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[By the courtesy of the BEDFORDSHIRE TIMES.]

THE RIGHT HON. FREDERICK GEORGE KELLAWAY, M.P.
POSTMASTER GENERAL.

TO THE READERS OF THE "TELEGRAPH & TELEPHONE JOURNAL."

"I am sure I can rely on the loyal co-operation of all ranks of the Telegraph and Telephone Service in maintaining the reputation of the British Post Office as the most efficient in the world."

F. KELLAWAY,
22nd April, 1921.

MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

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

INTRODUCTION.

In the following series of articles it is proposed to give a popular description of the recent advances which have been made in Wireless Telegraphy and Telephony, suitable for the general reader.

There is no lack of good books and articles on the subject written for the professional wireless man, but for the man in the street who wishes to obtain some intelligent grasp of what is being done in connexion with wireless matters without going too far into technical details, there is very little information available. It is for this type of reader that these articles have been written. Every effort has been made to present the subject in a readable and interesting manner, and it is hoped that anyone who reads through the articles will acquire a sound knowledge of the principles of modern wireless practice.

In order to avoid unduly increasing the length of the articles it has been assumed that the reader has some idea of the fundamental facts upon which the everyday application of electricity are based, such as can be gained from the perusal of any elementary book on the subject. The electrical phenomena of which use is made in wireless telegraphy are, however, less generally familiar, and to enable the reader to be in a position to appreciate what follows, a brief resumé will first be given of these facts. Then, in order to provide a bird's-eye view of the ground to be covered, an outline sketch of the present position of wireless telegraphy and telephony will be given. Afterwards, the various portions of the subject will be dealt with in greater detail.

GENERAL PRINCIPLES OF WIRELESS TELEGRAPH TRANSMISSION AND RECEPTION.

Ether Waves.

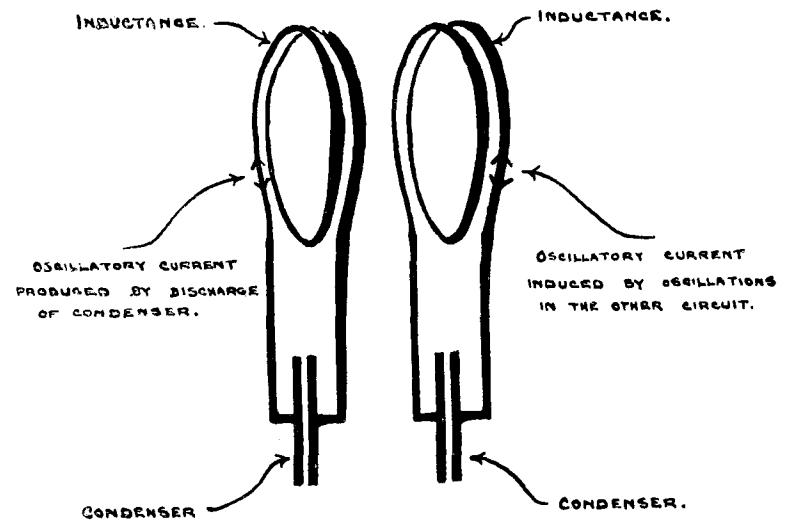
Wireless communication between two stations is effected by means of waves set up in the ether, the medium which, as far as we know, pervades all space—certainly all the visible universe. These ether waves are known as “electric” or “electric-magnetic” waves. By suitable means, at the transmitting station, a peculiar strain or distortion is impressed upon the ether, and this state of strain moves away from the transmitting station with nearly the velocity of light, the exact velocity depending on the nature of the ground over which the strain in the ether has to pass, in the same way that a hump impressed on a suspended rope by jerking the free end moves upwards with a velocity depending on the nature of the rope. Immediately after the production of this state of strain, a second distortion is set up, similar in nature to the first, but with the strain in the opposite direction, and this moves away with the same velocity as the first. Following this, at the same interval of time as elapsed between the first and second distortions, a third distortion is produced, in the same direction as the first one, and so on, each successive distortion being in the opposite direction to the preceding one. Since all these states of strain move through the ether with the same velocity, and since the intervals of time between their production are all equal, it follows that the successive distortions, as they move along, will all be separated by equal distances.

A similar state of affairs would be produced in the case of the suspended rope by jerking the free end in opposite directions at equal time intervals. A series of equally spaced humps, alternately on one side and on the other, and moving steadily along the rope, would then be produced.

A pair of such distortions in opposite directions constitutes a “wave.” A succession of equally spaced distortions, alternately in opposite directions, is known as a “wave-train.” The distance

between the centre of any particular distortion and the centre of the next but one, that is, the next one *in the same direction*, is the “wave-length.”

When a wave on the surface of a sheet of water meets an obstruction, the strain in the water tends to lift the obstructing body up. If it be free to move the wave will actually lift it. An analogous phenomenon occurs in the case of ether waves. When the strain in the ether happens to pass across a conducting body, such as a vertical wire, it sets up in that conducting body a tendency for a current of electricity to flow, in one direction or the other according to the direction of the strain, and if the conditions are suitable a momentary current will actually be set up. The succession of states of strain in opposite directions, which constitutes the wave-train, will therefore, given suitable conditions, generate a succession of currents in a conducting body across which the waves pass, the currents flowing first in one direction and then in the opposite direction in step with the oppositely directed components of the waves. These pulsating or alternating currents can be detected by suitable devices, and since their existence is a result of the passage of the waves, the devices used to detect them are known as wave detectors, although such devices are actually only very sensitive indicators of the existence of a weak alternating current, and are not affected directly by the waves themselves.



TWO OSCILLATORY CIRCUITS COUPLED TOGETHER.

FIG. 1.

The production of the waves at the transmitting station can be controlled by suitable methods, and long or short trains of waves emitted, corresponding to the morse equivalents of the message which it is desired to send. At the receiving station these long and short trains of waves will cause the detecting device mentioned to be actuated for corresponding long or short periods, and thus communicate the morse signals to the receiving operator.

It is convenient to represent a train of waves in the ether by a wavy line, like the surface of water across which ripples are passing, although we have no idea exactly what the nature of the distortion in the ether may be. The portions of the wavy line representing the train of waves which are above the zero position represent ether strains in one direction, and those portions below the zero position represent ether strains in the opposite direction. (Fig. 4).

Condenser Discharge.

The simplest way in which a train of ether waves can be set up is by making use of the discharge of a “condenser” through a few coils of wire. A condenser consists essentially of two metal plates separated by some insulating material. At first the electrical state of each plate is the same. The condenser is “charged” by causing a quantity of electricity to be removed from one plate, and accumulated on the other plate. The plates remain in this

state till a conducting path is provided between them, when the displaced electricity flows back, the electrical pressures or "potentials" of the plates are equalised and the condenser is discharged. The electrical bigness of a condenser, or its "capacity," is determined by ascertaining how much electricity has to be moved from one plate to the other to set up the unit difference of potential between them.

When the plates of the condenser are first joined by the wire a current flows from the positive plate to the negative plate with gradually increasing strength, and in a very short time the potentials of the plates are equalised. But the current which has been set up in the coiled wire cannot stop immediately the potential difference by which it was started is removed, by virtue of a property of such a wire called "inductance." The current therefore continues flowing and charges up the condenser in the reverse direction, the opposing potential difference set up as the reverse charge in the condenser increases causing the current to die away and ultimately to stop. The condenser then discharges in the reverse direction, and so on. At each successive swing of the charge in the condenser the maximum value of the current in the wire will be less, because the original energy in the condenser is gradually converted into heat by the electrical friction or "resistance" of the wire, and finally the oscillations stop. This is known as the "damping out" of the oscillations.

The action is analogous to the dancing of a weight on the end of a spring. The spring corresponds to the condenser and the mass or "inertia" of the weight to the inductance of the wire. Drawing the weight down from its position of rest corresponds to the charging of the condenser. The weight is drawn up by the spring, but when it reaches its original level this upward pull ceases. The weight is, however, now in motion, and its inertia causes it to continue moving upwards till the downward force set up by the compression of the spring causes it to stop. The weight then moves down, and again overshoots its position of rest. The action is repeated till all the energy which the weight originally possessed by virtue of its displacement has been dissipated.

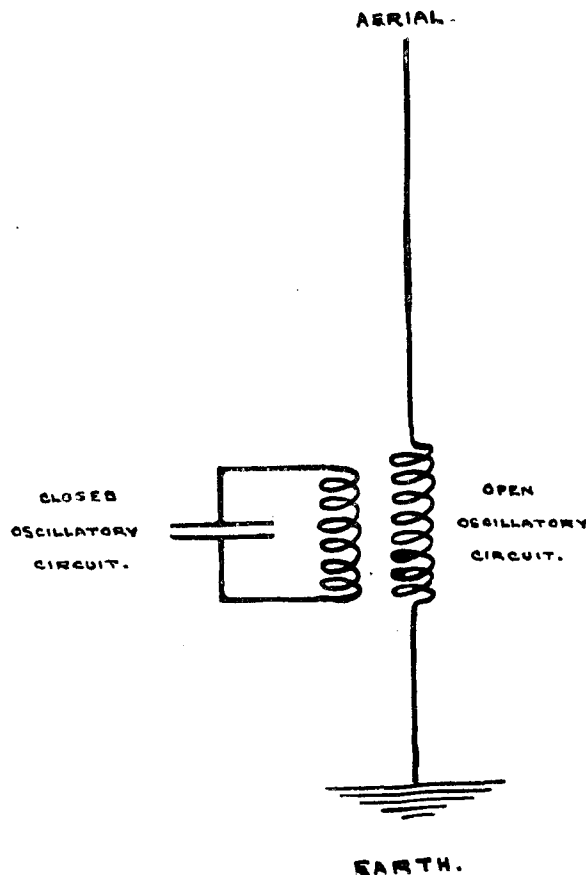
For a given weight and spring there will be a certain definite period of time in which a complete up and down oscillation will be performed, or, what is the same thing, a certain definite number of complete oscillations will be performed in each second. The time for a complete oscillation is called the "natural period" of the spring-weight combination, and the number of oscillations per second is called its "natural frequency." In the same manner a condenser with its plates joined by an inductance possesses a natural period and a natural frequency for the electrical oscillations set up as already described. The natural frequency in this case depends on the capacity of the condenser and the magnitude of the inductance; the bigger either of these is, the slower are the oscillations, or the less the natural frequency. Similarly, in the case of the dancing weight, the heavier the weight or the "flabbier" the spring, the more slowly the weight dances, or the fewer complete oscillations there are per second. A larger weight corresponds to more inductance, and a flabbier spring to a condenser of greater capacity.

Resonance.

If we give the dancing weight mentioned above a series of gentle upward taps, so timed that they occur at just the right instants to help the oscillations set up by the first tap, the distance through which the weight will dance up and down will get bigger and bigger. In the same way, if we apply suitably timed electrical impulses to a circuit consisting of a condenser with its plates joined by an inductance—a so-called "oscillatory circuit"—strong electrical oscillations will be built up. The simplest way in which this can be done is by taking a second oscillatory circuit of the same natural frequency as the first one, placing the wire coils of the two circuits so that they are near and parallel to one another, as shown in Fig. 1, and setting the second circuit into oscillation. When two coils of wire are placed thus, an alternating current in one sets up

similarly timed alternating electrical impulses in the other by means of a process called "induction." Since the two coils belong to oscillatory circuits having the same natural frequency, the impulses so produced by the oscillations in the second circuit will quickly set up, or "induce," strong oscillations in the first circuit. The two circuits are said to be "in resonance" with one another, and this phenomenon of resonance between two oscillatory circuits is largely made use of in Wireless Telegraphy.

Two oscillatory circuits arranged in the way described are said to be "coupled" together.



CLOSED OSCILLATORY CIRCUIT COUPLED TO OPEN OSCILLATORY CIRCUIT.

FIG. 2.

The Aerial.

A wire supported from the top of a mast by an insulator, and free from any conducting connexion with the earth, forms one plate of a condenser, the surface of the earth acting as the other plate, and the air as the insulating material between the plates. Such a wire is known as an "aerial" or an "antenna." If the lower end of an aerial be joined to the earth through a coil of wire, an oscillatory circuit is produced. By coupling a second oscillatory circuit, made up of an ordinary condenser and an inductance, to the aerial oscillatory circuit, and arranging that the natural frequency of the two circuits shall be the same, oscillations in the second circuit will set up oscillations in the aerial circuit. The arrangement is shown in Fig. 2. The aerial circuit is called the "open oscillatory circuit," the circuit with which it is coupled is called the "closed oscillatory circuit."

Production of Ether Waves.

From the shape of the "plate" of the condenser formed by the aerial wire, the electricity which charges the upper portions of the wire has to flow along the lower portions. The further we come down the wire the more electricity has to flow along it, because as we descend there is more and more wire above us to be charged. Consequently, when oscillations are taking place, an alternating current will flow up and down the wire, this current being strongest at the foot of the aerial, and diminishing in strength further up.

When the current flows up the wire a "ring" of ether round the aerial is distorted in one direction, and when the current flows down, a ring of ether round the aerial is distorted in the opposite direction. As already explained, these oppositely directed distortions move away with approximately the velocity of light, the rings expanding like those round a stone thrown into a pond, and constitute a train of electro-magnetic waves. Thus, so long as oscillations occur in the aerial, electro-magnetic waves in the form of horizontal rings will be sent off or "radiated," and it is clear that if the wire be symmetrical with regard to the earth, and the nature of the surface of the earth round the station be uniform, the magnitude of the waves must be uniform at the same distance away all round the aerial. Hence signals will be sent from such a station with equal ease in all directions.

A diagram of what is occurring round such a radiating aerial is shown in Fig. 3. In this diagram the dotted lines represent ether distortions in one direction, and the dot-dash lines ether distortions in the opposite direction.

If we imagine a section to be made of the medium round the wire by a vertical plane passing through the wire, we can represent the waves as they would be cut by this plane by a wavy line, as explained above. This is shown in Fig. 4. Since the current at any point in the wire does not suddenly rise to its full value, and then suddenly reverse its direction, but, on the contrary, rises and falls gradually, the corresponding distortions impressed on the surrounding ether will also increase and diminish gradually. It is because of this that the series of distortions which form the ether waves is truly represented by a wavy line which rises and falls gradually.

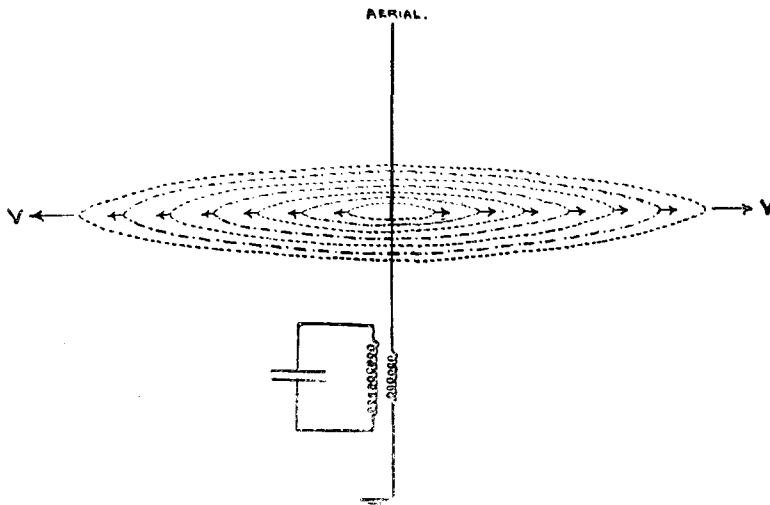


DIAGRAM OF WAVES ROUND A RADIATING AERIAL.

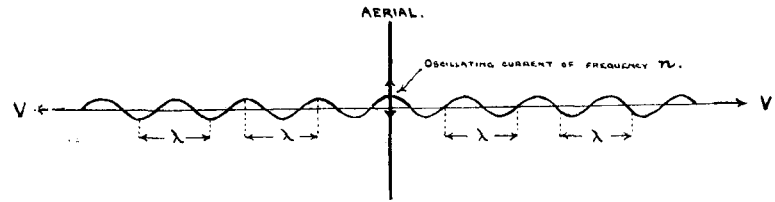
FIG. 3.

Wave Length and Frequency.

It will be convenient at this stage to explain several terms universally used in connexion with wireless telegraphy. It has already been mentioned that in a wave-train the distance between the centre of any distortion and the centre of the next distortion in the same direction is known as the wave-length. Since the shape of each complete distortion is the same, the distance between any part of a distortion and the corresponding part of the next distortion in the same direction is also equal to the wave-length. The wave-length is usually denoted by the Greek letter λ , (lambda). Several wave-lengths have been so indicated in Fig. 4. It has also been mentioned that the waves move away from the aerial with approximately the velocity of light. This velocity is about 186,000 miles, or 300,000,000 metres, per second, and is usually denoted by V .

The currents swing up and down the wire with the natural frequency of the aerial oscillatory circuit. This frequency is usually denoted by n . That is, in one second n complete up-and-down swings occur. Consider now the front edge of the wave sent off

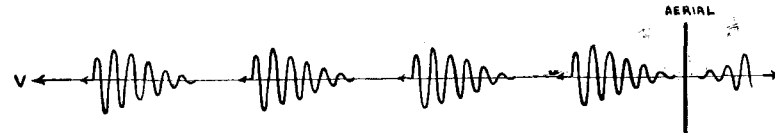
at the beginning of some particular second. This will move away with the velocity V , and therefore at the end of that second will have reached a distance V from the wire. But during the second n oscillations will have occurred, and consequently n waves will have been given off. Therefore, in the space V between the front edge of the first wave and the rear edge of the last wave sent off during the second, there will be n complete waves. The length of each wave is λ , and since n of them just fill up the distance V , we have $V = n \times \lambda$. To express the matter in another way; since in the distance V there are n waves, the length of each wave, λ , will be V/n . Of course, λ will be in miles or metres according as V is expressed in miles or metres per second.



DIAGRAMMATIC SECTION OF WAVES FROM RADIATING AERIAL.

FIG. 4.

If we know the value of the capacity and the inductance which make up any oscillatory circuit, the natural frequency of that circuit can be calculated. Thus n is known, and V is also known, for it is equal to the velocity of light. Hence for any given oscillatory circuit it is easy to calculate the length of the waves which it will give off. The waves most generally used for wireless purposes range in length from 300 metres, or about 1,000 feet, to 10,000 metres, or about 6 miles, but both longer and shorter wave-lengths are sometimes employed.



DIAGRAMMATIC SECTION OF DAMPED WAVE TRAINS RADIATED FROM A SEPARATE SPARK STATION.

FIG. 5.

Damped Waves.

It has been mentioned that the oscillations, set up in an oscillatory circuit when the condenser is allowed to discharge through the inductance, gradually die away, being damped out by the resistance of the circuit. Consequently the bigness, or "amplitude," of the successive waves radiated from the arrangement shown in Fig. 2 gradually diminishes. Such waves are known as "damped" waves. In the transmission of wireless signals by damped waves the arrangements are such that the condenser is recharged at once after each discharge, and is then allowed to discharge again. A series of wave-trains is thus sent off as long as the transmitting station is in action, the first waves of each train being of large amplitude, and the amplitude of the later waves in a train gradually becoming less and less. The actual first wave is not the biggest, as it takes a few swings of the closed oscillatory circuit before the aerial circuit is set into full oscillation. The waves radiated by a transmitting station using damped waves can therefore be represented diagrammatically as shown in Fig. 5. The spacing between the separate trains of waves is determined by the rapidity with which, after each discharge, the condenser of the closed oscillatory circuit can be re-charged, and the circuits again set into oscillation.

The production of the damped oscillations in the closed oscillatory circuit is associated with the occurrence of electric sparks in that circuit, one spark corresponding to each group of oscillations. Consequently, a transmitting station using a system such as that described above is said to employ "spark transmission." The characteristic of spark transmission is that the energy is radiated in detached trains of damped waves, the separate trains being spaced from each other by intervals depending on how fast the sparks follow one another, or, as it is called, on the "spark frequency."

(To be continued.)

THE BAUDOT.—XX.

By J. J. T.

DURING the movement of the entire impression arm Ca, *i. e.*, from its release by the retaining click C (Fig. LV) till it has printed the desired letter on that portion of the paper tape at the moment presented to the type-wheel by the impression cylinder *j*, and has actually been carried by the teeth of V^1 free of the latter and of the type-wheel—until that moment, the paper tape remains in a rigid position on *j*. A small portion is, however, held between the impulse cylinder l' and the compression cylinder *z* and during the forward movement of Ca, the impulse click K engaging with a tooth of the ratchet G of the impression cylinder, a portion of the tape equal to the width of one letter of the type-wheel is passed forward. Naturally, a similar length of tape is drawn up behind it under the pin-guide T. While Ca is being moved back to its position of rest by the oscillating lever L the impulse click K is released from the tooth of G with which it was engaged and engages with the next. In this return movement of Ca the impulse cylinder l' and ratchet wheel G do not move, the drum *l* being as already mentioned, lightly fitted upon *l*, and also on account of K^1K^1 the retaining click and spring which prevent any backward movement of G. Briefly, in returning to rest the arm *b* (Fig. LIV) moves backwards on the axle A^1 , the impulse cylinder l' is held by K^1K^1 (Fig. LV), consequently a clear portion of paper tape is drawn up with a gentle tension over the head of the impression cylinder *j* (Figs. LIV to LVI) ready for the printing of the succeeding letter.

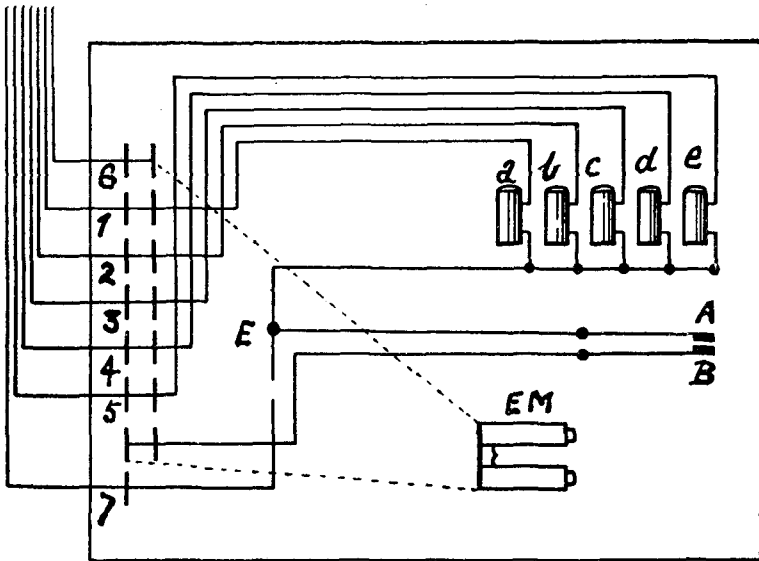


FIG. LVII.

The space between words and groups is made by a similar action, the only difference being that when the impression cylinder *j* rises towards the type-wheel, instead of meeting a letter or figure it meets a grooved blank and the paper is moved forward one letter-space untouched. We have already seen how the change of printing from letters to figures is arranged (Art. XVIII, p. 87).

When studying the Baudot Receiver as a whole, it is interesting to note the complete harmony and economy of movement of the various working parts. Thus the 9/40 of blank space on the peripheries of the printing and type-wheels permit of the return of the impression arm Ca to its position of rest. During this same period, represented by 9/40 of one revolution of the type-wheel, the appendix

levers, and the selectors (Fig. XL) are also returned to their normal positions, the former by means of the cam K^1 (Figs. XL to XLIII), and the latter by K^2 (Fig. XL), and the cross-over between the two selection discs, T, T^1 . Coincidentally with these replacing movements the retaining click C (Figs. LI, LII) the pedal P and the propulsion rod R (Fig. LII) are also brought back to their respective quiescent positions ready for the next movement. It is also during *this same period* that a cam K^1 fixed to the main axle *x* of the receiver (Fig. XLVI) is so positioned on this same axle as to close the circuit of a local battery in its rotation by means of two spring contacts shown diagrammatically (Fig. LVII A, B). The circuit is closed through an electro-magnet EM which causes a cork brake to damp down the speed of the receiver to that of the distributor with which it is connected and thus maintain a rough synchronism. Fig. LVII shows the connexions of the receiver base, the numbered lines representing 1 to 5, the five connexions from Ring I corresponding to electro-magnets 1 to 5 (*a* to *e*), connexion 6 representing that serving the local cadence and brake battery from Ring III of the distributor. Connexion 7 is a common earth. The latter is connected to the base plate of the receiver so that when the latter is placed in position upon it the electro-magnets being themselves connected to the receiver casing find earth together with the brake electro-magnet EM.

(To be continued.)

FROM OCEAN TO OCEAN BY TELEPHONE.

(ABRIDGED FROM THE *Telephone News*, NEW YORK.)

A new record of telephone achievement was made in the course of a demonstration witnessed by the members of the preliminary International Communications Conference at a dinner given them by the American Telephone and Telegraph Company at the Waldorf, New York, on the evening of Oct. 21. They were able to talk and listen over the line of the Bell System from New York to Los Angeles, and by wireless from Los Angeles to Santa Catalina Island and eastward by wire to an Atlantic port and by wireless telephone to the steamship *Gloucester* at sea, and they were also able to hear people talking from the ship on the Atlantic by wireless to shore, by wire across the continent, and by wireless to an island on the Pacific.

This new feat in the art of communication, remarkable in itself, was all the more interesting because it was made in connexion with the dinner given by President H. B. Thayer on behalf of the American Telephone and Telegraph Company and Associated Companies, the Western Electric Company, Incorporated, and the International Western Electric Company, which was attended by some fifty conference delegates representing Great Britain, France, Italy, Japan, and the United States, together with the principal officers of the Bell System and of the General Electric Company and its associated companies.

At the dinner, which was given at the Waldorf-Astoria, they were shown a motion picture descriptive of the building of the transcontinental telephone line. They were welcomed by President H. B. Thayer, and were addressed by Col. John H. Carty, vice-president of the American Telephone and Telegraph Company, who had charge of the demonstration.

Colonel Carty spoke briefly of radio development, and explained the singular advantages of the wire telephone service over land and of wireless telephone transmission in situations where wires could not be used. He referred to the wireless telephone record made by the Bell System in 1915, when wireless transmission was accomplished by engineers of the Bell System, not only across the continent, but from Washington to Honolulu and from Washington to the Eiffel Tower. In this connection he expressed gratitude for the co-operation of the navy in permitting the use of the Arlington Tower and of the French nation in permitting the use of the Eiffel Tower, particularly of the courtesy of General Ferrie, who was in command at the Eiffel Tower, and who was present at the dinner.

Each place at the table was equipped with a receiver, and as Colonel Carty called the roll of the district chiefs along the route of the transcontinental line, the guests heard each answer and learned from each the distance from New York, the local weather conditions, and the local time. As the roll was called a large map hanging on the wall was illuminated so that the course of the connection across the continent could be followed.

When the connexion with San Francisco had been established, conversations were held between the British Consul there and a representative of the British delegation, between the Italian Consul and a representative of the Italian delegation in the Italian language, between a Frenchman and the representative of the French delegation in the French language, and there was to have been a conversation in Japanese but for the inability of the Japanese Consul in San Francisco to be present.

Then the connexion was carried down from San Francisco to Los Angeles, and a conversation was had with a representative of the company at Santa Catalina Island. The representatives of the conference found that a communication of over 4,000 miles by wire and of 30 miles by wireless to Santa Catalina was as clear as if it had been from another part of New York City.

The connexion was then established with the steamship *Gloucester*, which had left port four hours before, and unfortunately had not gotten far enough from land interference to make possible the best wireless results. There was also at times considerable static interference. Nevertheless, the conversation between Colonel Carty and his representative on the *Gloucester* was clearly heard, and later, when the conversation was put through from the steamship *Gloucester* to Santa Catalina island, the hundred guests at the dinner were able to hear the talk from off shore in the Atlantic to off shore in the Pacific.

On behalf of the representatives of the delegates for the preliminary International Communications Conference, Mr. F. J. Brown, assistant secretary of the British Post Office, and presiding officer and senior delegate of the Conference, spoke on behalf of his confrères to express their high appreciation of the marvels of the art of communication which they had been shown, and of the hospitality of the American Telephone and Telegraph Company and its Associated companies.

REVIEWS.

"Wireless Telegraphy," with special reference to the "quenched spark system." By Bernard Leggett, A.M.I.E.E. Published by Chapman & Hall, Ltd., ix + 485 pp. Price 30s. net.

Every student of wireless telegraphy in this country has, no doubt, noticed the lack of information which is available, in English, on the subject of the quenched spark system of transmission.

This system is, however, of great importance, and its use is as wide spread as that of the ordinary spark system.

The present book has been brought out to remedy this defect in the literature of wireless telegraphy. Although the fact that it has been written with a particular aim in view gives the reader the impression that the author is distinctly biased, and is not giving fair credit to other systems, this is perhaps only natural on the part of a writer who is an expert on the particular system which he is describing, and who honestly thinks that it is better than any other. It is not difficult to call to mind other books, both in English and German, nominally dealing with wireless telegraphy as a whole, in which the reader's attention is focussed on the work of some one particular company to the practical exclusion of everything else.

The book under review covers, with the limitation mentioned above, the whole field of wireless telegraphy, and, for engineers and operators who have to deal with the quenched spark system it should prove extremely useful.

"Continuous Wave Wireless Telegraphy." By W. H. Eccles, D.Sc. Published by The Wireless Press, Ltd., 12/13, Henrietta Street, W.C.2. Part I. vii + 407 pp. Price 25s. net.

The use of continuous waves in wireless telegraphy, which has increased so much during the last few years, bids fair before long to supersede entirely the earlier spark methods. The ordinary text book on wireless telegraphy, however, aiming at covering the whole field, cannot give the space to the treatment of this special branch of the subject which its importance deserves, and therefore, the appearance of a book dealing exclusively with continuous waves is particularly welcome.

The student of the more advanced portions of wireless telegraphy usually discovers that he needs to refresh, or to add to, his knowledge of the higher portions of electromagnetic theory. It is, however, not always possible for him to obtain just the information which he requires without devoting considerable labour to searching through various text books, and it is not every professional wireless man who can afford the time for this work. In order to avoid this difficulty, and to make the book self-contained, the author has given, in Part I, the mathematical and electromagnetic groundwork necessary for dealing with the subject. In Part II will be given the practical applications of the fundamental principles set out in Part I.

Part I only has so far been published. The first chapter gives an historical summary of the subject, by which the advantages of continuous waves over the older systems are made manifest. Then follows a chapter on electrostatics and electrodynamics, one on the theory of alternating currents, one on coupled circuits and transformers, and finally one on the physics of ionic tubes.

Throughout the book mathematics are freely used, as it is of course impossible to deal properly with such subjects without their aid. No one, however, who has been through a course of mathematics up to an elementary knowledge of the calculus, should experience any difficulty in reading the whole of the book.

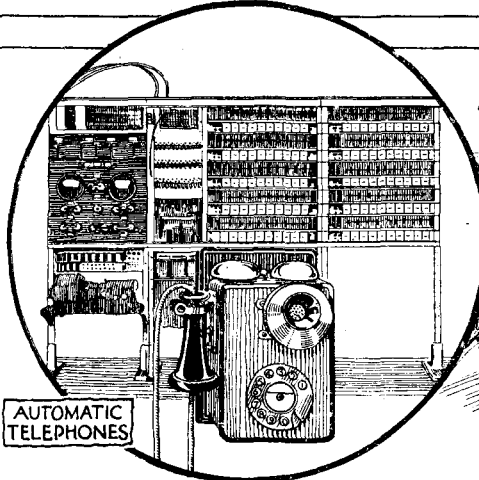
The get-up of the book is good, and the diagrams are very clear. We can recommend it to any one who wishes to go into the subject thoroughly, and we are looking forward to the appearance of Part II, which, if it maintain the standard of the part already published, will make the complete work one which will be invaluable to everyone who has to deal with the higher portions of wireless telegraphy.

TELEGRAPHIC MEMORABILIA.

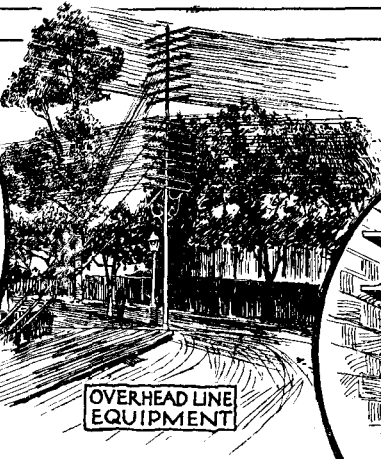
THE re-organisation of the Foreign Telegraph Department of the C.T.O., London, has resulted in an augmentation of staff and supervision which brings the total number of these two to the very respectable figure of just over 500. The optimists who pinned their faith to the development of the Cable Room and its activities are therefore fully justified. Among these one must place that optimist of optimists, the Controller, who, together with the Lords of the Treasury may well be congratulated upon that foresight which is frequently the truest economy. In the same galleries will now be seen wireless and cable systems working in friendly rivalry side by side and a range of apparatus—Wheatstone, Creed, Morse, Baudot, Siemens and Hughes, &c.—which produces that variety which if not exactly "charming" should certainly drive dull *ennui* far away. There remains, probably some years, of patient plodding and hard work, of co-ordination, co-operation, consolidation before this department reaches a stage of development which shall prove worthy of the best traditions of the winsome craft of telegraphy. No one can foresee what to-morrow's developments will bring forth in the shape of increased speed and increased outputs as regards both cable and wireless international telegraphy. Already the C.T.O. is in daily wireless touch—direct or indirect—with Denmark, Germany, Hungary, Italy and Yugo-Slavia, though it be but for a few hours, for each country mentioned has so full a programme that it can only spare, as we also in the present stage of development, at most five or six hours per day as in the case of Berlin, and but two in that of Budapest, Belgrade or Bagnitz. The most pleasing feature, and the most hopeful feature in all these modern advances in systems and apparatus is the keenness and enthusiasm of the younger men.

One visualises these telegraph leaders of the future smiling in the days that are yet to come as they look back on the telegraphic crudities of 1921, while we—brought up on a simple Morse key and a line none too free from "earth," grow petulantly reminiscent of our "good old days" when Wheatstone and Creed and Baudot and Murray and Western were good enough for us! This is no fancy of the brain. Modern developments have produced some of the most curious reversals of what we once believed to be immutable electrical law. We know now that Ohm's Law is not true for all conditions. We have learnt that the current in a simple cell travels in exactly the reverse direction to that which we were taught in our early lessons on electricity. We have ceased to believe as once we were told that the current from our battery passes out to line, goes to earth at the distant station and finds its way back through scores and scores of miles to the opposite pole of our battery and to the very identical cell from which it started and thus "completes

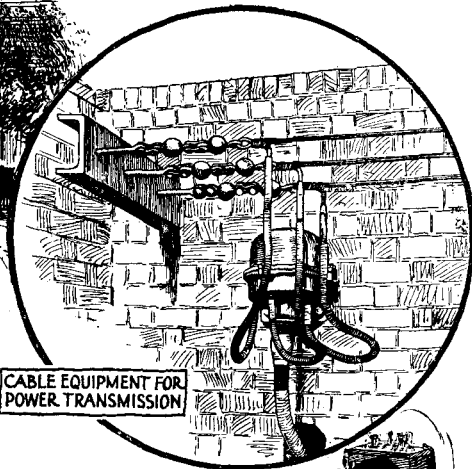
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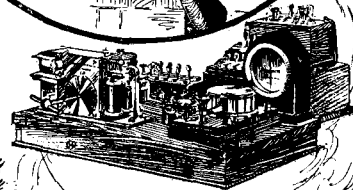
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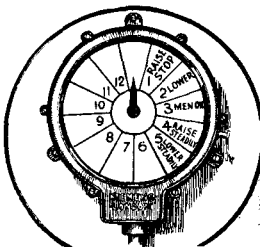
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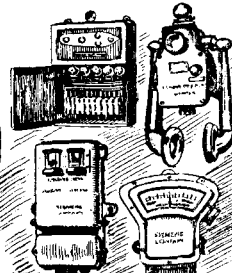
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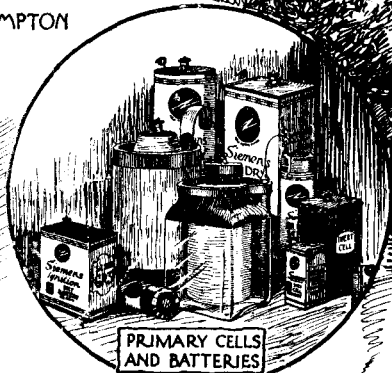
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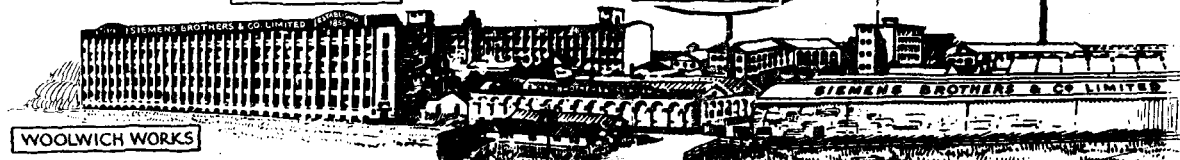
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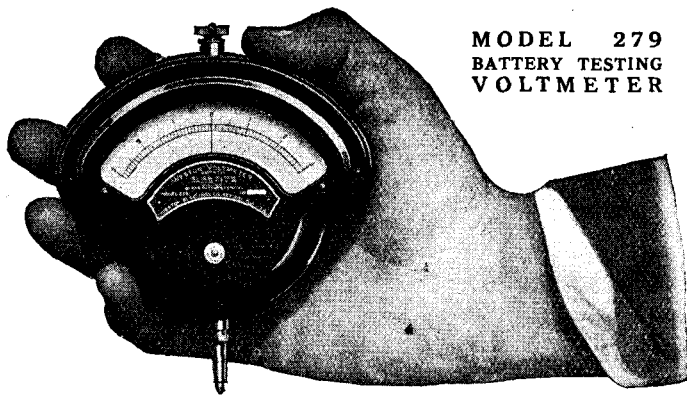


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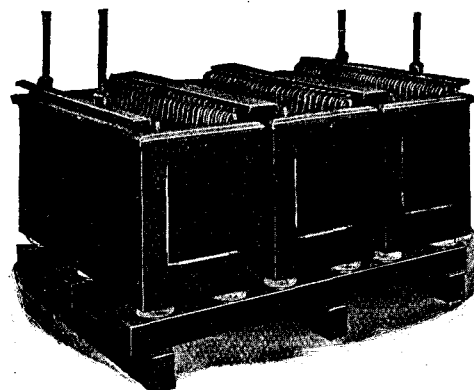
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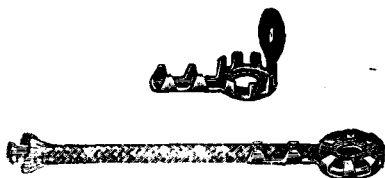
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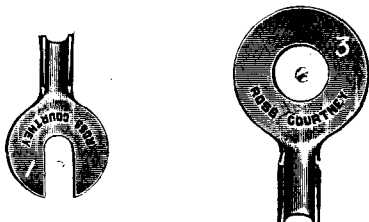
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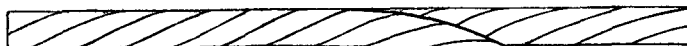
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the circuit!" Is it too much to imagine that there may be other facts also which to-day may appear fundamental, but to-morrow—! Does anything appear more solidly established, especially to a submarine cable man than the statement that one cannot signal through a metal conductor unless that conductor is carefully insulated from all moisture? Yet Major-General Squier, Chief Signal Officer of the U.S. Army, tells us that the Research Department of the Signal Corps laboratory, New Jersey, actually signalled electrically (telegraphically and telephonically) between Fort Washington, Maryland and Fort Hunt, Virginia, by means of bare No. 12 phosphor-bronze wire laid in the Potomac river. True it was only a distance of $\frac{1}{2}$ mile, but the possibilities of this experiment are as great as when Ronald laid those few yards of glass-covered wire in his garden at Highbury and proved the practicability of underground cables. The transmitter of the American invention was "an electron tube oscillator which delivered a current of about 270 m.a. to the line at a frequency of about 300,000 cycles per second." Frequencies three times this latter rate were used with success, and as a contrast it may be stated that the limit of the very best present-day submarine cable actually reaches its practical limit at 10 cycles per second. The sober, well-considered result of these experiments is that submarine cables of the future bid fair to be designed on an uninsulated principle, as the use of these "high frequency carriers" has the advantage that the chief distortion phenomena of present method transmission are eliminated."

A correspondent sends me an example to add to my list of "false economies" in the case of a Postal overseer, a dear old well-meaning chap, who would insist upon carefully untying every piece of string rather than adopting the shorter and quicker method of cutting the knots, and who could not be persuaded until disciplinary methods were threatened, that the Department's interests were best and most economically served by cutting the string rather than by utilising the valuable time and fingers of an officer of supervising rank for a slow and laborious process.

Records of abbreviations as utilised on Anglo-Continental lines in official conversation when making adjustments have been published in these columns on one or more previous occasions. The following is printed as an interesting example of phonetic French and might well puzzle many a student even well versed in the Parisian lingo. The conversation was made on the occasion of some technical difficulties on the London-Paris-Marseilles circuit. Lyons, the first speaker, being one of the repeating and intermediate office, addresses himself to Paris as follows:—

"ALLONS ENFANTS DE PARIS! COMMENT RECEVEZ VOUS? OUI MAIS VOILA 1 MINUTE SEULEMENT KJRECOIS ALORS. ECE BON CKJVOUS DI?"

Paris replies:—

"MÉ ENEFET JMLDEMANDE JE RECEVÉ ABSOLUMÉ RIEN AI JUSTE PASSÉ PAPIER SUR KTAKT DU RLAI KI MONT PARU PROPR CPDÉ CADVE VENIR DLA SUREMÉ."

Lyons acknowledges above from Paris and calls Marseilles:—

"OUI VESRMSSEIL. OHÉ OHÉ M. LA CANNEBIÈRE."

Marseilles who has been watching replies to the call of Lyons thus:—

"OHÉ LA BUTTE" (La butte—the little mound, a sarcastic acknowledgment of the hills upon which the city of Lyons is built).

"ICI LA CANNEBIÈRE" (Cannebiere—a well-known boulevard of Marseilles) "ESCE LA BUTTE KEST LA?"

Lyons replies in similar strain:—

"AH TE SALUE PANTRUCHE TT EST BON MSI VCI LONDRES,"

and switches the Marseilles section through to London.

Marseilles immediately turns his attention to the British end of the thousand miles line with a cheery call and salutation of:—

"OHÉ LA TAMISE! OHÉ LA TAMISE! ICI LE BO SOLEIL DE PROVENCE KI TENVOIE KRES RAYONS DORÉS. PUIJE FAIRE GLISSER X?"

We give the word to commence traffic in briefer, less flowery, but not less good-humoured terms, and work commences.

Is it waste of line-time? In a way and from a strictly scientific point of view, "yes," but these few moments—and the words are signalled and printed in much less time than it takes one to write them—have established not only good electrical communication but a good working atmosphere, which has a value not expressible in terms of costs and works accountancy. Anyhow, it is Anglo-Continental telegraphy, one phase of it.

The April number of the *P.O.E.E. Journal* is a particularly interesting one. Mr. Myles Hook, M.B.E., &c., continues the interesting account of Submarine Cables of the World, together with a brief account of the work of the British P.O. cable ships *Alert* (I and II), *Monarch* (I and II), the war-time cable ships, *Hodder*, *Mersey*, *Sialkot*, and *Madis*. All of the afore-mentioned boats were under the charge of P.O. engineers, and did some risky and amazing cable work. The *Sialkot*, though a converted trawler, carried out deep water work in the Bay of Biscay, diverting and repairing cables which "many had deemed beyond her powers." The *Madis*, originally built at Lowestoft as a North Sea drifter, was only 91 feet long, may surely be accounted the smallest cable ship in the world, and proved invaluable for shore and island work in the neighbourhood in the Firths of Forth and Tay.

Our old friend, A. C. Booth, gives an account of Recent Improvements in Baudot Apparatus, and a modest description of the Booth-Baudot keyboard

Tester, the practical value of which one cannot wish to deny. It only remains for one each of these "testers" to be loaned or presented to each of the foreign administrations with which this country is in direct communication to complete the conviction of their special utility.

Could one have looked in at the Strand Palace Hotel about tea-time on the 6th of last month, a goodly representative gathering of pensioned T.S.-ites, hale, hearty, merry and bright, might have been seen regaling themselves with the cup that cheered but did not inebriate. Judging from the united ages of the following twenty names telegraphy must have something of the elixir of life in its make-up to produce so healthily a collection of the genus homo. The names of those present at this happy little re-union were:—H. E. Adams, J. Bailey, I.S.O., F. Barfield, A. Bathurst, E. Bird, R. W. Cutler, C. Elphick, F. W. Fryatt, A. Gordon, E. L. Hilton, J. G. Hoppood, W. J. H. Joyes, C. S. Keen, R. E. Kemp, A. C. McEwan, A. Morgan, H. Trollope, A. W. Ward, W. J. Warrington, W. A. Webster.

It is realised that there are times when the "Morning Test" of telegraph lines is a real irritation to the Commercial Branch, interrupting as it does the flow of traffic at, with some towns particularly, most inconvenient moments. Nevertheless, the necessity for a regular record of the electrical value of each conductor maintained by the Engineering Branch should be easy of recognition by the technically qualified officers of the commercial side. The need as a necessity is on a par with the regular testing of railway bridges and lines. The fact that a line is actually working is no proof that it is faultless, and the aim of the engineers is that very laudable one, the discovery of incipient faults. This little screed on the subject is due to the receipt of a humorous complaint in verse, which neatly tells off the actual situation from the commercial point of view, and although it is impossible owing to the demands upon space to publish all the verses, one has witnessed inopportune morning tests which might well have produced the following from the very heart of a telegraph superintendent with heavy traffic on hand:—

"What brooks it that our fishing wires
Just sending out the price of 'fryers'
Are out in mid career?
Though language used be of the gate
Which Billings speaks when full irate—
Not English—but much freer!"

The calls for economy in Government offices which periodically appear in our history under the alluring alliteration of "Retrenchment and Reform" are almost sure to bring in their train "economies" which are only such in name. *Ink powder*, which at the end of a day or two results in thick unusable mud, which has to be thrown away, pencils that break before they are half used, and lower grade writing paper which splutters the pen, and results in an offence against neatness, are fair types of well-intentioned "economies," which are doomed to failure so far as regards real output and real interest in the work in hand. There is also the attempt to apply mere figures and averages to every set of circumstances without discretion. This, one has seen in the staffing of important wires in times of stress. Circumstances could be easily conceived in which "averages" applied to a telegraph circuit which had for its object the watch and ward of a portion of our sea-coast would not only prove uneconomical but actually criminal.

J. J. T.

THE PASSING OF A TELEGRAPH VETERAN.

On March 9 last, after a painful illness, one of the pioneers of the Telegraph Service, Mr. John Russell, was laid to rest in the cemetery at Elmer's End, Beckenham, at the advanced age of 80 years. "Jack," as he was more affectionately known to his confrères, commenced his telegraphic career in the Electric & International Telegraph Company in June, 1856, and remained with that Company until it, with others, was absorbed by the Government. In 1871 he was made Clerk in Charge for night duty. From September of that year until August, 1879, he held the rank of Principal Superintendent for night duty; that of Superintendent to October, 1894, and Assistant Controller from that date until he retired on Nov. 1, 1902. With the exception of the last few years of his service it may be said that he performed night duty continuously. That such work was not detrimental to his health has been amply demonstrated by his four score years of vigorous health. He was the exemplification of health and vigour throughout his service, and it seems but yesterday that with his cheerful and breezy activity he was interesting himself to see how early he could release the "Short nights," the "11 p.m.'s," and the "Specials." Although somewhat autocratic in his methods he earned the esteem and appreciation of his staff by such interest, and as a result he knew that he could always rely upon his men when business was beyond the "brisk" stage for any assistance.

Assembled at the graveside to take a last farewell were many old colleagues including Messrs Fisher, Fisk, Hoppood, Elphick, A. Bathurst, Moul, Druitt, Keen, Worthy, Poole and Bent. Among the numerous floral emblems was one from the Controlling Officers and Staff of the Central Telegraph Office.

Miss F. A. Russell, Chief Supervisor, and Mr. J. Russell remain in the Central Telegraph Office to carry on the telegraphic traditions of their father.

A. W. E.

The
Telegraph and Telephone Journal.

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

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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.

MAY, 1921.

No. 74

QUALITY OF SERVICE.

A SOMEWHAT unobtrusive paragraph in our London Telephone Service correspondent's notes contains a few operating statistics, which we think might astonish a thoughtful telephone user, although they present nothing novel or arresting to the telephone official. We think also that they might astonish a philosopher, if indeed it is in the truly philosophical temperament ever to be astonished, and furnish him with yet another text on the difference between the real and the imaginary, between the phenomena of hard fact and those which exist only in the realm of conjecture. Many would have us believe—although of course the opinion of the inarticulate majority is always unheard—that the London Telephone Service is incredibly bad. Only a sojourn in other lands and a comparison with other systems will effect a cure, for the axiom of many home-staying subscribers seems to be that the telephone service is always better in almost every other country than in their own.

The figures to which we refer show that the percentage of times a London subscriber is "cut-off" are .56 as against .60 before the War; he obtains 4 per cent. of wrong numbers as against 3.5; whilst the speed of answer was 5.9 seconds in December last as against 4.8 seconds in June 1914. It is actually now 4.7, a decimal point better than before the War. Subscribers imagine they wait minutes for a reply from the exchange, while figures show that, on the average, they are waiting seconds. Some subscribers indeed, know, from painful experience, that they have at times waited an unconscionable period; but how rare that experience must be is demonstrated by the fact that if it were reasonably frequent, the average would be sensibly affected, for it requires no complicated mathematical calculations to show what the effect

of a few cases of three, four or five minutes' delay would be on a general average of five seconds. The tests on which these figures are based are not made for the general information of the public; they are made for the guidance of the traffic officer who is constantly striving to effect an improvement in the results. The tests are practically continuous during the day time and the data are gleaned from the lines of subscribers of all classes. The public, of course, are not moved to emotion by learning that the "speed of answer" is reduced from 4.8 to 4.7 seconds, and might possibly consider that to strive to improve on that figure would be like gilding refined gold. They would probably be incredulous if told that the telephonist answered within 10 seconds. Again, few subscribers realise that the average time in which the answer of the called subscriber is obtained is 37.7 seconds, yet this is the average for the whole complex junction-line system of the London Telephone Service. We submit that a little over half-a-minute is not a discreditable period in which to carry out such an operation, and we are certain that the public would be both astonished and content if they realised that the average service is what these comprehensive and carefully obtained tests show it to be.

Why is it then that such a contrary opinion seems to prevail? Setting aside the question of the silent majority whose opinion of the service might be more favourable, we think that two main causes operate to form the opinion of the more vocal minority. One is the incurable inaccuracy of the average man in handling figures and data which do not refer to his own business, the confusion of impressions with facts, and the treatment of the statements of others as though they were his own experiences. The other and more powerful cause is the habit, from which few of us are exempt, of allowing one abnormal experience to outweigh scores of normal ones. One or two irritating delays in obtaining connexion (one perhaps, by an unfortunate chance, a very important one) annuls the good effect of days of prompt service and creates an altogether false impression of the average time of connexion. If we claim that the London Telephone Service is good, we hope we shall not be charged with complacency. As we have mentioned, the statistics at which we have glanced are obtained for the guidance of those whose constant care is to improve the service. To them the increase of a figure from 4.7 to 4.8 is a matter of concern, whilst the subscriber imagines that he would be happy if it were 5. With this zeal in action a further improvement may be looked for, but it is interesting to note that the standard of 1914 has already been regained.

HIC ET UBIQUE.

THE latest revision of rates of which we have information is that which came into force on April 1 in Italy. In the larger areas (those with upwards of 10,000 subscribers) the rate for large business and industrial concerns, banks, hotels, cafés and bars is 1,000 lire (£39 13s.); for smaller business houses, 700 lire (£27 15s.); for other categories, £19 17s. and £13 8s.; whilst journalists are favoured with a £10 6s. rate. It will be seen that although a flat rate is retained a pretty stiff charge is made to the large user.

ACCORDING to the *Morning Post*, the telephone tariffs of the Anglo-Portuguese Telephone Company which operates in Lisbon and Oporto, have now been raised 130 per cent. above those fixed in June 1920.

MR. E. H. BENNETT has been appointed Manager of the Guernsey States Telephone Department in the place of the late Mr. R. McLean. For the last seven years he has been Engineer to the Oriental Telephone Company at Singapore, after experience in the Portsmouth and Brighton Corporation Telephone Departments and subsequently in the Post Office. The Singapore exchange has singularly enough almost exactly the same number of lines as Guernsey, viz., about 2,600.

THE Select Committee on Telephones, 1921, began their sittings on April 6, when Sir Evelyn Murray was examined. The Secretary continued his evidence on the 11th, and Sir Henry Bunbury, Comptroller and Accountant-General (accompanied by Mr. Pearson) was examined on that date and on the 13th. On the 18th Mr. Robbins gave evidence on behalf of the Press Association.

THE late W. S. Gilbert told us in his witty way how he would have made the punishment fit the crime, and from a comprehensive abstract of International Telegraph Laws, recently issued at Berne, we learn how Argentinians legislate for telegraph crimes. If the culprit violates the secrecy of a telegram, he is liable to a fine of 1,000 piastres or 12 months' imprisonment. If he stops communication by intentionally interrupting the lines or cutting the wires, he may be called upon to pay 500 piastres or to serve his country without pay for six months. But an attack on or violent resistance to a telegraph officer being apparently an almost justifiable act can be performed at the moderate charge of 200 piastres or 2 months' honorary employment.

Some of the hostile critics of the Telephone Service in this country would apparently like to go one better on our South American friends and offer prizes for assaults on telephone staffs.

SOME months ago we ventured on a modest prophecy that the number of telephones in the United Kingdom would reach one million by the end of the financial year (31st March). Complete returns were not to hand at the time of going to press and estimates have been resorted to in the case of two districts not of the largest size. The result is a total of 998,000 telephones, of which 982,000 are Post Office stations, 13,300 Hull Corporation, and 2,600 Guernsey. But for the removal of the large system installed for the Ministry of Munitions (2,800 stations) which adversely affected last month's returns, the million would have been passed.

RECONSTRUCTION OF TELEGRAPH AND TELEPHONE SYSTEMS IN BELGIUM.

In spite of the utter chaos existing at Armistice and the setback in reconstruction due to severe snowstorms of last January, the Belgian Telephone and Telegraph Department states that up to July 1, 1920, 282 central telephone offices out of 283 had been re-established. Of telephone subscribers in 1914, 80 per cent. have been refund. It is curious to note that at Antwerp, Malines, and Turnhout there are now more subscribers than before the war. In Brussels there are 14,700 out of a pre-war 18,400, and at Liege about 4,000 out of a previous 5,000.

Reconstruction, it is said, would have been more rapid but for the complete removal or destruction of all copper wire and other material by the Germans. On the eastern lines not a single wire was left. In Brussels, the large and spacious installations were hacked. Some of the commutators have been found in Berlin, and engineers sent to recover them. The material taken from Brussels alone is valued at more than 2,000,000 francs, and that from Belgium as a whole at more than 70,000,000 francs (pre-war basis). —*Telegraph and Telephone Age.*

IMPERIAL TELEGRAPHIC COMMUNICATIONS.*

By A. AVERY (*Central Telegraph Office*).

THE title of this paper is understood to refer, principally, to the cable connexions between the British Isles and our distant colonies beyond the Atlantic and Pacific Oceans, but it will probably be of interest to many of you if a sketch be given of the events which led up to the accomplishment of these valuable and highly desirable means of communication between the homeland and our oversea kith and kin.

Although there had been many agitations for a system of cables, connecting the Colonies with the Mother Country, prior to the year 1915, the British Post Office had no experience of long-distance cable telegraphy and the mysteries of syphon recorder working were a closed book to it. This vital branch of telegraphy had been always in the hands of private companies.

The war in this—as in many other ways—brought unlooked-for necessities, and in the above-mentioned year, urgent need arose for direct means of communication with our then Allies, the Russians. Existing routes were obviously untrustworthy. A cable was laid between Peterhead on the Aberdeenshire coast and Alexandrovsk—a small town built on the shore of an inlet of the White Sea on the Kola Peninsula. This operation was carried out with the greatest secrecy, the cable ship *Colonia* in an endeavour to throw dust into the eyes of the enemy, having, as a preliminary to starting the real work gone cruising for three weeks previously in quite another direction. In passing, it might be mentioned that, in spite of all this manoeuvring and secrecy, on the morning following the completion of the cable laying, the fact was mentioned in the columns of the *Cologne Gazette*.

This cable, with a long land line containing two repeaters, gave us direct communication between the Central Telegraph Offices at London and Petrograd, and many telegrams from countries south of Russia, such as Greece, &c., passed over this cable in making their circuitous journey from the Levant to various parts of the world.

Our own Central Telegraph Offices supplied a staff to take charge of the Russian land line and the Eastern Telegraph Company provided a complement for each end of the cable, together with the necessary cable apparatus, and Post Office clerks took charge between Peterhead and London.

Out of the association of our own with the Eastern Company's men at Peterhead grew the ability of Post Office clerks to operate long-distance cables, for within a year or two they were able to take over the cable working between Peterhead and Alexandrovsk. These men were the fore-runners of the Post Office cable staff.

I would like to pay a tribute here to the good work of the Russians who had been gathered by their Government from the larger towns of that great Empire. They would sit and "punch," i.e., hand-perforate cable and Wheatstone slip, uncomplainingly the whole day long and show no signs of fatigue. They also, in good time, mastered the difficult task of cable operating. Their efforts to communicate their desires over the cable in our language, after the Englishmen had left them to manage alone, were sometimes very quaint. On one occasion I call to mind, they wished us to increase our transmitter speed and sent us a service message, saying: "Sir, please augment your quickness." On another day an incident happened which seemed to call for a mild complaint to their officer in charge. In response to the service message addressed to the Superintendent, Alexandrovsk, the reply came: "Mister, we have no superintendents. We do the work!" Some of us thought at the time that this possibly contained a subtle insinuation. They proved their mettle shortly after, when five enemy submarines made an attack on the little settlement. The instrument room was set on fire, but the staff managed to salvage enough apparatus to enable their capable engineer to rig up a simplex installation, and they were working to us again within three days. When asked later what had happened to the submarines, all we could elicit from them was: "They were all cancelled."

For a considerable time past the working of this, our first long-distance Imperial Cable, has been under a cloud on account of political difficulties, but with the recent signing of the Trade Agreement between Great Britain and the Soviet Government, we believe that it will, in the near future, prove a boon to both countries, and a busy channel of goodwill and good business.

During this period a more important Imperial link was being thought of. In July, 1916, a number of supervisors and staff from London, Manchester, Liverpool and Birmingham, were handed secret and confidential instructions to proceed to Peterhead, and many were the guesses at the respective headquarters as to the "why and wherefore" of their mission. To the principals themselves it appeared to be a somewhat formidable job to be up against, for they were all veterans of the "Morse" persuasion. All the young men were already booked for Military service. At first it seemed that the fence would be too high to clear, but "dogged does it" and in a year or so they

*Paper read before the London Telephone and Telegraph Society on March 21, 1921.

emerged from the struggle as passable cable operators. About this time a message came through from London, "a supervisor and three syphon operators to report here on Monday next." Many had been the conjectures as to where these embryo cable men were to blossom forth, and no one had imagined the Metropolis. The quidnuncs had said: "Some pleasant seaside resort in the South of England," but no one "London!" They did not know then that clever engineers had made it possible to "repeat" from a cable over a long land line.

Evidently someone had blundered. This noble four arrived south and were informed they had to open an Imperial cable across the Atlantic, with the aid of nine learners at the Central Telegraph Office! It were better not to recall the comments of the chief actors in this little drama. Still the opening had to be done, and it should be put on record that these devoted civil servants "stuck it" three days and nights continuously while the secretariat were scouring the country for re-inforcements.

The fight, these tyros found, had only started. They had had no experience of commercial cable practice, and many were the pitfalls which presented themselves day after day. Nevertheless they won through, and each month has improved on the past one, until at present, the British Post Office can fairly compare with cable workers of life-long experience.

The early days of the Imperial Cable were one long fight with pressure. These were the times when our brave colonials of Australasia and Canada were in the thick of the fighting, and their long lists of casualties, which had to be signalled, made heavy demands on the endurance of the new cable staff. It was no uncommon thing for the Colonial Headquarters staff, to hand in a despatch containing 10, 12, 15, and even 17 thousand words, which had to be sandwiched in sections between the general traffic, and sometimes covered whole periods of 24 hours, for cables never sleep: their wakefulness is too valuable to their owners.

A word or two as to the place of the Imperial Cable in the All Red Route should now be said. It had long been the desire of the English and Colonial Governments that a complete route, touching only British territory, should exist, and a commencement was made a few years previously by a line from Australasia to the western seaboard of Canada. A composite body, called the Pacific Cable Board, with headquarters in London, was formed of English and Colonial Government representatives, in the proportion of Australia 2, New Zealand 1, Canada 2, and the Imperial Government 3, including the Chairman.

The war with Germany provided the opportunity for supplying the final link across the Atlantic. One of the German Emden-New York cables was cut in the English Channel and brought into Penzance, the distant section being picked up on the other side of the Atlantic, and about 300 knots joined thereto, to take it into Halifax, Nova Scotia. Owing to many of the Pacific Cable Board operators having joined up, a number of our own Peterhead-trained syphon operators had to be requisitioned to operate from the Canadian side.

The ramifications of the All Red Route are extensive, and constant working of the Imperial Cable seems to bring one very close to the far-flung corners of our Empire. When the Superintendent at the Central Telegraph Office is daily communicating with the Superintendents at Auckland, Sydney, Suva in the Fijis, Montreal, and Halifax, the world appears to have become much smaller. The route serves the whole of the South Pacific (and names of Stevenson's haunts are familiar words in the Imperial Section), Canada, the United States, and the West Indies.

Westward traffic arriving at Halifax is disposed of as follows:—the whole of the Pacific work is "gummed up" in the syphon character, and the operators "punch" from this, for transmission across the Continent to the Pacific Coast. The terminal traffic for America is handed to the Canadian Pacific Railway Administration for disposal over the Canadian and United States landlines, and that for Bermuda, the West Indies, British Guiana, &c., to the Halifax and Bermuda Cable Company. All these connecting companies are located in the Dennis Building, which also houses the Imperial Cable staff and plant.

The path taken by the All Red Route is, London to Halifax, through automatic repeaters at Penzance, and the Island of Fayal in Mid-Atlantic; Halifax to Bamfield (a small place in Vancouver Island on the western seaboard of Canada), by Wheatstone duplex, through eight automatic repeaters; thence to Fanning Island (a small island of coral formation in the middle of the Pacific Ocean). This was one of the first of the cable points attacked by the German Fleet. One day near the commencement of the war a German cruiser accompanied by a collier hove in sight. A couple of boat's crews landed and made at once for the cable station, smashing everything.

They then overhauled the papers in the office, and discovered therefrom, the place of concealment of duplicate apparatus. This they dug up and destroyed, and then cleared off. The next morning the officer in charge of the station performed a fine piece of emergency work. Utilising a homely pickaxe, he constructed a grapnel and managed to pick up the ends of the broken cable which the Germans had severed. He then improvised a wooden raft, which he anchored, and then fastened to it the broken cable ends, and made a through connexion with a piece of covered copper. He then constructed a primitive set and got into communication with Suva and made known his plight.

This (Bamfield to Fanning) is the longest single stretch of ocean cable in the world. From Fanning the next step is to Suva in the Fijis, from whence the route is *via* Norfolk Island repeating station to Auckland, New Zealand, and on from there to Sydney, with an alternative route, Norfolk Island to Southport, near Brisbane.

When one endeavours to visualise this varied and lengthy path it seems a decent performance to get test-match score telegrams, off the Adelaide, Sydney, and Melbourne cricket grounds, as we have been doing recently, in 15 to 20 minutes, especially when it is remembered that there are 7 or 8 transmitting points to be negotiated.

Our Contoller brought off a little stunt last summer. He offered His Majesty the King the opportunity to send Prince Edward the result of the Derby, and without any elaborate preliminary arrangements got it into the hands of the Prince at Sydney in less than twenty minutes.

The Imperial Cable section of the All Red Route possesses some of the most recent developments of cable telegraphy, the inventions of the capable engineers of the Eastern Telegraph Company. The transmission both at London and at Halifax, is done by Judd and Fraser converter cable transmitters. These are automatic, and by the use of a switch, will take either the Morse or cable type of perforations. A speed of about 30 words per minute is maintained at duplex. This is very constant, and only on rare occasions has simplex working been necessary, due to interruption of the circuit from a variety of causes. The tape for feeding these auto-transmitters is prepared both by hand and keyboard perforators at both ends alike, but the method of reception differs. At Halifax a vibrator syphon recorder is in use and the slip with its syphon characters is "gummed up" and from it punchers prepare tape for Wheatstone transmitters, signalling across the Continent to Vancouver.

In the homeward direction, novel and interesting apparatus is in use. The signals arrive at Fayal from Halifax in block form, that is, owing to the great electro-static capacity of the cable the separate pulsations of dots and dashes have become continuous curves of their respective signs. They here actuate a relaying instrument called an interpolator, which, being synchronised with the Halifax transmitter, breaks up these block signals, and sends them on to Penzance as perfect and separate pulsations, just as they started from Halifax. By the time they arrive at Penzance, they have assumed block form again, and a special repeater passes them on so to London. Here they have a double function. Not only do they actuate the usual syphon recorder, which is placed in the bridge of the bridge-duplex, but also operate a couple of Post Office standard relays, placed in the line circuit of the land line loop. One of these relays responds to the dot, and the other to the dash current. In turn these relays, through their local circuits, operate selector sounders, which, again, in turn energise the respective dot and dash magnets of a cable re-perforator, which transforms the syphon characters into Morse perforated tape. This being passed through a Creed printer, gives a record in ordinary Roman type. It should be mentioned that an exceedingly close synchronism is necessary here, as at Fayal, for successful results to be obtained. The cable re-perforator is very complex in construction, and quite a bag of tricks of clever devices, and it will be appreciated that with only about 2 per cent. of margin for variation, a good deal of nursing is necessary in order to maintain constant working. In practice, the syphon slip is "gummed up" and serves to provide an office copy, while the printed one, gives an excellent copy for the public.

There are some faults and interruptions met with in cable telegraphy which appear novel to those who have been familiar only with land line working. For example—now and again a laconic message is received: "Lightning, I now earth cable." It will be pretty obvious to all that the high value of a cable renders it very necessary that no risks to it should be run from such a danger. On a recent occasion Penzance was obliged to keep the cable earthed for three hours. Earth currents are a source of not infrequent interruption, especially in the vicinity of the Azores. The outward repeating relay at that station is of the drum form. The cable coil is joined to a tiny conductor, which in its zero or neutral position, rests on a very narrow metal segment insulated by thin mica segments of a small drum, kept rotating, to obviate friction, by a little motor. The deflection of this conductor off the mica segment gives the necessary local circuit for relaying the respective dot and dash currents. It can easily be imagined what a job it is to keep this delicate arrangement in alignment when earth currents are about.

What has struck us as the most curious cause of interference has been that due to humidity at the Azores. It should be explained that on a duplexed cable the artificial line, or, as we call it, the compensation circuit, is a formidable thing, weighing two or three tons. It is made up of resistances and condensers with which to balance as closely as possible the electrical conditions of the cable. It is generally built up in a separate room. In these humid times, with a hot and "perspiry" atmosphere, all the connexions are reeking with moisture, and the poor electrician has to light large lamps in an endeavour to dry out the damp. Meanwhile he is unable to maintain duplex working, and resort has to be had to "up and down" turns at simplex.

Some interruptions, which cannot be placed in the category of ordinary faults, have happened to the route at various points. The first serious one was due to some uncertain cause in deep sea between 200 and 300 miles from Penzance and not only this, but two other cables were broken. Owing to submarine activities it was not possible to repair these until fourteen months had elapsed. A very recent interference was due to some Halifax local

authority who, having to blast frozen ground near our conduit, managed to break it, and narrowly missed making a complete stoppage of both the imperial and Halifax and Bermuda Systems. On another occasion a big landslide on the Canadian Pacific Railway carried away some miles of rail and telegraph lines. These lines are also subject to breakdown due to heavy falls of snow, but it is remarkable how very quickly restoration is made in these cases.

Still another cause of trouble on the 3,000-mile Trans-Continental land line is the intermittent presence of electric storms. Cases have occurred in our short experience in which the apparatus at some of the repeater stations, has been absolutely burnt out by the inrush of these heavy currents.

Sometimes we have felt that the Imperial has a charmed life. On one occasion seven other cables in its vicinity were interrupted.

The most amusing interruption was when the Controller had invited the Lord Mayor and the Sheriffs and Aldermen to come and see the Imperial Cable and the Central Telegraph Office generally. Everything was in readiness. The cinema man was installed, the Lord Mayor momentarily expected, the red carpet had been laid and the anxious Controller was at the front door. The Lord Mayor's carriage drew up, and at that minute the cable was interrupted. Happily it came right during the time the Lord Mayor was signing the visitors' book, and when he reached the circuit with Mr. Illingworth all was going merrily and the cinema man got his picture.

It has already been mentioned that the working speed of the Imperial Cable is 30 words per minute at duplex, but our engineers hope in the near future to be in a position to instal amplifiers by means of which the rate of signalling will be increased at least 30 per cent. These wonderful devices, of which a number of forms are in use, enable the conversion of the microscopic signals due to the increased speed into characters of readable size.

At a time like the present when there appears to be an almost universal desire to throw mud at Post Office institutions, a word or two about our relations with the business world may be of interest. When it first became known by us that the projected Imperial Cable would have to enter into competition with the Cable Companies, it was viewed as a stiff proposition: for it was feared that the department which—to its credit by the way—would have to mete out equal treatment to great and small users, would start greatly handicapped. This has proved to be the case, but the Secretariat has steered the ship through uncharted waters so well, that no point has been available for attack.

It will be understood how difficult it has been to apply rules solely to Imperial Cable affairs, which cannot be applied to foreign traffic generally, but, as difficulties have arisen in this direction, they have been successfully overcome. It has taken a good time for the Imperial Cable to become known, especially in our great provincial centres, but this state of things is gradually disappearing, and with the use among other things of our special delivery forms and envelopes, together with the forwarding forms showing the joint titles of the Imperial and Pacific Cable Board, it is hoped the system will soon get quite well known for what it surely is, a real, live Post Office cable concern.

A step in the right direction has recently been taken by the appointment of a number of canvassers both in London and the provinces. The good work of these officers has borne evident fruit. Our short cable experience has taught us that there is nothing like a little personal contact to remove a lot of the misapprehension which exists in business men's minds with regard to this "awful Post Office." At the same time, I must say that our clients have been kind. We are continually receiving testimonials as to our good work, and complimentary comparisons are frequently made, in spite of the fact that we always hold the scales evenly balanced.

It will be fresh in the memories of some that the Government has acquired Imperial Cable number two from the Direct United States Cable Company, primarily as an insurance against interruption of service. This cable runs from the terminus of the London-Irish line at Ballinskelligs Bay in south-west Ireland to Harbour Grace in Newfoundland, where it is relayed into Halifax. From thence communication is made to New York, through a cable to Rye Beach on the United States coast. It is believed to be the intention of the Department to bring this end of the cable out of Ballinskelligs, and extend it to our Penzance repeating office. This second Atlantic cable will greatly increase our capacity for transmission of traffic between the United Kingdom and the American continent. At present this cable continues to be leased to the Western Union Company on a short term agreement, subject to the right of the Post Office to take it over at any time in the event of the ex-German cable being interrupted.

The Pacific Cable Board also, is about to duplicate—partially at least—the Pacific section of the All Red Route. A much-needed provision for, on account of the great length of the link between Vancouver and Fanning, the rate of signalling is low and reduces the speed of the whole Pacific section to a very small figure. There is a good deal of traffic over this part of the route between Australasia and America and Canada, and the duplication will have a beneficial effect all round.

Who knows what the future may hold in regard to the extension of State-owned cables? Let these be what they may, I think we can confidently assert that the foundations of their working have been securely laid.

POST OFFICE SPECIAL CONSTABLES.

SPECIAL RESERVE.

ALTHOUGH their active functions came to an end a few weeks after the conclusion of the Armistice, it may be of interest to the readers of the *Telegraph and Telephone Journal* to learn something of the doings during the war of the Post Office special constables.

In view of the extreme importance of telegraph and telephone communications in war, it was essential to provide in every possible way for the security of the chief telegraph and telephone buildings. Accordingly, one of the precautions taken within a few days of the outbreak of war was the enrolment of volunteers from the Post Office staff as special constables for the protection of Post Office property. Fortunately, some of the dangers feared at the outset did not materialise, but the Zeppelin menace and, later, hostile aircraft's visits, caused very great anxiety, arising not only from apprehension of direct damage from air bombs but also from the possibility of resultant fires. To meet these risks squads of Post Office special constables attended nightly at the principal postal telegraph and telephone buildings in the London Area. They were instructed carefully, among other things, in the use of fire-fighting appliances, and in the topography of the premises, a most important point in the case of such large buildings. There were very few raids on London during which damage was not caused to property in close proximity to Post Office premises. On the day when the Central Telegraph Office was bombed, there was an outbreak of fire which the Post Office special constables, who were standing by in readiness on the spot, helped to keep under pending the arrival of the fire brigade. On other occasions Post Office special constables stood by with fire hose ready to prevent fires spreading to Post Office buildings from conflagrations near by, and they extinguished one or two small fires caused by wind-borne flaming billets.

During the earlier raids and threats of raids, particularly before public warnings were instituted, the knowledge that special constables were stationed on the look-out was a help to the Post Office staff which remained at work. Even when public warnings were given, the presence of the constables was of considerable moral support, especially at Telephone Exchanges where female staffs were carrying on, under very trying conditions, their very important national work, including telephone services connected with the repelling and destruction of hostile aircraft.

When the Post Office buildings were made available as Air-Raid Shelters, the Post Office Special Constables undertook the task of marshalling and controlling refugees in Post Office premises.

The G.P.O. North, West and South and the King Edward Building were protected by Post Office Special Constables enrolled in the City of London Police Special Reserve. These numbered from first to last between 500 and 600.

Colonel W. T. Reay (of the Metropolitan Police Reserve) in his recently published book: "The Specials: How they served London," wrote of the Post Office Division (Metropolitan Force) as follows:—

"Close upon two thousand of the staff were enrolled in the General Post Office Detachment of Special Constables, which was under the charge of Commander C. W. Masters Paterson, with Mr. E. A. Martin as Assistant-Commander. Both are capable men and were enthusiasts in the work. They had during the war an administrative office in Victoria Street, and day and night there was in attendance an inspector who, in a night emergency, took up the general direction of the Detachment until the arrival of a senior officer.

The largest unit was that formed at the administrative office (at Kensington) of the Post Office Savings Bank. The strength ranged from 150 to 200; the men were well organised and well drilled, and, although primarily their police duty was departmental, they were ready for outside work at a pinch. In the engineering and stores branches, at the district post offices, and at some of the telephone exchanges, units—forty-eight in all—were formed. The exchanges were very vulnerable points, and, of course, of incalculable value in all schemes for the defence of London. In anticipation of and during raids, the work they did was of the first importance. On the rare occasions when an exchange had, during the heat of a raid, temporarily to suspend activities, it made all the difference in the world to the men charged with defence and associated responsibility.

To insure police protection for the Exchanges when it was most needed was the privilege of the local body of special constables, and their work was marked by zeal, skill, and courage. Meanwhile, the other units did their parts at the more or less extensive establishments of the branches of the service to which they respectively belonged. Some of the District Post Office detachments were very well drilled.

The principal officers and a few of the men provided themselves with uniforms; but the great bulk were distinguished only by police armlets, supplemented in the case of officers by additional vari-coloured armlets indicative of rank, such as all officers of the Force wore before general service men were put into uniform. The Commander and his Assistant frequently inspected the units at their own respective centres, and on three occasions the General Post Office detachment turned out for a general inspection parade. The detachment won the praise of the successive Postmasters-General, that of the permanent chiefs of the service, and that of all who saw them.

At the valedictory parade of the Special Constabulary, the detachment marched past the King and, in default of uniform clothing, all appeared in straw hats."

Of the total Force mentioned by Colonel Reay, upwards of 600 came from the Engineering and Telephone branches of the service.

During the whole of the war period, from early in 1915 until the conclusion of the Armistice, nightly guards were maintained at all the buildings belonging to the Department, Savings Bank, Money Order Department, Stores Department Depots, L.P.S. District Offices (including the Inland Section, Mount Pleasant), and Telephone Exchanges. This necessitated the absence from home for the entire night on many occasions of the men on duty, thus contrasting with the outside specials on street duty who, as a rule, were only called upon for four hours spells in the neighbourhood of their own homes.

Six hundred and fifty-six men of the division qualified for the Special Constabulary Long Service Medal by three years' continuous service, combined with the performance of at least 150 turns of duty, representing at least 600 hours of voluntary and gratuitous work—exclusive of the time occupied in travelling to and from duty and the hours necessarily spent in the guard rooms when duties were completed at too late an hour to enable a return home to be made.

In addition to the actual Long Service Medal a large proportion of the constables earned the Long Service Badge for two years' continuous service and the Silver Star for enrolment prior to Dec. 31, 1914.

Col. Reay concludes his history in the following words:—

"We venture to claim that included, although not specifically mentioned, are the special constables of the metropolis and elsewhere in the thanks which Sir Douglas Haig, in his last despatch, gave to our kinsmen and kinswomen of the British Empire for the unflinching support they have given us by their thoughts, their prayers, and their work throughout the long years of war." "In all these years," he adds, "their trust and confidence never wavered, their labours never ceased, and no sacrifices, hardships, or privations were too great to be borne, provided that thereby the needs of the troops might adequately be supplied. The dauntless spirit of the people at home strengthened and sustained the invincible spirit of the Army."

WHAT THE SPECIAL CONSTABLE HAS GAINED.

There is, however, a debtor as well as a creditor side of the account with the community. We have not disguised our view that the men who served as special constables have well earned the thanks of their fellow-citizens. On their part these men are the first to acknowledge their gratitude for having been given the opportunity for service when their country was at war. Theirs was not the smug and unenviable placidity of the shirker. Nor did they hold in those terrible days of anguish, when it was no mere figure of speech to say that "never morning wore to evening but some heart did break," that it was sufficient for the non-combatant to give his tongue to the currency of unctuous moral sentiment. Mingled to-day with the proud satisfaction that they "did the State some service" is their clear recognition of the fact that the force organised and managed by Sir Edward Ward furnished them with a field and enabled them to do real work. The call which the war made to the citizenship was in the police, as in other useful services—like in the more important and the less important—a call to England's higher patriotic sense. Some think that before this call that sense was in peril of the atrophy which is ever the penalty of disuse.

"Before the war," remarked the other day one of those concerned, "I suppose I figured amongst the people who, while discharging professional and family obligations, did little or nothing for the community. I came into the Special Constabulary, and it gave me more than I could ever give it—in knowledge, breadth of vision, real experience, neighbourly association with other men of all classes, and the ever-resultant admiration for them and a worth in them I had not previously known. So if I'm not a better man as the result of this service I ought to be."

The Post Office division did not expire with the War, but survives as a branch of the Special Constabulary Reserve under the leadership of its old Commander (now Commandant) C. W. Masters Paterson and has at present an enrolled strength of over 600.

The conditions of service provide that members of the Reserve will only be required to do duty when the Commissioner of Police deems it necessary to declare an emergency, and so far as the Post Office division is concerned their primary duty will be, as in the past, the protection of the property of the department. At the same time members will have the opportunity of volunteering for other duties such as helping the regular police to line the routes of Royal and other processions. Men joining the divisions will now be supplied with uniform—overcoat, tunic, trousers and cap.

The present strength of the Post Office division is unworthy of the department and of the splendid Force which existed during the war. It is hoped that many of the old members, "fed up" perhaps for a time on the conclusion of their strenuous duties, will again respond to the call and rejoin their old comrades, and that younger men, who have "done their bit" in the fighting services, and who have perhaps for the time being felt equally "fed up," will realise that the country still calls for their services as and when occasion arises, and see in the Special Constabulary Reserve an easy and honourable way of being on the spot and ready when national danger arises.

LONDON ENGINEERING DISTRICT NOTES.

Imperial Cable Communications.

Mr. Avery is to be congratulated on the admirable paper which he read on the above subject at a recent meeting of the Telephone and Telegraph Society, not only on account of the paper itself, but also because it was the means of drawing out some most interesting information from subsequent speakers. For example, Mr. Lack referred to the laying of a submarine cable from Peterhead to Alexandrovsk, by the Cable Ship *Colonia*, in the record period of eight days. The office at Alexandrovsk was subsequently destroyed by fire, due, it is believed, to enemy action. The members of the staff contrived, however, to salvage a few pieces of apparatus and, in the course of two or three days, extemporised a signalling set which enabled them to make their requirements known to the British Authorities. The necessary apparatus, including an artificial line, was hastily manufactured in this country and despatched to Russia with the result that duplex working was quickly restored. Although the work was done at great speed it was well done, as is evidenced by the fact that, with the exception of one short stoppage due to a fault in the cable, the circuit has worked continuously to the present time. A cable was also laid from Alexandrovsk to Archangel with a repeater at a little village on the Murman coast named Yukanski. Mr. A. H. Roberts, of the Engineer-in-Chief's office, went to Russia in connexion with these operations and had some unique experiences.

Mr. Avery's paper is published in this month's journal, but engineering readers will be interested to know that there are two repeater stations between London and Halifax, Nova Scotia, one being at Penzance and the other at Fayal in the Azores. The Dipper Relay is in use at Penzance for re-transmitting to London the signals received from the cable, and Post office relays are used for transmitting towards Halifax. At Fayal a drum relay is used on both sections of the cable for re-transmitting purposes, and an interpolator is introduced for the purpose of converting the received block signals into perfect signalling units. Currents are thus sent out which are similar in form to those sent out by the originating station. The installation at Halifax was supervised by Mr. James Lockhart, of the Engineer-in-Chief's office. Mr. Lockhart also visited Russia in connexion with the cable before mentioned.

When the Germans were making their first rush through Northern France a cable was laid from Beachy Head to St. Nazaire and was of immediate and almost priceless value. Mr. J. Fraser, of the Engineering Department, was in France in connexion with this work.

During the war period Post Office repeaters were installed by some of our colleagues at Dieppe and Havre. By these means it was possible to work Triple Duplex Baudot between London and Paris on the Beachy Head-Dieppe and Cuckmere-Havre cables.

If the work done by Post Office engineers in all parts of the world during the war period were properly described what an epic it would prove?

Harrow New Exchange.

A new No. 10 C.B. Exchange was brought into use at Harrow on Wednesday, March 30, the transfer from the old No. 9 C.B. Exchange taking place at 2 p.m. on that date. The new exchange, which provides accommodation for 1,400 subscribers' lines, is housed in an extension of the old exchange premises. The installation was carried out by Siemens Bros., and, in common with the usual practice of this firm, is supplied with a 40-volt battery. The transfer was effected very smoothly and successfully, and much credit is due to the local staff. At 4 p.m. the subscribers' lines and junction circuits were entirely free from faults.

Hitherto it has been usual to carry out transfers to new exchanges on Saturday afternoon, but a departure from this procedure was made in the case of Harrow. Wednesday, being early closing day, was chosen in preference to the following Saturday, on which day a local election was to take place.

Private Branch Exchanges.

In spite of the slump in trade under which the country is suffering and the unsettled conditions obtaining at the present time, the Private Branch Exchange work in the district maintains a satisfactory level. Several new works are in hand and extensions to certain existing switchboards are being installed. A large No. 1 type exchange for an important Government department will probably mature in the near future and this, together with other cases which are under review, ensures a busy time for the large staff which has been engaged on this class of work for the past few years.

Telephone Repeater at Trunk Exchange.

Much has been said and written recently about the advantages which are expected to follow the introduction of telephone repeaters, and readers of these notes will be interested therefore to know that a repeater cord circuit has been in use for some weeks at the London Trunk Exchange on the Cardiff-Paris connections. Up to the present the experiment has been entirely successful. The improvement in speech is equal to the suppression of approximately 10 miles of standard cable.

A similar repeater will shortly be brought into use in connexion with the Liverpool-Paris traffic.

It is not possible to estimate, even approximately, the total financial gain that will accrue from the extensive use of repeaters, but there is no doubt that it will be very considerable and that any expenditure upon research work in this connexion will be amply repaid.

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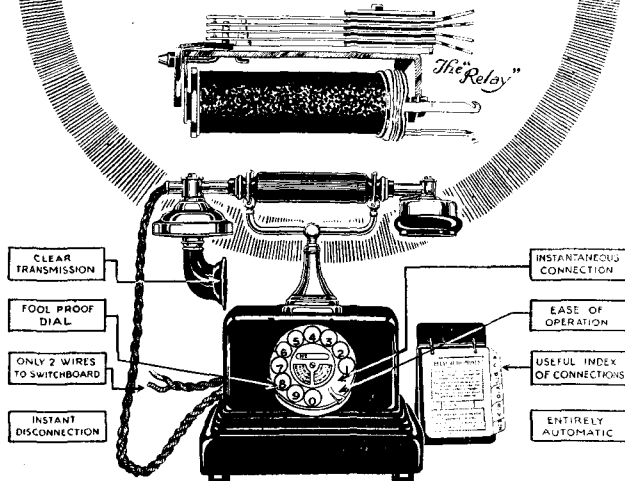
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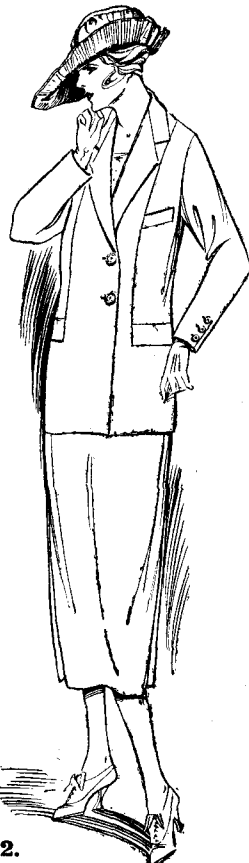
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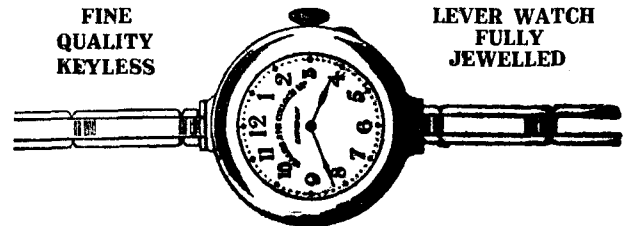
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High Frequency Telephone Circuits.

When Sir William Noble read his paper before the Institution of Electrical Engineers reference was made to the experiments that had been carried out in America with High Frequency or "Carrier" Circuits. It may not be generally known that our own Research branch has for some months been making experiments with a similar system with a view to its adoption in a form suited to English conditions. Considerable progress has been made and there is reason to believe that a few circuits will soon be put into commercial use between London and Bristol. It is expected that ultimately it will be possible to have six or more conversations proceeding at the same time over one pair of wires without interference.

Wireless Telegraphy.

In the March issue reference was made to the large number of licences granted to members of the public. The number of permits issued now exceeds 1,000. The increase for the month of March was 67 stations.

Telegraphing to Germany.

A Siemens-Halske automatic type printing set has been fitted in the Foreign Gallery of the Central Telegraph Office for communication with Germany. With this apparatus it is possible to work duplex at high speed (160 words per minute), but this advantage is counter-balanced by the fact that the flexibility of the system is not so great as that of those worked on the Duplex Multiplex principle.

London Inspectors.

The London engineering inspectors held their first annual dinner at the Connaught Rooms, on April 4. Over one hundred members were present under the chairmanship of Mr. J. D. Boulton. After a presentation had been made to Mr. C. W. Messenger, Mr. H. B. Howe proposed the toast of "The Society." In responding the president stated that the membership exceeded 1,000. He made special reference to the benefits of Whitleyism, and predicted still greater success if all concerned invariably approached their tasks with an honest and open mind. The chairman then proposed the toast of "The London Engineering District," and gave statistics to show the great and increasing volume of work carried out, the varied nature of the work, and the degree to which the maintenance efficiency of the district had been improved since the date of the transfer. He coupled the toast with the name of Mr. A. Moir, Superintending Engineer, who was the guest of the evening. In reply, Mr. Moir expressed his deep appreciation of the kindly reception accorded to him. Whatever success had attended his management of the London District was due to the loyal and energetic help of the staff. Many of the inspectors before him were his own nominations, of which he thought he had a right to be proud—(Cheers). He might tell them that the one great attribute necessary for upward movement on the staff ladder was thoroughness. If they knew their job, were thorough and prompt, promotion was practically assured. Other toasts were "The Visitors" and "The Veterans of the Inspectors' Society."

A really enjoyable musical programme was provided during the evening.

Western Telephone Cricket Club.

A concert in aid of the above club was held at the Chiswick Town Hall, on Wednesday, March 30, organised by the committee (Mr. C. W. Stewart, Mr. W. Hole and Mr. E. R. Gray).

The musical part of the programme was arranged by Mr. F. Walker (Park Internal) and special thanks are due to him for his effort in this direction. An audience of 200 spent an enjoyable evening, appreciating very much the talent of the various artistes. The interest of the executive officers of this and other sections was demonstrated by the presence of Messrs. A. G. Cardrey, R. Wilson, J. A. Hunt, J. L. Brown, W. J. Gear, E. P. Neate and H. M. Chambers.

It was originally intended that the proceeds should be devoted to a fund for inaugurating a sports club to replace the existing cricket club, but unfortunately it has not been possible to obtain a suitable sports ground for this season. The cricket club has now been in existence a number of years, and it is thought that the time is ripe for extending its sphere by the formation of a General Sports Club. If the necessary support is forthcoming, it is hoped to make arrangements for the renting of a ground for next season, and with this object in view another concert will be held in the autumn. The committee will be glad of any assistance readers may be able to offer.

All communications should be addressed to the Hon. Sec., Mr. E. R. Gray, at Park Exchange.

Denman Chess Club.

A most successful first season was brought to a close on Wednesday, March 30. The club championship has been won by Mr. Francis, but the tournament has not yet been finished.

It is hoped that the membership roll will be considerably extended next season.

One of the club members, Mr. R. A. Wells, who is also a member of the Engineering Department (Engineer-in-Chief's) Chess Club, has won the championship of the latter.

THE STRIKE PRESSURE AT THE C.T.O.

ONCE more the Central Telegraph Office has been called upon to face abnormal pressure as a result of labour troubles and a period of unwelcome comparative slackness has suddenly been transformed into one of exceptional stress. Although the volume of work was not so great as at the commencement of the Railway strike of 1919 the recent situation has in some respects been more difficult to deal with as the uncertainty of the position from day to day and even from hour to hour, and the sudden and dramatic nature of the changes made it an extremely difficult matter to estimate requirements and to make advance arrangements to meet emergencies.

The decision of the Railwaymen and Transport Workers to strike at midnight on Tuesday, April 12, led to a large increase of general business during the week preceding that date and the mobilisation of the Navy and Army Reserves brought with it much Government traffic. Continuous telegraphic facilities were provided to all the large Naval and Military centres, and in a modified degree the conditions were reminiscent of the early days of the War. Up to Saturday the strike appeared to be inevitable, but hopes of a settlement were raised by the receipt about 9 p.m. of a request for arrangements to be made for the immediate delivery of urgent telegrams to a large number of addresses in mining districts. As all offices except the head offices in the very largest towns were closed at that hour it was necessary to advise those which were open to be prepared for the messages and to arrange for their disposal by any means available.

In view of possible developments it was decided on Sunday morning that all offices then open till 10 a.m. in normal course should re-open at 5 p.m., and although there were no changes of importance during the day the additional outlets were very welcome as the evening work, especially Government traffic, was heavy. Matters quieted down after the postponement of the Railway and Transport Workers' strike on the Monday, but revived on the announcement that it was to take place at 10 p.m. on the following Friday. Right up to 4 p.m. on that day there was every indication that the strike would take place, but at that hour news came through that it was to be cancelled and for the rest of the evening the office was flooded with work. Batches varying from 50 to 1,500 messages in each batch came to hand in quick succession.

A feature of the traffic throughout the crisis was the large amount of "batch" work including one batch of 3,000 messages in connexion with the postponement of the Census arrangements. These batches usually consisted of a list of addresses and a text, and as this entailed the preparation of a separate complete form for each address the work involved, apart from the actual signalling operations, can readily be imagined.

Arrangements had been made with the object of securing the attendance of the staff in the event of a stoppage of travelling facilities, and detailed instructions to the staff were in readiness for distribution, but it was decided to run some risks and to defer the introduction of the emergency arrangements until the last possible moment. As events turned out this avoidance of any precipitate action was fully justified and much expense and dislocation of normal arrangements were avoided.

It is satisfactory to be able to say that without departing to any appreciable extent from the ordinary course an excellent service was maintained throughout the crisis, and there were very few instances of anything approaching abnormal delay. As usual the staff rose to the occasion and it was due to their efforts and to the cordial co-operation of all ranks that the work was dealt with so smoothly and expeditiously.

PRESENTATION TO MR. J. T. WHITELAW, DISTRICT MANAGER, MIDDLESBROUGH.

A large gathering of the District Office Staff, Middlesbrough, met on March 9 to make a presentation to Mr. J. T. Whitelaw on the occasion of his promotion to Rochdale. Mr. T. Hann, Chief Clerk, in making the presentation on behalf of the staff, spoke in appreciative terms of Mr. Whitelaw's career in the Middlesbrough District and expressed congratulatory sentiments on his promotion. Mr. W. Brodie, Contract Manager, Mr. W. A. Frame, Assistant Traffic Superintendent, and Mr. Ford, Postmaster of Middlesbrough, also contributed complimentary remarks. Mr. Whitelaw feelingly replied and thanked the staff for their co-operation and kindness during his term of office at Middlesbrough. The Staff's gifts were a silver-mounted ebony walking-stick and silver cigarette case, together with a pair of silver vases for Mrs. Whitelaw. An enjoyable programme of songs, whist, etc., concluded the proceedings.

LONDON TELEPHONE SERVICE NOTES.

AFTER a period during which so much adverse criticism has been levelled against administration by Civil Servants, and especially the administration of the telephone system, the following extract from an article in the *Daily Telegraph* concerning the Food Ministry provides a welcome contrast in its tribute to Civil Servants generally:—

"It is impossible to form a true conception of the work involved in buying such gargantuan stores of food as these statistics represent, and then distributing them in small quantities to millions of consumers so as to ensure the fair treatment of everyone in the matter of amount and price. For the triumph achieved, the successive Ministers, in accordance with our well-established ideas of public life, deserve the credit, as they would have received the blame had they failed; they were supported by the advice of business men of knowledge and experience, to whom praise is also due. But the efficient administrative structure, with its widespread ramifications at home as well as abroad, could never have been created without the trained skill of the Civil Servants who were associated with the Ministry. They saved it from chaotic confusion. They translated into action the policy of the Government as reflected by the Minister from time to time. It has become the fashion in some quarters to sneer at Civil Servants, but let it be said that no community is as well served in this respect as our own. The British Civil Service, with its high traditions, has no superior, and no little of the success of the Ministry of Food as of other war Ministries, was due to the members of this great silent body."

* * * *

That happy home of telephones which our critics would have us believe exists on the other side of the Atlantic is, we learn, disturbed by a revision of telephone tariffs. In fact one of the news agencies reports that "considerable disgust" has been raised in New York by the decision to increase the rates by 28 per cent. Increased salaries and other expenses are urged as necessitating the change.

Harrow Exchange.

Wednesday, March 30, saw the opening of the new Harrow Exchange. The new switchroom, which forms a new wing to the old exchange building, had been in readiness for some years, but the equipment was deferred owing to the war.

The date selected for the transfer was unusual. Advantage was taken of the anticipated slackness of traffic on the early closing day, instead of deferring the transfer until the usual week-end, when, on this occasion, the excitement of a local election was calculated to increase the normal Saturday traffic. Owing to an outbreak of influenza, the School, due to break up on the intervening Friday, was closed three days earlier, and the day of transfer saw a pressure of traffic considerably greater than usual. In spite of such adverse circumstances the transfer of the 700 subscribers' lines and 140 junctions took place without hitch and is recorded as being one of the most successful, thanks to the efforts of the Traffic and Engineering staffs.

The new exchange is of the C.B. No. 10 type, having lamp signals which are much preferred to the indicators of the old C.B. 9 board by the staff. The subscribers' multiple has a six-panel repetition throughout instead of the standard four-panel repeat. This modification was decided upon when it was found that the ultimate development of Harrow subscribers would exceed the estimated capacity of 2,000, on which the four-panel repetition was designed. The incoming junction equipment is jack ended instead of the usual plug ended, and Harrow possesses the distinction of being the only C.B. 10 exchange in London whose incoming service is carried by the new and much-debated jack ended type of junction. The new board is fitted with subscribers' registers. The capacity of the initial equipment is for 1,400 lines and the 700 spares will, it is confidently expected, be absorbed within five or six years.

The old switchroom, when cleared of telephone apparatus, will be utilised as a telegraph instrument room for the Harrow Post Office which forms the other wing of the building.

Langham Choral Society.

The last concert of the session will take place at 8 p.m. on May 10 at Queen's Hall. An attractive programme consisting of operatic excerpts and a concert performance of "Cavalleria Rusticana" has been arranged, with Beatrice Miranda, William Boland and Andrew Shanks as soloists.

Tickets, prices 8s. 6d. to 2s. 4d., are on sale at all exchanges, or can be obtained from the Hon. Secretary, Miss W. M. Nurse, West Traffic Office, 11/12, Norwich Street, Fetter Lane, E.C.4.

Coming Events.

A new feature of our JOURNAL will be the inclusion in each issue of a diary of events taking place during the ensuing month. Exchanges are invited to announce in that column any social or other functions which they

arrange. The items should be sent not later than the 15th of each month to Mr. Mead, Traffic Branch, 32, St. Bride Street, E.C.4. The period covered by the diary will be that from the 10th of the month of issue to the 10th of the following month. Thus items sent in by May 15 will appear in the June issue, and should cover the period June 10 to July 10. It is hoped that all exchanges will make full use of this column.

L.T.S. Whitley Committee.

The subjects dealt with at the tenth meeting of the L.T.S. Whitley Committee included the extension of the tea relief on 10-hour duties, the provision of metal lockers in the exchanges, accommodation for the medical officer and patients in the G.P.O. South building, the removal of the record table from the Trunk Exchange switchroom, and the desirability of arranging regular standing reliefs for telephonists. It was agreed to set up a special Committee with the following terms of reference: "To consider and make recommendations for improving the arrangements for cooking meals for night telephonists in the following exchanges in the L.T.S., Gerrard, Regent, Central, City and Trunks." The members of the Committee are:—

Official side.—Mr. Benham, Chairman, Mr. H. Dive, Miss R. James.

Staff side.—Misses A. M. Flanagan and D. J. Curtis, Messrs. Lansbury and Campbell.

Operating Statistics.

A statement was made concerning the improvement which had occurred in the Service as shown by a comparison of the operating statistics for the six months ending December, 1920, with similar statistics during and before the war. The figures in question are:—

	Six months ending June, 1914.	Six months ending Dec., 1919.	Six months ending Dec., 1920.
Percentage of "cut off" cases6%	.72%	.56%
		Ending June, 1919.	
Percentage of wrong numbers ...	3.5%	4.7%	4%
		Ending Dec., 1918.	
Percentage of operating irregularities	29.2%	36.2%	26.3%
		Ending June, 1919.	
Average time taken by operator to answer ...	4.8 secs.	10.1 secs.	5.9 secs.
		Ending June, 1919.	
Average number of written complaints per 1,000 direct lines per working day86	.92	.47

PRESENTATION TO MR. TINSON.

A presentation to Mr. Tinson, Assistant Superintendent and Head Master of the C.T.O. Telegraph School, on his retirement from the above honorable post and official life, took place on Thursday, March 31. Kindly was the thought that prompted this friendly gathering, the ladies—as usual the soul and animating spirit of this celebration—surpassing themselves, not only with their songs and elocutionary efforts, but also in the perfection of their refreshment arrangements.

The Deputy-Controller made the presentation in a brief speech, which admirably placed on record the affectionate tribute of a friend of over 35 years' standing and aptly expressed the goodwill of those present.

Mr. Tinson made a really happy response to the generous remarks and was evidently deeply moved.

The opportunity is now taken of placing on record on behalf of the school staff who have been closely associated with him in his labours, the positive pain with which they part from so real a friend. They will always carry with them a fragrant memory of his personality. His presence was always cheering as a shaft of sunshine, while his abiding interest in his staff and in the young pupils committed to his care was ever marked by thoughtful and even affectionate kindness.

It is unavoidable to omit one of the delightful surprises of the evening which was the singularly effective speech of our Controller. All knew that Mr. Lee had a wonderful way with him, but the manner in which he said what he had to say was as striking as a new revelation. It was a remarkably happy blend of elegance and good sense enlivened and illumined by many a playful and imaginative sally. Even a verbatim report would convey but a very imperfect idea of its witchery, and the effort crowned a very happy and successful evening with yet another crown of success. Mr. Tinson should be a happy man.

F. M.

DENMAN STREET AND ITS SURROUNDINGS.

BY F. W. HEATH.

THE spacious building in Denman Street, London Bridge, which forms the headquarters of the London Engineering District, formally opened in June, 1916, by the Postmaster-General, stands upon grounds formerly occupied by St. Thomas's Hospital, which was founded by Richard, Prior of Bermondsey, in 1213, and under various forms continued to exist until its removal to its present situation on the banks of the Thames, on the East side of Westminster Bridge, in 1870-71.

As the Borough High Street and Old London Bridge were for many centuries the only avenues of approach into London from the South of England, and indeed from the Continent, the neighbourhood was always a busy and bustling one, and many a brave pageant and historical event have taken place within a few yards of the present office buildings.

Across the High Street lies Southwark Cathedral, known to former generations first as St. Mary Overy's and later as St. Saviour's. Here memories of the great dead thickly crowd upon us. Shakespeare, it is known, resided in the neighbourhood in 1596, and Malone says: "Nor is there any ground for supposing that he ceased to reside there until he quitted the stage altogether." The Revd. Canon Thompson styles him "Our most distinguished parishioner," and goes on to say "Without the smallest desire to deprive Stratford-on-Avon of a particle of the high honour which it proudly enjoys as the birthplace of Shakespeare, we should like it to be remembered that he belongs most truly to London, and especially to St. Saviour's, where he spent the best, if not the greater part of his days, and where his mightiest work was done." In the Cathedral is a beautiful window in his honour. His youngest brother, Edmund, was buried here Dec. 31, 1607.

Here lie also buried, Gower, the father of English Poetry, and Fletcher and Massinger, the Playwrights. John Harvard, the founder of the University bearing his name at Cambridge, Mass., was born almost under the shadow of the Cathedral walls, and was baptized here Nov. 29, 1607.

The Church of St. Thomas at the rear of the office in St. Thomas Street is used as the Chapter House of the Cathedral, and was acquired for that purpose in 1901. It was rebuilt in 1702 on the foundations of the monastery.

Passing westward we reach New Park Street, formerly Maid Lane, upon the site of Shakespeare's own Theatre, the "Globe." This fact is made known and the position approximately indicated by a tablet upon the wall of Messrs. Barclay and Perkins's brewery. It was built about 1599 and burnt June 29, 1613. The neighbourhood of Bankside was then practically the playground of London, and here, as well as the "Globe," were other theatres and the Bear Garden. Edward Alleyn, the celebrated actor and founder of Dulwich College, enjoyed the post of Keeper of the King's Wild Beasts, or Master of the Royal Bear Garden, Southwark.

In the Borough High Street stands the old "George" Inn; notable as being the last of the old coaching houses. "The Tabard," from which pilgrims bound for the Shrine of St. Thomas à Becket used to set forth, as recorded by Chaucer in the "Canterbury Tales," "The White Hart" where Mr. Pickwick first met Sam Weller, the "King's Head," the "Queen's Head," the "Bull," the "Spurre," have all gone, but the "George" survives in much the same condition as in the days when all who fared toward Dover had to do so by road. True there is an inn called the "Tabard," but it is a very modern affair. As long ago as 1676 the then standing house was burnt, and it is doubtful whether even then any part of the building was co-existent with the time of Chaucer.

But the Borough, as well as for its inns, was also noted for other places of resort; for there here existed, or in the neighbourhood, five prisons. The Marshalsea, a few of whose old buildings still exist a little to the north of St. George's Church, and in which many of the scenes of Dickens's "Little Dorritt" are laid, the Clink at Bankside, the Borough Compter, the site of which is now fixed by Counter Court, the Queen's Bench in the Borough Road, and Horsemonger Lane in the thoroughfare of that name, afterwards Union Road. It is good to think that these have all vanished, the last named being also the last to go, about forty years ago.

The district known as the Mint, which took its name from a mint established there by Henry VIII, which is now intersected by Marshalsea Road, was in its day an asylum or sanctuary for the lower class of debtors, coiners, and vagabonds of every kind. It flourished from the middle of the 16th Century and was not finally suppressed until the reign of George I. It was here that the first case of Asiatic cholera in the Metropolis appeared in the great visitation of 1832.

Southwark Fair, which in Hogarth's time lasted 14 days, was held between where the Town Hall used to stand and Mint Street. Both Pepys and Evelyn mention it in their diaries. It was suppressed in 1763.

It must be a source not only of pleasure but of pride to the staff to know that their working lives at Denman Street are spent near the scenes of such great happenings, and in such a close association with a glorious past.

MY TRIP TO AMERICA, 1920.

BY C. S. CLIST.

My holiday this year was spent in Seattle, Washington, U.S.A., and it has been suggested that I should relate some of my experiences. I sailed from Liverpool on June 2 on the *Empress of France*. The weather during the first part of the voyage was not good, but I quite enjoyed life on board. We arrived at Quebec the following Wednesday morning, June 9, and great excitement prevailed when the boat was getting near land. I had passed the Customs, &c., and was on the train to Montreal by 2.30 p.m. The trains are much longer than ours, and I was impressed by the lack of platforms. One boards the train by the steps. I arrived at Montreal early in the evening, had a few hours there, then took the night train down to Toronto. That was my first experience of a sleeper. I wondered if I should sleep, but it speaks for itself that I had to be called in the morning.

I spent three days in Toronto, during which time I saw Niagara Falls, and left Toronto on Saturday, June 12, by the night train for the West, and arrived at Vancouver the following Wednesday morning. The time spent in the train is very interesting, as the scenery varies so much. From Toronto to Winnipeg reminds one of Scotch scenery, while from Winnipeg to Calgary is nearly all prairie. Calgary to Vancouver is just grand, the Canadian Pacific Railway takes one right through the Rockies. Food on the train is very good, and by the end of the journey one gets quite fond of the nigger porter. My brother met me at Vancouver and then my troubles of travelling alone were at an end, not that I had really experienced any difficulty on the whole journey.

I was sorry to leave Vancouver, but we had to continue our journey to Seattle early the next morning. We performed the journey of about 200 miles by motor.

It was a wonderful ride and gave me a very good idea of the country in British Columbia. We arrived at Seattle in the evening, and it took me quite a time to realise that I was at my journey's end.

Seattle itself is a charming place on the Puget Sound. On the one side is the Cascade Range, and on the other the Olympics. The town is built partly on the shores of Lake Washington and Lake Union. Both are very large, Lake Washington being about 30 miles long. The scenery, with the Sound and the mountains, is beyond my description, and I think it is one of the prettiest places along the west coast.

I had nearly eight weeks in Seattle, during which time I motored over 5,000 miles, so I have a good idea of the State of Washington.

I spent one morning going over the "Elliott" Telephone Exchange, owned by the Pacific Coast Telegraph and Telephone Company. The Exchange looked very much like one of ours. The expressions used are very similar to those we have. One they have sounds fine. "I beg your pardon" is always used if a wrong number is repeated or given. I had occasion to use the telephone a fair amount during my stay, and owing to my English accent, the poor American operator had difficulty in understanding me. The method of giving in the numbers differs a little from that adopted in this country; for instance, if three two double three were asked for, the operator would repeat, three two three three. The testing position is known as the hospital.

No educational exam. is required of the operators before entering the service of the company, and no medical test is enforced. The telephonist is questioned by the teacher in the school, when she calls for the form of application. I happened to be in the room when an applicant called, and to my great surprise, she was asked, "Are your eyes good?" "Can you hear all right?" "What about your throat? &c." It seemed very strange to me after our severe medical test. Promotion in the main part is given on merit. It may happen that the supervisor is far junior to the operator. The operators are trained for a week and then sent out to an exchange. Life generally is much the same as in our service, but discipline is more as we had it during the years of 1910-1914.

In July I visited Victoria, British Columbia, about five hours' boat trip from Seattle. It is a very pretty place and reminds one of England as regards customs, &c. As stated previously I had about eight weeks in Seattle. I left Seattle on Sunday morning, Aug. 15. The following Wednesday I arrived at Chicago where some friends met me and took me round to see the sights, including Lake Michigan. I left Chicago the same evening by the Pennsylvania Line, and was due in New York the next evening at 5.30. I travelled on the "time limited" express by which one pays six dollars extra, and if it happens that the train is late, so much per hour is returned. On this occasion the train was not late. We reached New York just at 5.30. and I spent the next day in seeing what I could of the city. It is certainly a very busy place, and the noise seems greater than in London, which, I imagine, is due to the overhead railways.

I left New York the next morning on the *Caronia* and arrived at Liverpool on Sunday evening, Aug. 29, just managed the night train to London, and reached Euston at 5.30 in the morning. I then realised that my holiday was really over, and must admit I was not pleased.

I like the West of America very much; the customs of the East are very different from those of the West. The scenery is also much grander on the other side. I can strongly recommend a holiday in the United States, and it is a good plan to go *via* Canada and return by America.

CORRESPONDENCE.

TECHNICAL PAMPHLET F.1.

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

SIR,—With reference to the Technical Pamphlets now being issued to workmen, it may be desirable to call attention to a slight error in Pamphlet F.1, Fig. 9, Page 12, "C.B. sub's telephone, with wall sockets and plug." A fitter unless experienced, working to diagram, would possibly have some trouble owing to this omission.

On reference to Position 2, in the diagram mentioned, and tracing the ringing current from the Exchange B. line, it will be seen that the 1,000 w. extension bell is not provided with a return path, back to the Exchange B. line.

Whilst on the subject of Technical Pamphlets I, with many other fitters, wish to inquire if Pamphlets other than those issued can be obtained by purchase. We should like to see Groups D. E. and F. issued free and facilities provided to purchase any others desired.

"CIRCUITS."

[The "return path" our correspondent speaks of is provided by a strap shown in position 3. It is thought that the diagram is sufficiently explicit for most fitters, but as it is apparently liable to be misunderstood, a short explanatory note we understand from the Engineer-in-Chief will be added on next reprint.

An edition of the pamphlets for sale is now being prepared, and it is hoped that they will be available for purchase from the usual Government Stationers within the course of a few weeks.—Ed., T. & T. J.]

DINNER TO MR. A. K. MURRAY, BIRMINGHAM.

Mr. A. K. Murray, Contract Manager, Birmingham, was invited by the Contract staff to a complimentary dinner to celebrate the 25th anniversary of his entry into the Telephone Service.



In proposing the toast of the guest, the Chairman, Mr. J. S. Rhodes, stated that Mr. Murray entered the Telephone Service at Glasgow on March 9, 1896; was made Contract Manager at Hull in 1907, and subsequently transferred to Birmingham in the same capacity in 1914. Mr. Murray, in his reply, specially mentioned the friendly spirit existing in the Department, and his remarks in accepting the gift of a set of golf clubs as a memento of the occasion, exemplified the fact that Scottish humour was not dead. Among the notable features of an exceedingly pleasant evening was a humorous topical song specially composed for the occasion.

CALENDAR OF COMING EVENTS.

- May 10.—Concert of Langham Choral Society at Queen's Hall, 8 p.m.
 „ 10.—Cricket. Cable Room v. D. and E. (C.T.O.) Dulwich Park
 „ 17.— „ Cable Room v. Met. (C.T.O.) Dulwich Park.
 „ 24.— „ Cable Room v. A. and B. (C.T.O.) Dulwich Park.
 „ 25.— „ Secretary's office (G.P.O.) v. Harrow P.O. at Roxeth.
 „ 31.— „ Cable Room v. C. and F. (C.T.O.) Dulwich Park.
 „ 27.—Annual Dinner of the Society of Civil Servants at Connaught Rooms (Sir Cecil Harcourt Smith will be in the chair and the Right Hon. D. Lloyd George will be present).

PERSONALIA.

LONDON TELEPHONE SERVICE.

- Miss G. W. PORTER has been promoted Assistant Supervisor, Class II, at Brixton Exchange.
 Miss D. APPELBY has been promoted Assistant Supervisor, Class II, at Regent Exchange.
 Miss F. I. CLARK has been promoted Assistant Supervisor, Class II, at City Exchange.
 Miss L. A. FISHER has been promoted Assistant Supervisor, Class II, at Holborn Exchange.
 Miss H. E. BLAKE has been promoted Assistant Supervisor, Class II, at Hop Exchange.
 Miss M. E. CARPENTER has been promoted Assistant Supervisor, Class II, at Battersea Exchange.
 Miss M. A. TYLER has been promoted Assistant Supervisor, Class II, at Hop Exchange.
 Miss H. C. STILL has been promoted Assistant Supervisor, Class II, at Holborn Exchange.
 Miss L. K. DAVIES has been promoted Assistant Supervisor, Class II, at Trunk Exchange.
 Miss M. A. CHORLEY has been promoted Assistant Supervisor, Class II, at Central Exchange.

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

- Miss E. M. HATTON, Assistant Supervisor, Class II, of Putney Exchange.
 Miss A. BRIDGE, Assistant Supervisor, Class II, of Paddington Exchange.
 Miss B. EASTER, Telephonist, of Avenue Exchange.
 Miss G. WEBBER, Telephonist, of Avenue Exchange.
 Miss D. M. E. HANSFORD, Telephonist, of Avenue Exchange.
 Miss L. E. WELCH, Telephonist, of Avenue Exchange.
 Miss F. V. H. HARRIS, Telephonist, of Central Exchange
 Miss L. M. ADAMSON, Telephonist, of Central Exchange.
 Miss E. R. LEWELLYN, Telephonist, of Central Exchange.
 Miss R. E. GOULD, Telephonist, of Hammersmith Exchange.
 Miss E. M. HALL, Telephonist, of the Trunk Exchange.
 Miss C. M. WEEKES, Telephonist, of the Trunk Exchange.
 Miss D. M. BUTT, Telephonist, of the Trunk Exchange.
 Miss B. BONE, Telephonist, of the Trunk Exchange.
 Miss L. PALMER, Telephonist, of East Exchange.
 Miss F. S. MILLER, Telephonist, of East Exchange.
 Miss G. E. CARTER, Telephonist, of Barnet Exchange.
 Miss A. R. C. PAYNE, Telephonist, of Victoria Exchange.
 Miss F. A. OCKENDEN, Telephonist, of Victoria Exchange.
 Miss E. L. KEDDIE, Telephonist, of Victoria Exchange.

PROVINCIAL.

Mr. A. E. M. CAREY, Contract Manager, Plymouth, was presented by the District Managers and Exchange staffs with a silver cigarette case on the occasion of his transfer to Bristol on March 31, 1921.

Miss F. POLGREEN, Telephonist, Plymouth, resigned on April 2, 1921, on account of marriage and was the recipient of a set of stainless cutlery from her colleagues.

At Preston, on Friday, April 1, Mr. F. E. ADAMS was presented by his colleagues with a clock as a mark of their esteem on his being transferred to Plymouth as Contract Manager. The presentation was made by the District Manager, Mr. E. E. Stockens, who, in a few well-chosen words wished Mr. Adams success in his new undertaking.

Mr. Adams, who has taken a leading part in the Amateur Operative Societies of Blackpool and has appeared on the concert platform regularly during his eleven years in the Preston district, replied with considerable emotion. He will long be remembered in the Preston district for his cheery disposition and a readiness at all times to assist in any entertainment for which his services were in great demand.