency of the registration step: under the old tariff the register key was depressed in the case of flat rate and message rate calls alike. The new tariff, however, makes this difference:—under the old conditions, though nearly 80 per cent. of the London subscribers were message rate subscribers, less than 50 per cent. of the traffic was message rate traffic; with the result that in more than 50 per cent. of the calls handled the charge made to the subscriber did not depend in any way upon the telephonist's accuracy of recording. Now it depends wholly upon this.

"Use to the full the comprehensive machinery of call supervision provided by modern switchboards and give the subscriber the benefit of any doubt," is the new instruction in a nutshell. This is an earnest of the spirit in which the new tariff will be applied. At first sight it may seem an exaggeration to say that the success of the new rates—in its complete sense—depends upon the degree of efficiency attained in the simplest of the chain of operations that go to make up an effective call; but there is a very real sense in which the statement may fairly be made. For the complicated mechanism of co-operative effort called "Telephone Service," goodwill is the only lubricant; and of all the multifarious service troubles inherent even in the most perfect telephone service none have deeper adverse re-action on the co-operative possibilities of the subscriber than charge disputes. In a sense widely different from the obvious, therefore, the key to the success of the new tariff is the register key.

## THE TELEGRAPH PROBLEM.

WE all have our solutions of the Telegraph Problem. Mr. Skinner, in this issue, tells us the way in which he thinks the deficit can be removed, and he will not think us disrespectful if we suggest that his solution is not altogether novel. The daily press has insisted that if only the product is sufficiently cheapened there is no limit to the profits which could be made. Those newspapers which once were a halfpenny and are now a penny are the most eloquent on the subject, and their reluctance to reduce their price to a halfpenny again is ascribable to a laudable spirit of self-sacrifice. It is very luring to say that if the price of telegrams were only reduced to sixpence we should have thousands more telegrams and all our troubles would be ended. The arithmetic of the subject is not encouraging. If we take the total cost of the staff and divide it by the total number of telegrams we shall get a figure which sets one thinking. Moreover, it is not at all certain that even if such a tariff could be proved to be remunerative the public at the present moment wants a cheaper rate, either deferred, or posted, or treated in any other inferior way. In a vast country like the United States there are possibilities for graded tariffs over long distances which do not arise in the United Kingdom. Nor at a time of industrial depression is it at all opportune to make such a venture. There is a limited demand, at the moment, for most commodities, and it is the business telegram which happens to be lacking just at present. Not even the wildest enthusiast for a deferred tariff will expect to find his thousands of supporters in the business communities.

All this sounds very hopeless, but it is only facing facts, after all. A nationalised service does cater for the country at large in a way which is not possible to a privately-owned service. It is rather remarkable to reflect that we are trying to serve even the smallest town with the same quality of service as the larger town. There is in America a device known as the "Way" circuit. It is a long omnibus circuit serving in some cases as many as thirty small towns. Possibly it gives them some sort of a telegraph service; at any rate, when two of the offices are working together nothing happens to the other twenty-eight. That may or may not be the

true ideal. It may be the case that where there is little traffic it is sound economic theory to cheapen the service. At any rate the nationalised services have not done this. They have not graded the service in quality according to the amount of support which they get from the particular neighbourhood. To give a service of practically identical quality to every office is a high ideal, but it is a costly ideal. It involves unoccupied time somewhere of plant and of staff. It may be well worth it for the sake of the cohesion of the nation and the rapidity of interchange of communication, just as a branch railway line has its special value. But the network of telegraphs includes a great deal of branch lines. They are everywhere. No village of any considerable size can get away from them. And while students of transport have been suggesting very limited facilities on branch lines, we in the telegraph service—allegorically speaking—give them expresses and dining-cars.

This is not to say that we should be complacent. On the contrary, there is room for study. Output is an old question and yet if the staff charge per telegram is to be reduced we shall all have to co-operate to increase the output. None of us likes the thought that our industry is labelled unsuccessful, whatever explanations we may be able to give. Sooner or later we shall have to face this issue. Not until we have brought the staff charge per telegram within more reasonable proportions of the total charge to the public will it be possible to consider the various schemes which contributors ask us to publish. There may then be opportunities for developments in the way of finer grading of services, but before that day comes we have to face the bigger problem. No one who knows the telegraph service will accuse its officers of lack of zeal, or enterprise, or keenness. The contributions to which we have referred, such as Mr. Skinner's, bear tribute to these qualities. But if we are to use the newer types of telegraphy to good purpose, to the furthering of the usefulness of our craft to the public, we must set to work to find out in what way we can so economise the details of labour as to encourage the productivity.

## A FEMININE PLAINT.

SOME sprightly verses from a correspondent in one of the London Telephone exchanges which we print in another column re-open a vexed and difficult question, and we are glad to give them publicity and, as far as we are able, to take up the gauntlet thrown down. We are, of course, eager that the JOURNAL should circulate in every exchange and that it should contain matters of interest to every telephonist—but we think that interest should revolve round the varied and manifold aspects of the Service and the personal and practical problems connected with it. It is a very wide field, and affords scope for matter which cannot be styled technical or dry. We feel sure that the majority of telephonists agree with us in this view and will understand that the inclusion of a special ladies' column in the JOURNAL would not be a satisfactory remedy of any alleged lack of interest. Purely feminine questions of dress and household management are dealt with so fully in dozens of ladies' papers, not to mention the considerable space devoted to them in the daily and Sunday press, one or several of which every telephonist doubtless reads, that it would be a work of supererogation to occupy our scanty space in an effort to rival those expert purveyors of feminine fare. We have our lighter side, but, after all, ours is a telegraph and telephone journal, and comic sketches, puzzles, anagrams, and serial stories would be out of place in it unless they had some bearing on our work.

We have from time to time dealt with operating problems and with traffic questions generally, and we are always glad to publish articles, paragraphs and pictures dealing with the social life and sports of the exchange staffs. If we do not provide more matter of close interest to telephonists, we think the remedy is largely in their own hands. We should be glad to hear from them more frequently, and will undertake to give a sympathetic hearing to their views. There must be vexed questions and two-sided problems on which they have opinions. We have before stated that the JOURNAL exists for the interchange and expression of opinion, and its success must necessarily be founded on co-operation. All communications sent to us are treated in confidence, and if they contain anything of a helpful, interesting, or amusing nature they will be welcomed by the Committee. We hope we shall not be blamed for quoting an old truism, if we point out that a subject which one tries to understand at once becomes interesting; and this applies especially to our work. We know from pleasant experience what a keen interest many telephonists take in problems bearing on the Service and we beg those who think the subject dry to give it a short trial.

## HIC ET UBIQUE.

WE confess we were very pleased to read in the Press a circumstantial and uncompromising rejoinder by the Postmaster-General to Mr. Macquisten's legend of Dalkeith. Amongst other things the legend told of prodigality of staff employed on what in his wisdom our critic considered a simple job. This kind of legend has been very rife of late, and the number of superfluous staff employed on the "simple job" is always an increasing number. We expect the next telephone critic who discovers three or four men installing a telephone will take, like Falstaff, the points of eleven rogues in buckram on his target.

NOVALIS says somewhere: "There is an ideal series of events which run parallel with the real ones. They rarely coincide." We might also say that there is a comic series of events running parallel with real ones; which also rarely coincide. There are people who live in a comic world, who demand that their papers, even their daily ones, be comic papers and their public men comedians; and we know that where there is a demand there is usually a supply. To such the comic aspect of life is so normal that its incongruities remain unnoticed. Fact and fiction are inextricably confused in their minds, and they find the latter infinitely the more amusing.

WE have received the following cuttings from a thoroughly unreliable source:—

*Evening Times*, Feb. 29.

Mr. Samuel Slumkey (Eatanswill, North) asked the Postmaster-General if it was the fact that 75 officers of the post office telephone department were employed in taking down a telephone pole in the forest of Sapsworth.

The Postmaster-General in reply stated that the pole, which was a heavy one, was removed by 3 men and a foreman. The figure of 75 referred to by the Hon. Member appeared to include a chief ranger, 2 parkkeepers, and 68 Loyal Sons of Temperance, who were picnicing in the forest, and 1 errand boy, all of whom were displaying great interest in the work.

From the same, June 31.

Horatio Fizkin (Eatanswill, South) asked the Postmaster-General whether he was aware that 957 servants of the post office were engaged in

removing a telephone bracket from the High Street, Eatanswill, and whether in the days of the National Telephone Company 2 employees would not have sufficed for the job.

The Postmaster-General in reply said the work had been satisfactorily carried out by 2 members of the post office engineering staff. Careful enquiry seemed to indicate that 614 officers and men of the Suffolk Light Infantry, 327 members of a procession of unemployed (who were passing while the removal was being effected), 7 policemen, 1 steeple-jack, 1 turn-cock, 3 brush-binders, and 2 organ-grinders must have been included in the Hon. Member's total of 957.

THE following remarks from the *West London Observer* will both amuse and instruct our readers: "The G.P.O. Telephone Mechanical Staff is having a busy time—cutting off the 'phones, hence the profusion of little canvas huts to be found on the pavement and elsewhere. This is the result of the great telephone swindle."

So that's how they think it's done—cut off at the main like water!

## THE BAUDOT.—XXII.

BY J. J. T.

THIS same axle $A^1$ also carries a geared wheel which when the receiver is placed in position on the base-plate engages with a slower running wheel *inside* the receiver connected to the printing-axle. In the weight driven form of receiver the necessary train-work is also geared on to the moderator axle so that when the receiver is placed in position the engagement of the moderator axle with the printing-axle revolves the latter and its printing mechanism.

In the case of the modern electric motor-driven type of receiver the motor is placed at the side of the receiver (Fig. XIII, Vol. VI, No. 57) and drives the printing-axle by means of an endless band and a grooved wooden driving wheel fixed on to a short extension of the printing-axle *outside* the receiver and behind the rear casing plate. When, in this case, the receiver is placed on the base plate it is therefore the printing-axle which drives the moderator axle. In both cases it is the moderator which determines the running speed of the receiver.

The electro-magnet brake coils have an ohmic resistance of 40 per coil. The free end of each of these terminates on the ebonite block R (Fig. LX) which is also provided with terminals *h h* from which the end of the coils are led away. An armature BB (Figs. LVIII, LX, LXI) the lower part of which is hinged under the base plate at M (Fig. LXI) carries a curved flat spring $S^1S^1$ with an adjusting screw $M^1$ (Figs. LX, LXI) which latter determines the position of a cork brake P (Fig. LXI) in relation to the periphery of the brake wheel BW. A capstan-headed screw LS (Figs. LX, LXI) limits the distance of the armature BB from the cores of the coils EM. BB is provided with diamagnetic facings to prevent the "sticking" of the armature and pole-pieces while the springs $S^1S^1$ further assist to throw off the armature once a current has ceased to flow in the coils. When the brake current from Rings 6 to 3 passes through the coils EM it attracts the armature BB. This action brings the cork brake P (Fig. LXI) up against the periphery of BW gently damping down the speed, for as already stated the running speed of a receiver is fixed slightly higher than that of the distributor of the installation to which it belongs, and this advance speed is determined by the *moderator* which we shall presently examine. The British method of adjustment is such that the moderator speed is fixed at a figure just so much in advance of the distributor that a gentle action of the cork brake on BW at *every* revolution of the distributor suffices to reduce the *running* speed of the *receiver* to the actual speed of the *distributor*, or at least within practical and workable limits. It will be seen from this statement that the moderator need not be so finely adjusted a piece of mechanism as that demanded by the more delicate functions of the distributor governor. The *moderator* is in fact a comparatively roughly constructed type of speed governor.

Before proceeding to the closer examination of the moderator it will be appropriate to mention that although the damping down of the receiver speed by the action of the brake current is a very simple method of phasing the receiver with its distributor it is nevertheless an operation which should only take effect at a certain moment during the cycle of movement of the receiver mechanism. We must therefore return to our study of the Baudot receiver selectors and their action (Art. XV). It will then be realised that it is impossible to actuate the selector levers *during* the passage of the selector N and its cams $KK^1$ (Fig. XL) into the arc occupied by these same levers. As a matter of fact it is absolutely necessary that these levers which are about to be displaced to the combination selected may be actuated before $KK^1$ reaches appendix (or selector) lever No. 1. We shall therefore be in the ideal position if the levers are actuated when the double selecting cam $KK^1$ *is as far away as possible from the appendix levers' field of action.* This may be crystallised into a rule which lays down the adjustment that when the third appendix is actuated the middle of the selecting cam should be diametrically opposite to this third appendix; *i.e.*, when the third appendix is actuated that portion of the combiner wheel to which the selecting cam is fixed should

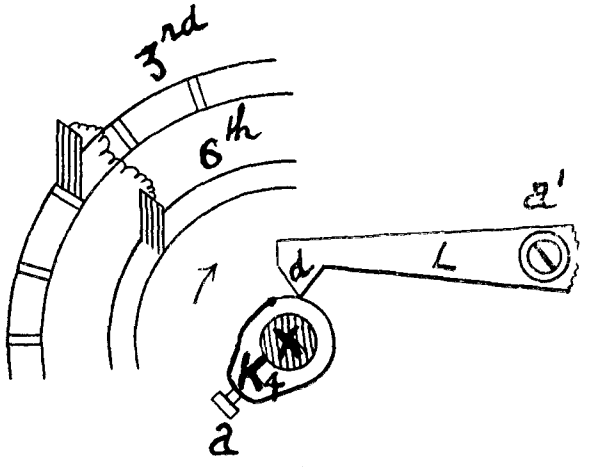



FIG. LXII.

be in its nearest possible position to the base plate. But the receiver is arranged to revolve faster than its distributor and it must therefore happen, and that very frequently, that the correct relationship will not be maintained, and that even the braking effect must take place at such a moment as to maintain this correct relationship. With this end in view the segments of Ring III chosen to actuate the electro-magnetic brake coils are so chosen that the passage of the brake-brush over these segments practically coincides with the segment joined to the third electro-magnet of the respective receivers of the installation. Now the selecting cam $KK^1$ (Fig. XL) is, as we know, a fixture upon the combiner wheel C, and to maintain the relationship just mentioned between this cam and the actuation of the third appendix *during reception* it is necessary that as $KK^1$ are not adjustable some other means must be found to accomplish complete phasing. This is done by means of the circuit-closing cam $K^4$ (Fig. LXII). In the case of this diagram to obtain correct adjustment $K^4$ should be shifted round upon the axle *x* (by first loosening the binding screw *a*) until it is in such a position that the cam just begins to raise the balance lever L at *d* and thus commences to complete the brake circuit when the selecting cam $KK^1$ (Fig. XL) is in a diametrically opposite position to the third appendix. There it should be fixed and as the brake brushes have already been adjusted in the relationship mentioned above the braking effect of the energised coils EM (Figs. LX, LXI) can only occur at the correct moment, that is when the selecting cam is well out of all possible action.

*(To be continued.)*

## SLUMPS—AND VISIONS.

By J. SKINNER (Brighton).

THE general decrease of business everywhere is beginning to make even those usually thoughtless and indifferent pause and reflect. In Post Office circles the fall in telegraph traffic is apparent to all, and is doubtless causing much anxiety to those responsible for the administration. It is not our purpose to discuss the various causes that have contributed to this unfortunate state of affairs, but the fact remains that we are face to face with a decided "slump."

Notwithstanding the difficulties in which the country has been plunged, and the many unsolved national and international problems following the great war, the Press has seen fit to deliver a bitter attack upon the Telephone Service. Only a strong respect for the official regulations has prevented many of us from taking up the cudgels on behalf of the libelled service, and at least refuting a few of the prevarications circulated daily. In passing, I may perhaps be permitted to remark that the general tone of the Press to-day seems to indicate that we have not made much progress upward from the savage state. The newspaper proprietors, with a very few notable exceptions, probably serve up what they think their readers desire.

Our chivalrous gentlemen of the Press readily and conveniently forget the debt they owe to the Telegraph and Telephone Services, and, "on receipt of instructions," placed the Telephone Hymn of Hate record on the gramaphone, and let it go fortissimo, Well might Shakespeare exclaim :—

"Freeze, freeze thou bitter sky,
Thou does not bite so nigh
As benefits forgot."

Artemus Ward seems to have been well acquainted with the Press, for he once wrote :—

> "Sum editers in a sertain town which shall be nameless air both sneakin and ornery. They cum in krowds to my Show and then axt me ten sents a line for Puffs. I objectid to payin, but they sed ef I didn't down with the dust thay'd wipe my Show from the face of the earth."

This, gentle reader, is by the way.

### NOT UNPRECEDENTED.

The "slump" in trade is not, however, without precedent. During the years immediately following the Napoleonic wars, history tells us business matters were indeed serious in Europe, and that prices were "famine high." One writer says :—"The triumph of the nation was succeeded by a reaction of internal distress and discontent. Trade languished from the exhaustion of the Continental nations, and their consequent inability to purchase our goods. A multitude of persons were thrown out of employment through the depressed state of trade, and their numbers were swelled by the soldiers and sailors discharged at the termination of the war. Thus seditions and tumults arose. . . ." Verily, history indeed repeats itself!

Many readers will remember that the South African War—now regarded as quite a minor campaign—which added 160 millions to our National Debt amongst other inconveniences—caused considerable disturbance to business. Figures published by the Board of Trade show that, whereas the percentage of unemployed stood at 2.40 in 1899 (the year of the outbreak of war) in 1904, two years after peace had been signed, the percentage had risen to 6.80. In 1911, however, the figures had fallen to 3.0. How trivial these records seem, when compared with the appalling figures of to-day!

### THE ABIDING TELEGRAM.

The Telegraph Service, the Cinderella of the family, is feeling the depression keenly. It has indeed borne its full share of "the slings and arrows of outrageous fortune" during its career, and has had to remain content with the drudgery of the kitchen, whilst its more fortunate sister, the Telephone Service, expensively dressed, has sat in the drawing-room, to receive homage of countless admirers and wreathes of roses—with other offerings—from the Press.

Nevertheless, the telegram will always remain with us. It is the poor man's Mercury, the business man's "stand-by," the wealthy man's toy, and the general public's friend in every emergency. The great majority of people in this country will never be able to afford the luxury of a telephone, and will continue to rely upon the Telegraph Service as need arises.

Someone once said that the Telegraph Service was past praying for, but enthusiasts in the profession—and there are many of them—do not agree. They ask why not "boost" the service? Only Post Office officials read the Post Office Guide, and members of the public generally are unaware of the facilities afforded by way of the telegraph. Why not large type notices in every Post Office advertising the half-rate and week-end cable rates? Something pronounced and arresting; there might even be a picture of the prodigal son, in a remote colony, receiving a deferred rate message from home! Why not a constant reminder, in bold letters, that a telegram can be sent to ANY place in the British Isles for one shilling? Why not a special cheap rate—one shilling for 40 or 50 words—for messages to be delivered by post the following morning? In short, why not advertise "the goods" and increase the facilities? Then think of the advertising space wasted in regard to telegram forms. What revenue would accrue if only the backs of the forms were used to advertise household remedies and what not. Just fancy—but no, we had better not!

### IN FUTURO.

When one thinks of the possbilities of the future, the gloom of the present is dispelled. The telephone is yet in its infancy, whilst the telegraph has only just begun to walk.

Our colleagues in the Telephone Service will continue to press forward, *per angusta ad augusta*. Doubtless many of them have already seen the vision, but perhaps we may be permitted to adumbrate a few of the developments that may follow. Amongst the many items that come to mind we might suggest that an educative and recreative bureau could be established in the central exchange at each large town, so that subscribers could receive information and instruction at a moment's notice. Students of foreign languages could have portions of standard works read to them, in the desired language (per phonograph-telephone if aliens remain *verboten*).

Business men could, at once, obtain information on almost any subject. Invalids could have selections of music played to them, almost *ad infinitum* (if they could stand it) with the assistance of the phonograph, and the latest news could be read to subscribers throughout the day.

The generally admired dulcet tones of our fair telephonists would be of decided therapeutic value in convalescence, and one is confident that the medical profession would order the installation of the telephone in many cases where the patients were of the male sex!

Long distance telephony will be one of the features of the future, and the development of the thermionic valve will permit of conversations over vast distances. The prodigal son referred to above may even be able to telephone home, if he has "struck" a gold or coal mine!

Machine telegraphy is making such palpable strides that it needs no advertisement here. Perhaps the day is not far ahead when the sender of a telegram will go into a "call box" and actually transmit his telegram by means of a type-writer keyboard.

### EXTENSIONS.

Many readers will doubtless recollect a most interesting article written a few years ago by Mr. John Lee, M.A., on the "Red Milkman," in which, we think, it was suggested that the postman should deliver the milk. Since that day many, many additional duties have been thrust upon the Post Office, but have we reached the limit of that great institution's usefulness? The writer humbly suggests No! far from it.

After acquiring the country's milk trade, the pawnbroking business should be taken over. Here is an El Dorado indeed, and future Postmasters-General would be able to announce phenomenal profits. Perhaps even "The Trade" might be absorbed, and instead of half-a-dozen public-houses in one street, we could have the business confined to the head and branch offices, under strict State supervision! Objectors to this development are reminded that there would be considerable profits, and after all, did not a celebrated Roman emperor once remark, when a question arose regarding the source of certain revenue." "Non Alet!" For the benefit of our readers who have forgotten their Roman history it should perhaps be stated that fragrant paper money was not in use during this emperor's reign.

The Post Offices of the future should, and will be, housed in stately and handsome buildings. When the writer was in Durban, he enquired for the Post Office, and was directed to a palatial edifice boasting a lofty tower with a peal of bells. He had to go inside to receive assurance that it really was a Post Office before he would believe it. And when he arrived inside and beheld the marble, brass and mahogany—many cathedrals would be glad of such fittings—he was speechless with joy! The doorkeeper in such a building must be even a prouder man than a commissionaire at a picture palace.

The head Post Offices should be arranged on the lines of the big department stores, and each one should include a restaurant. Adequate seating accommodation would be a feature, and good circulating libraries at cheap rates might be installed. Provision should be made for minding the babies, whilst the mothers are transacting business and taking refreshment. A selected postman, experienced in such matters, could be available for this duty. This is not so ridiculous as it sounds, for at one of the great 125th Street Stores in New York an Englishman is employed to mind the babies outside. He gives a receipt for each child to its fond mother, and is evidently successful, for he is described as an expert tear drier and rattle retriever. What is possible in New York can surely be done in England, and here is a fine opportunity for the Post Office.

Matters are moving elsewhere, for a writer in the London *Daily News* mentioned recently that in Switzerland one could pay taxes, doctors' bills and a dozen or more accounts at the Post Office there, and that the Post Office is the ordinary channel for the distribution of newspapers.

We have wandered from our main theme somewhat, but after all, the Telegraph and Telephone Services are living members of that great body, the Post Office, and the welfare of that body depends upon the sound health of each and every organ contained in it.

To those amongst us feeling somewhat depressed at the outlook we would say "Take courage," and remind them of the philosopher who once said :—"My worst troubles were those that never happened." The clouds will pass, and we shall then march forward to such achievements as Rowland Hil Morse and Bell never even dreamed of.

One envies our youthful colleagues, for they will reap the harvest—the wonderful harvest resulting from hard spade work on the part of those bearing the heat and burden of to-day. "Carry on!"

## TELEGRAPHIC MEMORABILIA.

IF my information be correct there appears to be a tendency across the Atlantic to veer round towards tape-printing as against page-printing in connexion with machine telegraphy. It is possibly that despite the beauty and perfection of the Murray and Western Electric systems, for example, the extra mechanism and line-time involved in obtaining the page-printed telegram, users of to-day have by no means proved so keen in its advocacy, faced as they are and as must needs be the case with post-war economic conditions.

During the past few weeks amongst those who have visited the C.T.O., London, are Mr. Gates of Manchester, *en route* for Paris on a semi-official visit to that city; Monsieur and Madame Semeelen (*nee* Mowatt), the former to obtain a closer view and experience of Baudot Triple Duplex in his capacity as Technical Officer of the Antwerp office, Mr. John Munro (late of T.S. Foreign), Principal Inspector of the Egyptian State Telegraphs, Cairo, home on short furlough and looking the picture of health, and Mr. Sun, of the Chinese State Telegraphs, who is spending a week or two with us studying the British telegraph system and organisation, also the much-esteemed Mr. H. A. Harrison, fresh from a visit to Chicago, still keenly interested in machine telegraphy and brimful of information regarding the use to which this type of our craft is utilised in the States. "Over yonder" it appears that some of the larger corporations have their own telegraph offices and their own lines stretching "up town," "down town," and to country depots. In Chicago one of these companies possesses a central office with an instrument room to accommodate from one hundred to one hundred and fifty operators, for the exclusive use of the business of the firm. Telephonic communications one may be quite sure are not excluded from the organisation, but it may prove an eye-opener to certain of our readers to learn how wide-awake it is possible for telegraphy to be in modern business methods, while it is equally heartening to those who have believed in the vitality of the telegraphic art to learn that telegraphy can live and thrive in friendly rivalry with the telephone. All the apparatus in the above office, it is understood, was on the type-printing principle.

Mr. Harrison was loud in praise of the Western Union Company's Central Telegraph Office in the same city. Its appointments were apparently on a magnificent scale. Even the retiring rooms and bathrooms of the messengers, I repeat "bathrooms of the *messengers*" were equal to that of some of the best hotels of the city. Should a messenger's uniform appear a little less smart than usual all the owner has to do is to hand it in to the Renovating Department in the evening when he leaves duty to find it cleaned and pressed ready for use in the morning when its owner again signs on. European administrations, please copy!

All Post Office readers will be pleased to note that Sir Andrew M. Ogilvie was recently elected an Associate of the Institute of Electrical Engineers.

It is gratifying to record that at long last the Institute has now returned to its home on the Victoria Embankment and the autumn should find its activities in full swing. The re-opening was practically inaugurated by a unique day in the history of the Institution when two Danish engineers, Johnsen and Rahbek, aided by Mr. Frank Gill, explained the new phenomenon in connexion with electro-static attraction which the two former had discovered in 1917, and had applied to telegraphy and telephony. It is stated that as applied to telegraphy an excellent radio recorder is obtainable, currents from even small valves being sufficient to record speeds of several hundred words per minute.

During this same inaugural period the Council of the Institute extended true British hospitality to a party of the chief engineers of Holland who were paying a return visit to this country to inspect electrical and other kindred organisations.

The British Post Office has been rather proud of itself in the realms of sport this summer. It is not, however, likely that it will be able to readily beat the record established by Mr. W. J. Hunter, of the Deal Post Office, who won the Amateur Golf Championship, or that of the score of 84 made by Mr. W. T. Cook of the C.T.O. in his maiden first class match on behalf of Surrey.

The working of the direct wire which has recently been established between the Paris Bourse Office and London Stock Exchange has proved a complete success, and has perhaps given more satisfaction to the City than anything the C.T.O. has accomplished for a long time. Up to the time of writing only a simplex Hughes has been employed, but there are signs that more traffic channels will soon be needed. It has apparently surprised some folk that the output of this "old-fashioned" apparatus should have been capable of so high an output as 70 to 80 telegrams per hour in skilful hands. One has heard prophesies of its being scrapped, and yet it survives and insists upon surviving. The seasonal wire between London and St. Malo established for the potato traffic is worked by this same apparatus and easily deals with 70 per hour. The new Anglo-German communication between London and Dresden, opened on May 21, is worked by means of Hughes, and the historic opening of the direct line between London and Prag on the 27th of the same month was inaugurated by the same system and for the present is so working. This latter circuit, be it remembered, is the first direct Anglo-Czecho-Slovakian line established and thus marks the calendar.

While dilating upon the undoubted virtues of Hughes apparatus, one must hold the balance fairly and place on record the fact that at the time of writing the Booth-Wilmott keyboard has been working for about two weeks with but little more than the barest maintenance attention, and bids fair to have come to stay when certain elemental changes have been made.

Even if one were inclined to forget the place which high-speed printing telegraphy is bound to take in the world there comes a happy little souvenir post-card from Athens from that modest Baudot expert, Monsieur P. Mércy, of Paris, who is occupied in installating the above system on behalf of the Greek Government.

*Electricity* with its usual enterprise is publishing in its weekly issue Sir William Noble's paper which was read before the I.E.E. on "The Long Distance Telephone System of the United Kingdom." In effect this paper is really a history and a complete one of that of Trunk Telephone development in these islands, and should prove a classic on the subject of telephones.

According to *Reuter*—

> French wireless experts state that as the result of experiments direct wireless communication between Paris and New York can now be obtained. This will reduce the time of transmission by two hours, as hitherto communications have had to be sent *via* Lyons or the big station near Bordeaux.

One of our watchful correspondents writes, referring to the attempted "Conquest of Mount Everest," on behalf of the Royal Geographical Society and the Alpine Club and the fact that news of the progress of the expedition will be sent by native runners, that it is a wonder that portable wireless is not to be used for this very special occasion.

The Direct Spanish Telegraph Company's accounts for 1920 show that a dividend of 10 per cent. was paid on the Ordinary Shares (free of tax), and that, after paying Income Tax and E.P.D. for 1919, there was still a credit balance of over £46,000. The Great Northern Telegraph Company's Directors announce the distribution of a total dividend and bonus of 24 per cent., carrying forward the formidable sum of £285,892.

Sir William Slingo's arrival in Peru as Controller-General of Peruvian Posts, Telegraphs and Wireless Communications under the concession granted to a private company, leads one to query whether after all the British home-grown Civil servant is so unprogressive an individual after all. Evidently a business organisation not generally accredited with undue sentiment has found the employment of an ex-Government official a profitable investment even in his seventh decade.

On May 31 Mr. C. F. Moody, Assistant Superintendent, late Class II, retired from the Telegraph Service, having completed his sixtieth year. No ordinary eulogy would fit the occasion. Words themselves in all their varying terms of deepest affection and of highest esteem would miserably fail to express what was a unique relationship between supervised and supervisor in the case of "Fred." Around the personality of the man there was an atmosphere of kindliness which forbade the harsh word, the unkind thought, or the ungracious retort, while the honest fun that twinkled out from this atmosphere served only to breathe out yet more of a real love for mankind. "Dear old Fred" said the lads and lassies as he left us, and "Dear old Fred," perhaps best expresses the sum total of the lasting impression of C.F.M. which will ever remain with us. Those who knew him best will best realise that the pen that wrote the above has but partly succeeded to do honour to a very lovable character.

Friends of Mr. George Scholey, pensioned overseer, who had rendered admirable service during and subsequent to the war by his assistance in the Cable Room, C.T.O., will hear with keen regret of his demise on May 20 after a brief illness. As a telegraphist he had spent some part of his early service with the Direct Spanish Company, transferring to the late Submarine Telegraph Company somewhere in the early eighties, and continuing his service under the aegis of the Government when the latter company passed from private control.

The City and Guilds Report for 1920 shows that in 1920 there were the following increases in the number of students who sat for—

| | 1920. | 1919. |
|---|---|---|
| Telegraphy ... ... ... | 579 | 198 |
| Telephony ... ... ... | 683 | 267 |
| Magnetism and Electricity ... | 839 | 268 |

As a leading electrical journal remarks, "this increase is doubtless to be attributed to the return of Post Office employees to their ordinary civil duties."

According to *The Times* the price paid by the British Government to the Direct United States Cable Company for the "cables and properties" of the latter company was £70,086 in cash and £506,700 in 5 per cent. National War Bonds 1923.

It is hoped that the Eastern Telegraph Company's system to India and the Far East will shortly be sufficiently renewed and improved as to increase the carrying capacity of its submarine cables. Work, it is understood, is actually going on in connexion with the Company's Red Sea cables at the present time.

The following somewhat cryptic advertisement appeared in the London *Times* of June 6:—

> WANTED, a firm or gentleman of influence to take the responsibility and immediate charge of the exploitation of a TELEGRAPH APPARATUS (covered by five patents and just completed) which so reduces and expedites the work of despatch and delivery that all telegraph services will be enabled to make a substantial reduction in their rates and at the same time considerably increase their profits—an epoch-making development which also benefits the telephone service and would seem to have come at the psychological moment to help the Postmaster-General out of his present financial difficulties. Terms of Agreement with the applicant need not necessarily interfere with his own business.—*Address, &c., &c.*

The gathering of retired officers of the C.T.O. and their friends at Kew announced in the Coming Events of the T. & T. JOURNAL last month was a huge success. If the editor could manage to squeeze in the full list it would be a very useful and interesting and almost historical list which it will surely not be able to repeat, but alas! he cannot, and a selection of names would prove invidious. It must therefore suffice to record that everyone spoke highly in praise of the organising and painstaking efforts of Mr. C. S. Keen which produced the above-mentioned satisfactory result.

J. J. T.

## LONDON ENGINEERING DISTRICT NOTES.

### Telegraph Apparatus Development.

THERE are not a few persons who are under the impression that the telegraph system is dead and that the few obsolete instruments that remain will soon be replaced by telephone apparatus.

If anyone holding such views had been present at the Royal Society of Arts on May 24 he would have been astonished at the rate at which the development of telegraph system and apparatus is taking place. Mr. Lack gave a most interesting and useful summary of recent developments in the science of telegraphy, and illustrated his lecture with exceptionally good lantern views of the pieces of apparatus that he was describing. Mr. Lack is to be congratulated on the arrangement of the apparatus for photographing purposes, as well as in the matter of the paper.

It is a fault of some authors that they pay too little attention to the lantern slides, and leave this matter to the photographer with the result that although an excellent picture may be obtained, the special and distinctive features are not brought clearly into view. It is thought possible that Mr. Lack and the photographer had many heart-to-heart talks before they could agree as to the best view, but in any case the result was very satisfactory.

The audience was impressed by the ingenuity of the mechanism and the quickness of telegraph inventors to apply the most recent scientific discoveries to telegraph purposes.

An engineer who is specially engaged upon telephone work may be excused if he becomes so engrossed in grappling with the problems of his rapidly expanding art that he considers his subject the only one that matters. For instance, he is inclined to look upon the development of the three electrode valve only as having important application to telephone working. Mr. Lack, however, was able to show that this valve has already been adopted for use in telegraph working and that a scheme for doing this had been developed in the Research Section of the Engineering Department.

Although machine telephony involves the use of much mechanism there is as yet much less intricacy and variety than there is in machine telegraphy. Some of the movements in the latter are remarkably beautiful and many of the audience would have liked to linger over certain instruments, but the field which Mr. Lack had set himself to cover was so large that he found it possible to make only passing reference to items which were worth the devotion of a whole evening. If telegraphy be in its old age then it is a very vigorous old age, and use must have been made of the thyroid gland injection to bring back the spirit of youth.

It is hoped that it will be possible to print the paper in full for the sake of those who, although interested in telegraphy, have not been able to closely follow its development stage by stage, owing to absorbing interest in other work.

### Threadneedle Street P.O.

A photograph of the existing Post Office building appeared in last month's Journal with a notification that it is to be demolished and a new office erected. It is understood that the new building will be one of the tallest in London. The basement, ground, and first five floors will be in use in connexion with the Post Office. The three top floors will be leased to an Insurance Company. The rebuilding is to be carried out in two stages the rear portion of the building being completed first. The premises are adjacent to the Stock Exchange and most of the messages transmitted over the telegraph circuits are in connexion with Stock Exchange business. There are approximately 30 telegraph circuits terminating in the Instrument Room, most of them being direct lines to Provincial Offices fitted with high speed apparatus. There is a complete installation of secondary cells in the basement. A number of tubes connect the office with the Central Telegraph Office and the Stock Exchange.

One room is given up for use as a public telephone call office, and contains 12 cabinets. When the new building is complete, in addition to the public call office, it will contain a room with a suite of cabinets for the use of Stock-brokers who will gain entry to the room direct from the Stock Exchange. This will complete a scheme in connexion with the provision of call office facilities for the Stock Exchange which was started in 1914.

There will be a considerable amount of work for the London Engineering District to do in keeping the whole of the installations working during the rebuilding operations and in fitting up the apparatus in its permanent quarters. Pending the completion of the new Instrument Room the circuits will work in a temporary Instrument Room in an adjacent building.

### Improvements.

It was noticed with pleasure that several members of the London Engineering District have been successful in obtaining awards with respect to suggested improvements in plant and apparatus during the six months ending March 31. It will be seen from the Post Office Circular of May 17 that the suggestions cover a wide field and indicate that interest in the efficiency of the service is being displayed in all directions. Men who handle apparatus day by day and whose duty it is to remedy defects therein are in an exceptional position to suggest modifications with a view to remedying shortcomings in design. Such suggestions are very carefully considered by the Committee appointed for the purpose and the fact that some are not adopted should not dishearten their originators. Clearly there may be good reasons which are not obvious to an officer suggesting an improvement why it should not be adopted when considered from the broader point of view by a Committee surveying the need of the country as a whole.

An interesting announcement was made at the Annual General Meeting of the Institution of Post Office Electrical Engineers held on May 24 to the effect that Lieut. Col. Booth, whose valuable work in connexion with the Baudot Telegraph System is well-known, has handed over a sum of £100 for the formation of a fund from which an annual award will be made to the originator of the most valuable suggestion relating to improvements to the Baudot System.

### A Suggested New Society.

If the wives of Post Office engineers ever scan these notes they will not agree with the hopes of the writer of the previous paragraph. An American is credited with the statement that "Life is just one blamed thing after another." If, in the homes of some officials, the husband has time to do a little household carpentry, gardening, and even (whisper it gently, Louise) lend a hand in spring cleaning, why cannot the P.O. engineer do likewise? He always appears to have technical papers, magazines and books that he really must read and, when the bottom of the pile is nearly reached, a fresh supply comes to hand.

It is rumoured therefore that in order to secure the use of a little of the time which the husbands spend away from the office the wives and children are forming an association for the suspension during one year of the publication of all technical literature and reports of recent inventions.

### Annual Outing.

After an interval of six years the External Engineers of the District renewed acquaintance with the scenes of former expeditions—Ashbridge Park, West Herts. The journey this year was made by road and was a great success. Assembling near Paddington Exchange at noon on Saturday, June 4, the party proceeded by motor coach through Edgware, Elstree, Hemel Hempstead and Little Gaddesden to what is known locally as Ashbridge Monument. Travellers on the London & North Western Railway may observe this monument showing above the trees on the high ground to the north of the railway in the vicinity of Tring Station. It was erected to the memory of the Duke of Bridgewater, father of Inland Navigation. The scenery in the neighbourhood is very beautiful. The return journey was made *via* Berkhamsted, Watford, Rickmansworth and Harrow to the starting point which was reached at 8.30 p.m. An excellent dinner was served at the Swan, Hemel Hempstead, and tea at The Crown, Berkhamsted. Notwithstanding a somewhat threatening sky the day passed without rain and everybody went home happy.

### A Literary Test.

As a test of literary knowledge our traffic colleagues are invited to say from which author the undermentioned quotations have been taken. It may be of assistance to state that the writer in question, although not a member of the London Engineering District, was at one time wont to haunt the neighbourhood where the Denman Street offices now stand. A further clue can be obtained by reading the article by Mr. Heath on Denman Street and its surroundings, which appeared in the May issue.

"Traffic confound thee if the gods will not"

"If traffic do it the gods do it."

"Traffic's thy god and thy god confound thee."

## PRESENTATION TO MR. MOIR BY THE STAFF OF THE LONDON ENGINEERING DISTRICT.

OTHELLO : "I have done the State some service and they know it.
"Speak of me as I am, nothing extenuate, nor set down aught in malice."

The present Head of the London Engineering District will terminate his services with the Post Office on July 31. On May 31 representatives from all grades of the staff of the district attended a pleasant little gathering at which Mr. Moir was presented with a grandfather clock, silver salver and gold mounted walking-stick, and Mrs. Moir with a diamond and platinum brooch. The fact that nearly 3,000 members of the staff of the district contributed towards the presentation is indicative of the regard with which Mr. Moir is held by those under his control.

The Chairman, Mr. G. F. Greenham, opened the proceedings by outlining a specification for an ideal Superintending Engineer, which he claimed the retiring one was, and wished Sir William success in his task of selecting a successor to Mr. Moir. He took the opportunity of thanking Mr. Moir publicly for the fair way he had dealt with the transferred staff which had resulted in the two groups of men in London being welded together in one efficient whole in a very short time. He suggested that the energy which Mr. Moir had continued to display in face of his impending retirement was an indication of the disinterested outlook which characterised his work. He still took an absorbing interest in schemes which could not mature till long after his period of office had terminated.

Mr. Gibbons, speaking on behalf of the Executive and Assistant Engineers, said that Mr. Moir had been doing work that had formerly taken three superintending engineers to do. He was particularly interested to know how Mr. Moir was going to occupy his leisure and referred to the hobbies of other officers who had retired from the service during the last few years.

Mr. Cooke, speaking on behalf of the Clerical Staff, paid tribute to the Superintending Engineer's strong sense of justice and stated that although Mr. Moir had a certain amount of reserve yet that reserve covered a large heart. He referred to the strenuous days of 1912-13 when the London engineering district was being moulded into its present form, and to the tremendous capacity for work that Mr. Moir displayed in those days. The Head had high ideals which he expected the staff to live up to.

Mr. Boulton, representing the Inspectorial Grade, said that in his opinion Mr. Moir combined in his personality some of the finest qualities which go to make up character. Mr. Moir could pride himself on being a successful organiser, as was proved by the data and statistics available in the district. He suggested that a knowledge of the fact that he had won the esteem and warm regard of the staff would be more satisfactory to him than the bestowal of any gift or honour.

Mr. Rose, speaking on behalf of the Skilled Workmen, had learned to respect Mr. Moir as a Superintending Engineer and love him as a man. He referred to the good work that was being done by the Whitley Committees in bringing the staff into closer touch with the higher supervising officers. The feeling amongst the men was that they had only to take their troubles to Mr. Moir to get them settled satisfactorily, and that although they did not always get their own way they were sure of justice.

Each speaker in turn expressed the hope that Mr. Moir would live long to enjoy the leisure which he has so well deserved.

Sir William Noble in asking Mr. and Mrs. Moir to accept the gifts from the staff, said he had known him since he was a boy. He agreed that Mr. Moir conformed to the specification outlined by Mr. Greenham. He had made a wonderful success of the London Engineering District which formerly had been under the control of three superintending engineers. Mr. Moir had carried on the work single-handed despite the large accession in the responsibility due to the transfer of the National Telephone Co.'s staff.

Mr. Moir, in thanking the staff on behalf of himself and his wife, said that he found it difficult to express in adequate words the great kindness that had been shown to him by the presentation of such handsome mementoes. He had been in the Department's service for something like 47 years and had seen many great changes take place. He referred to the great strides that had been made in the business of the engineering department and to the great improvements there had been in regard to the welfare of the staff, particularly in connexion with accommodation. He referred to the many occasions on which it had been his pleasant duty to compliment members of the staff for satisfactory work done or to present them with medals in the King's name. He felt that perhaps he had not always expressed his appreciation of the efforts of the staff as freely as he might have done, but he had been brought up in the Victorian Age and had been taught that "Virtue is its own reward." He was looking forward with satisfaction, but with some regret, to the fact that one morning in a few weeks' time he would wake up and find himself not in control of a staff of 6,000 men and women, but only one, viz., his wife. The least he said about the control in that case the better.

In again thanking the staff on behalf of himself and his wife he expressed the hope that the future might hold much prosperity for them all.

## LONDON TELEPHONE SERVICE NOTES.

### New Rates.

By the time these notes appear the revised tariff will be in full operation and the difficult transitional period, if not forgotten, will at least be left behind. The task of transferring more than 170,000 lines in London from the old to the new tariff was a "full size" job and it can be claimed that it has been well done. When it is considered that the work was additional to carrying on the every-day service we think a "night's repose" has been earned, but the telephone business does not permit of such laxity.

### Opening of Chancery Exchange.

Chancery Exchange, situated in High Holborn, was opened at 2.30 on May 28 with the transfer of 520 lines from the neighbouring exchanges, City, Central and Holborn. The opening went off quite smoothly, in fact, almost like the proverbial "house on fire," seeing that in the early hours of the following Monday morning the Fire Brigade were summoned on an alarm of fire which happily was of little consequence. The opening of this exchange did not remain unsung in the Press, for one of the evening papers favoured us with a leaderette. Up to the time of going to press, we have been unable to determine whether the paper's humorist was instructed to write a telephone article or their telephone expert to write a funny one.

### Post Office Ambulance Corps.

On Monday, May 30, at King Edward's Buildings, the Postmaster-General presented the awards made by the St. John's Ambulance Association to members of the P.O.A.C. Mr. Kellaway handed to the recipients 115 labels, 30 pendants, 14 medallions, 19 vouchers, 65 First Aid Certificates and 3 Special Certificates awarded for Air Raid duties. The women's trophy and medals were awarded to Miss Alice L. Drewe's G.P.O. South team. The Postmaster-General congratulated the corps upon its successes and remarked upon the elevating influence of work done, not for reward, but for the love and benefit of one's fellows. He said he felt it a privilege to be associated with a function of such a character on the occasion of his first contact with the staff in his official capacity.

Dr. Prynne presided, and Mr. G. E. G. Forbes, Secretary's Office, Miss Buchanan, Savings Bank, Mr. C. Sanderson, Controller, London Postal Service, and Mr. Page, Foreign Section, spoke during the evening.

We are told that the recipe to ensure winning an ambulance award, and especially the coveted trophy, is first to take 5 enthusiastic members of the P.O.A.C. and mix them well together, add one whole course of study of the First Aid Manual. When the proper consistency is reached, place before the fire of examination. The three best teams surviving this ordeal are then placed before the public in competition and the one showing the best response to cries of HELP ! ! ! (heard off) wins.

### Light on the Wrong Number Trouble.

In a recent issue of *Punch* it was remarked that on the removal of a telephone instrument from a subscriber's premises 23 wrong numbers were found in its crop. Telephonists will be interested to learn of this authoritative confirmation of their suspicions that a crop of wrong numbers might one day be discovered at the subscriber's end.

### Woolwich Exchange.

Dr. A. Webley, the exchange medical officer, has again invited the staff to make use of his tennis court this summer. This kindly act is much appreciated by the staff, and their happiness is increased on the many occasions when Mrs. Webley finds time to join them in a game.

### More Phonetic Similarity.

The other day a subscriber complained that an officer of the department had called him a fool. The complaint was investigated, and it transpired that in course of conversation over the telephone in connexion with the signing of an agreement, a contract officer had intimated to the subscriber that his "full" name should be given. Merely a matter of accent.

### Belgrave Social and Athletic Club.

An all-day river trip from Richmond to Chertsey has been arranged for Sunday, July 24. The Hon. Sec., Miss N. Williams, of North Exchange, will be pleased to give full particulars to anyone interested.

### Retirement of Miss A. A. Heap, I.S.O.

Miss Heap retires at the end of the month after an official life of over 40 years, the last 20 of which she has spent as a Superintendent in the London Telephone Service. She was responsible for the recruitment and training of the operating and supervising staff in the earliest days of the Post Office Telephone System in London. Then, and at every subsequent stage, she has taken the keenest interest in the development of the Service and the welfare of the staff. Many who have worked with her have accepted other responsibilities and are to be found in homes (well ordered, without a doubt) up and down this old country and, indeed, the world over. If these notes meet the eyes of any such they will be glad to know that the present members of the L.T.S. are actively engaged in preparing for Miss Heap a fitting tribute of their regard and admiration. Miss A. M. Webb, of the Carter Lane School, G.P.O., South, will gladly acknowledge any contributions old friends and fellow workers of Miss Heap may care to send.

Congratulations to Miss Heap upon the distinction of being decorated by His Majesty the King with the Imperial Service Order in the Birthday Honours List.

## WHERE TO STAY.

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

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

**DEAN FOREST.**—Severn-Wye Valleys. Beautiful Holiday Home (600 ft. up) 55 rooms, extensive grounds, motors, golf. Boarders 47*s.* 6*d.* to 63*s.* Prospectus—Littledean House, Littledean, Glos.

**EASTBOURNE.**—"The Polytechnic," 109-111, Tideswell Road Recommended by Polytechnic, Regent Street. Comfortable holiday home. Seven minutes station. Five minutes pier. Liberal table. Piano. Terms, board residence 5*s.* deposit and 2 guineas at end of week.

**ILKLEY, YORKS.**—Marlborough House Boarding Establishment. Tennis Court. Billiards. Excellent cuisine. Near Moors. Stamp for tariff. Mr. and Mrs. J. T. Robson, Resident Proprietors.

**MARGATE (CLIFTONVILLE).**—"Lavardin," Edgar Road. Board Residence. Minute Sea. Liberal Table. Highly Recommended. Young Society. Tariff on application.

**SHANKLIN, I.W.**—Comfortable, homely board-residence. Holiday home. Substantial cuisine (separate tables). New management. Close sea, shops. Picnic parties arranged. Geere, Glenavon. Phone 37.

**SWANAGE.**—The Highcliffe Private Hotel and Pension. Unrivalled position on sea-front. Near Golf Links. Excellent cuisine. Inclusive terms. Enlarged 1911-1912. 'Phone: 47 Swanage. Mrs. Hooke.

## CONTRACT BRANCH NOTES.

CONTRACT Notes have been "conspicuous by their absence" from the JOURNAL of late, not from apathy, but by reason of the tremendous amount of work entailed by the revision of rates. It is not at the moment possible to go into figures very deeply, but a general review of the situation from a contract branch point of view might be interesting.

It should be borne in mind that the only exchange line cases dealt with by that branch are those where the subscriber has decided to allow his agreement to cease, cases where it is found that the actual signatory to the agreement is not using the service, cases of any doubt whatsoever and, worst of all, those cases where the subscriber shows absolute indifference to the department's letters and telephone calls.

The calling officers generally have been received with civility, but with arguments which plainly show the power of the Press, it being obvious that the subscribers' minds have been moulded on arguments gleaned from the newspapers, arguments which the contract officers are easily able to overcome.

A great loss of time and money has been occasioned by the Press outbursts, and their statements, although in most cases literally true, have been such that the full story has not been disclosed and the subscriber has not appreciated its true value.

Take one argument.—A paper stated that if a subscriber in a certain district had 400 calls per annum, each call would cost 6*d*., "the price of a pre-war telegram." This ignores the fact that a reply is included in the telephone charge and that an extra 6*d*. would have to be paid if a reply telegram were used. A telephone message provides for the sending of the message, its answer, and a three-minute, at least, conversation, in one operation. This is quoted only as an instance of the unfair methods of criticism adopted by those who should be above reproach.

In many instances it is stated that the cost under the new rates would be too heavy, and we have lost subscribers owing to this, but there is no doubt whatever that within a very short period the person who ceases his line for such reason will find that it is necessary to re-instal the circuit or lose his place in the running for business.

The present state of industry has had a marked effect on small traders but with the revival of business there is no doubt that a rush will be made upon the service, and even at the present moment applications for new service are being received by their hundreds.

As might be supposed the strongest protests come from late unlimited subscribers, and it is only human nature to object when one, after having received something for less than cost for so long, now has to pay for it. These subscribers generally will not listen to arguments as to the equity of the charges, and yet not one of them would presume to offer the Post Office £20 for an unlimited supply of postage stamps. If such a suggestion is made to a subscriber, he states that there is no comparison, ignoring the fact that the department's business is that of message transmission, either by postage, telephone or telegram.

The compulsory ceasing of the unlimited service has had a marked effect on the volume of traffic, to the advantage of the subscriber and the department. In one case the subscriber was irate and insulting at having to make the change. He now states that instead of paying more, his telephone charges will be less, this being brought about by curtailing unnecessary calls.

Then there is the subscriber who would have ceased in any circumstances. Amusing incidents have occurred in this direction. The officer, in making a call upon a subscriber whose wife was unwell, suggested that the absence of the service might cause delay in the arrival of a doctor which possibly might lead to the death of the lady. The subscriber's answer to this argument was—"A thundering good job too." A small shop-keeper was told that the service was practically invaluable in case of fire. He suggested that it would not matter if his place were burnt down as he would then get the insurance money. These arguments come from people whose service would be ceased in any case.

Quarterly payments are highly advantageous to the small trader and the abolition of the surcharge has had a very good effect on the public in general. When agitations have ceased, and departmental officers are allowed to attend to their own business, the service will grow to a greater extent than has ever been anticipated.

The Contract Branch is dealing with the obtaining of private wire agreements at the new rates, and it will probably be found when this work is finished that the percentage of ceasing subscribers exceeds that for exchange circuits, but such cessations are not necessarily a "dead" loss of revenue. Speaking generally, it will be found that in cases where the offices of firms were connected by means of private wires or tie lines, unlimited service lines were rented at both ends, and consequently the existence or otherwise of private circuits did not directly affect the revenue. Now, with a general message rate, the cessation of such private lines means an increase of exchange revenue.

One somewhat amazing feature is the number of firms who have long been paying for private circuits to other firms, and who now state they have not had any business with the other firms for years, and only on the presentation of the new contracts for signature have they realised the existence of the circuits.

The following extracts from letters received from private wire renters may be of interest:—

(1) "May I enquire whether it is the intention of the post office to renew the agreement for the private wire between these two points, and if so, on what terms, and will these terms be inclusive of calls? If not, am I right in assuming that, in addition to the quarterly rental, there will be a charge of 6*d*. for every call of three minutes' duration, as well as the local fee of 1½*d*., making 7½*d*. in all?"

The interesting point here is that the letter emanated from a London newspaper, one, too, that did not lag behind in screaming about the revision of rates.

(2) ". . . wishes to say when the 'phone to stables was placed there was a large family to use it, now for some years only herself."

Later from the same subscriber:—

"The above charge is a swindle. A wire used once or twice a day for an old lady from her house to the old coachman."

There is perhaps in these letters a veiled suggestion that there should be a sliding tariff for private circuits, based on the number and age of the users.

(3) "No private company would be allowed to adopt such an action (*i.e.*, the termination of the old contract) but we are prepared to accept your notice.

. . . This letter will save you the trouble of sending the new agreement."

However, the new agreement was duly sent, and promptly signed at the new rental which was, as it happened, slightly less than the old.

(4) "It is pleasant to find that the statement of alleged unreasonable increases in telephone charges are not always based on fact."

How different is the aspect that a reduction of rental makes in a case.

There were some 9,000 private wire cases to be dealt with in London the annual rental per case ranging from £1 5*s*. for a short power ringing lead to over £4,000 for a long circuit to the Provinces, the average rental per case being about £15.

## MISS HEAP, I.S.O.

"A WELL deserved honour" was the comment of all who knew Miss Heap when they learned from their morning papers on June 4 that the King had been pleased to include her name in the birthday honours. The announcement was read by the staff of the London Telephone Service with mixed feelings—joy that their first Superintendent should have been so honoured

*(Photograph by F. C. Burnham, Brixton Road.)*

MISS HEAP.

regret because they knew that it was an indication of her pending retirement.

Miss Heap is retiring this year after 45 years' service spent entirely in the Post Office. She was a member of the telegraph staff in Manchester

from 1876 to 1901. During this period she attained to supervising rank and was for a considerable time attached to the Trunk Exchange in Manchester. Her experiences during this stage of her career include the transfer of the trunk lines to the Post Office and the re-organisation necessary after a disastrous fire in the Manchester Post Office.

The Post Office London Telephone System was opened in February 1902, and shortly before that date Miss Heap was appointed to recruit, organise and superintend the work of the women of that Service—a work which she has carried on most ably until the present day.

The Service opened with one Exchange, Central—in a part of the switch room at present occupied by the City Exchange and with a staff numbering 40 persons. It has since expanded until at the present time it comprises 75 exchanges staffed by 6,560 women.

The most notable additions to the service were the transfer of the London Trunk Exchange in 1906 and the transfer of the exchanges of the National Telephone Company in 1912. Not the least successful part of Miss Heap's work has been the welding together of these staffs which now work as one harmonious whole.

The period of Miss Heap's service includes that of the Great War, and perhaps in no department of the Post Office were the effects of that war felt to a greater extent than in the London Telephone Service. It was necessary to recruit and train 6,700 women for the day and night staffs. The night work had previously been undertaken by men, but as the majority joined H.M. Forces during the first months of the war, it was necessary to replace them by women.

Miss Heap has always evinced a special interest in the training of the women not only on their entry into the service but throughout their career. Many remember the pleasure and profit they derived from a series of lectures which it has been her practice to give to all officers at the time of their promotion to the supervisory class—these lectures have been embodied in a book entitled "Advice to Telephone Supervising Officers."

Her standard in all things has been high, and it is to her insistence on the maintenance of this standard that the staff owes many of the things which oil the wheels of their official life—their well-equipped dining rooms, their comfortable rest-rooms and their excellent libraries. Her unusually wide knowledge of literature rendering her well able to give advice as to the most enjoyable books to secure for the latter.

In all things she has associated herself with the outside interests of the staff, and in many led the way. She has been associated with the Telephone Branch of the Post Office Ambulance Corps since its inception, and she kept up a personal correspondence with the members of that Corps who were privileged to join the nursing service during the war.

From 1914 to 1919 she was Chairman of the London Telephone Service Branch of the Hospital Saturday Fund, and it was due to her energy and personal influence that the subscription to that fund increased from £780 to £1,200 during her chairmanship.

She has from time to time contributed to the success of the Telephonist's Society by reading interesting papers. Several members of the staff are this year spending their holidays in Italy, possibly as a result of the very interesting lantern lecture given by Miss Heap for that Society in January last, entitled "A little holiday in Italy."

The crowning success of her association with the staff, outside her official work, was undoubtedly the organisation of the bazaar in December last, the proceeds of which enabled the staff to endow two beds and a child's cot in the South London Hospital for women. The staff have shown their appreciation of her efforts in this direction and of her work on their behalf generally by endowing them in her name and thus ensuring that these shall be a perpetual memorial of the work of their first Superintendent.

But it is as a friend and not as a superintendent that many of the older women will always remember her. Although in the last few years it has not been possible for her to know all the younger members of the staff individually, as was the case during the earlier years, she has always been accessible to them, and many women of her staff, both past and present, have cause to be thankful to her for advice and assistance of a practical kind which have ever been at their disposal.

"To spend and be spent" has always been Miss Heap's practice. Her many friends will not, therefore, be surprised to hear that her retirement is not to be one of entire leisure, she has already been elected to the board of management of the South London Hospital and the Committee of the Dulwich Scientific and Literary Society, and no doubt in a short time other activities will find in her a willing helper.

### ROYAL SOCIETY OF ARTS.

The Albert Medal of the Society for 1921 has been awarded by the Council, with the approval of the President, H.R.H. The Duke of Connaught and Strathearn, K.G., to Prof. John Ambrose Fleming, M.A., D.Sc., F.R.S., in recognition of his many valuable contributions to electrical science and its applications, and specially of his original invention of the thermionic valve, now so largely employed in wireless telegraphy and for other purposes.

The Medal was instituted in 1862 as a Memorial of H.R.H. The Prince Consort and is awarded annually, for "distinguished merit in promoting Arts, Manufactures and Commerce."

## NEW CATALOGUES.

*Siemens' Bros. & Co.*—

No. 600.—*Primary Cells and Batteries—Dry and Fluid.*

No. 531A.—*Leclanche Fluid Cells and Batteries.*

No. 531B.—*Electric Cells and Batteries—Fluid and Dry.*

No. 537.—*Dry Cells and Batteries.*

The first (No. 600) is a revised and enlarged catalogue of primary cells and batteries manufactured. It comprises 88 pages of the latest and most complete particulars relating to the principal dry and fluid primary cells and batteries manufactured at the firm's Woolwich Works.

Nos. 531A and 537, are made up to some extent of excerpts from the principal catalogue, whilst the third (No. 531B) has been prepared with a view to meeting the needs of those dealers in and users of these cells who are less widely acquainted with the technical side of the subject and are interested mainly in the more generally employed types of cells. This branch of the electrical industry is one to which Messrs. Siemens' technical staff at Woolwich has devoted a most specialised and unrelaxed attention for upwards of 50 years.

*Relay Automatic Telephone System* (*Marconi House, Strand*). This is an excellently illustrated catalogue, setting out the advantages of this sytem, amongst which secrecy, flexibility, quickness and reliability are claimed. Directions for calling numbers and for the wiring of the system are included, and some pages are devoted to special points of interest to architects, consulting engineers, contractors and others.

## CALENDAR OF COMING EVENTS.

July 6.—Cricket. Elmers End *v.* Cable Room at Elmers End.
" 7.— " S.E. & C.R. *v.* Cable Room at Catford.
" 12.— " *D and E Divs. *v.* Cable Room at Dulwich Park.
" 19.—Centels Sports Association. Sports and Garden Party Grove Hotel, Dulwich.
" 19.—Cricket. *Met. Div. *v.* Cable Room at Dulwich Park.
" 20.— " Cable Room *v.* Elmers End at Dulwich Park.
" 27.— " Silverdale *v.* Cable Room at Dulwich Park.
*C.T.O. League.

## REVIEW.

The June number of *The Wire*, the magazine of the Royal Corps of Signals, and the official Organ of the Signals' Association, is to hand, and contains amongst other specialised and interesting matter the first instalment of a series of articles on "Notes on the History of Signals," by Colonel-Commandant E. G. Godfrey-Faussett, C.B., C.M.G.

# PERSONALIA.

### LONDON TELEPHONE SERVICE.

The following officers have resigned for marriage:—

Miss M. H. GLENNIE, Telephonist, Avenue Exchange.
Miss K. MCCARTHY, Telephonist, Avenue Exchange.
Miss B. M. DONALDSON, Supervisor, Class II, Central Exchange.
Miss F. E. LEWIS, Telephonist, Central Exchange.
Miss E. M. MOSELEY, Telephonist, Central Exchange.
Miss E. F. WADDINGTON, Telephonist, Central Exchange.
Miss A. A. PETERS, Telephonist, Museum Exchange.
Miss V. YOUNG, Telephonist, Museum Exchange.
Miss E. R. VAIL, Telephonist, Putney Exchange.
Miss E. DAINTON, Telephonist, Trunk Exchange.
Miss M. POWELL, Telephonist, Trunk Exchange.
Miss J. C. ENGLISH, Telephonist, Victoria Exchange.
Miss E. HAYDOCK, Telephonist, Victoria Exchange.
Miss M. A. E. LOCK, Telephonist, Victoria Exchange.
Miss D. S. VENTERS, Telephonist, Victoria Exchange.
Miss L. M. BARNSLEY, Telephonist, Woolwich Exchange.