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TELEGRAPH AND TELEPHONE MEN AND WOMEN.

XXXI.—

MR. ALFRED E. COOMBS.

MR. A. E. COOMBS, the District Manager at Glasgow, is one of the best-known and most popular figures in the telephone service. He was born in August, 1879, and, prior to the transfer of the telephone service to the State, had spent several years in the employment of the National Telephone Company, chiefly in South Wales. At the time of the transfer (January, 1912) he was Traffic Superintendent of the Bristol district, but his worth, under the new conditions of service, was early recognised, and in March, 1914, he was promoted to the post of Traffic Superintendent of the Liverpool district. In that capacity his success was marked, and in February, 1925, he received a well-merited promotion to his present post. When Traffic Superintendent of Liverpool, Mr. Coombs rendered good service to his brother traffic officers as



their representative on the Department Whitley Committee and other bodies.

Mr. Coombs is an enthusiast in his profession. The telephone service has the power, from whatever source it may spring, to generate enthusiasts, but Mr. Coombs is an enthusiast *in excelsis*, and he combines with that characteristic a knowledge of telephone technique and a gift of leadership which few are fortunate enough to possess.

Mr. Coombs's enthusiasm, however, is not confined to the telephone service. It carries him into paths which the ordinary Post Office servant is hesitant to tread. Who has not heard of his zest for those curious competitions where success is awarded by pianos, postal orders and books in large quantity, or of his zeal in the management of the football team which swept victoriously over Wallasey? Such as he deserve and command success, even in these strange fields.

[Photo by Parisian Studios, Liverpool.]

SOME THOUGHTS ARISING FROM THE TELEPHONE JUBILEE.

BY ARTHUR E. COTTERELL.

As one privileged to attend the *Conversazione* of the Institution of Electrical Engineers held in celebration of the Telephone Jubilee, it was natural that I should find old interests stirred as I gazed on the various exhibits which ranged from the early and crude apparatus of Philip Reis and the successful apparatus of Bell to the automatic switching appliances which are the striking features of to-day.

My thoughts went back to those far-off days when the whole telephone system in this country comprised only three exchanges, viz., those in London, Manchester and Liverpool, to be succeeded by memories of all the wonderful evolutions which cover the growth and development of telephony.

Coupled with these recollections came the names of men who have played large parts in the development of British telephony, and it was good to see not a few of them present, and though regretting that many of them were absent to know that nearly all of them are still amongst the living.

This last thought made one feel glad that although Alexander Graham Bell did not survive until the year which constituted the jubilee of his great invention—the greatness of which is exemplified by its simplicity and the fact that it is unsurpassed as a receiver—he lived long enough to see its world-wide adoption; an acceptance which not only brought to him a rich and well-deserved reward but afforded an enormous boon to our commercial, political and social lives.

Even so, however, it seems a matter for regret that he was not spared for a few more years which would have enabled him to witness the far wider adoption of the child of his genius; without which, broadcasting would be non-existent. In order to visualize this let us take merely Great Britain and Northern Ireland to begin with, and what do we find. As a result of nearly 47 years effort the Post Office and its predecessors, the Companies, have brought into use 1,450,000 telephones, but when we turn to broadcasting we notice that there are at the present time no less than 2,076,000 licensees. We may deduce that every headphone set comprises two Bell telephones and each loudspeaker is also a Bell receiver. It is to be supposed that each licensee even with a crystal set has at least two pairs of headphones, i.e. four Bell receivers and probably more. The latter is fairly certain with those who have valve sets—in my own case I have four headphone sets and a loudspeaker, i.e., nine Bell receivers in all. There must be many who not only equal but exceed this, but assuming an average of only three headsets we perceive an average of six Bell receivers per licensee which gives us roughly about 12,500,000 instruments in use in broadcasting in the home country or over eight-fold the number in use in the ordinary telephone service. What an achievement in some three or four years! But these remarks relate only to a portion of the story. To-day there are somewhere about 27,000,000 telephones in use for exchange and private wire purposes throughout the world. If now we apply the above-mentioned comparison in regard to broadcasting, which is probably an under-estimate, it would appear likely that somewhere about 240,000,000 Bell receivers are in use in this recent and popular service; a colossal figure which, it may probably be supposed, far exceeds even the most optimistic hopes that Professor Bell could have entertained.

Time brings many changes, and it is curious to note that what was at one time considered a bugbear in wired telephony now performs a highly useful part therein, and performs an essential

function in wireless. In the early years there was some knowledge of the effects of self-induction; i.e. inductance, to use the modern term. In the state of knowledge prevalent at the time it was generally known as something deleterious to telephonic transmission and therefore to be avoided or minimised as far as possible in the arrangement of circuits, particularly as regards the signalling apparatus through which it was unavoidable that speech should be effected. In the early eighties the late Oliver Heaviside discussed at great length the properties of telephonic transmissions and the effects of self-induction and capacity, another known trouble regarding cables, giving some clues to methods by means of which these phenomena might be made useful instead of harmful. It is to be feared that the engineers of the time were indisposed or unable to grapple with his extensive mathematical formulae, as although the late Professor Silvanus P. Thompson, a few years later, made some interesting suggestions, nearly twenty years elapsed before Dr. Pupin evolved a practical method in simpler terms which soon caught on and has since been used with enormous advantage. With the advent of wireless our knowledge of inductance and capacity has been further extended, and thanks largely to Lodge, their uses in combination are the simple means of adjusting wave-lengths.

In the early days after Hertz's discovery of electric waves it was, I think, Professor Bose who referred to the detector as "the electric eye" which probably to many, as to myself, seemed rather a far-fetched term. In view of the now more self-evident relation between such waves and those which we recognise as light, the appellation appears to have been justified, with, however, the reservation that the "eye" becomes closely allied with the ear. It was Bacon who said "No natural phenomenon can be adequately studied in itself alone, but, to be understood, it must be considered as it stands connected with all Nature."

Mary Somerville, in her excellent work "The Connexion of the Physical Sciences," emphasized this axiom at a time when natural science had not proceeded far as compared with to-day.

To come closer to our own times we have the words of Henri Poincaré: "Thus we see, ever dawning afresh, the eternal hope of co-ordinating all natural phenomena into one grandiose and imposing synthesis."

MR. A. W. EDWARDS.

A REMARKABLE gathering of the staff of the Central Telegraph Office was held at the Cannon Street Hotel, London, on the night of July 16, to bid farewell to Mr. Edwards, the Deputy-Controller of the Central Telegraph Office, on his retirement, and to ask his acceptance of a number of gifts as symbols of the regard and esteem of the staff of the Central Telegraph Office. The chair was occupied by Mr. R. E. V. May, and an admirable programme of music was given including selections by the "Irrepressibles." Mr. May, in opening the proceedings for the actual presentation, made an interesting survey of the Central Telegraph Office at the time that Mr. Edwards joined. "A gathering like this," he said, "gives rise to several emotions. We are breaking a close fellowship of over 40 years' standing, and we must preserve a cheerful countenance to speed the departing one with all the good wishes possible.

"The retirement of A.W.E., to my mind, marks almost the close of an epoch in the history of the Telegraph Service, more especially as far as TS is concerned. When he entered the Service 44 years ago, the whole of TS was contained on the 3rd floor. The FG—the TSF of those days—was tucked away in the corner of the S/S now occupied by the Private Wires. The Central Hall circulation, with the City Office tubes, occupied the south side of the centre. Some of the present day busy Tube Offices were, at that time, connected with TS either by a Morse inker or a single

needle. The shortest circuit was, I think, a single needle working to Doctors Commons, just the other side of St. Paul's Churchyard. The cloakrooms were situated in the large room immediately under the centre now occupied by the TSF circulation, &c. The dining rooms were down in the basement opposite the engine room and next door to the coal-hole. The rest of the building was occupied by the High Executive Departments of the Post Office, from the Postmaster-General down.

"I mention these matters to give an idea how the Service has developed. In this expansion Mr. Edwards had taken a prominent part. He entered the office in 1882 as a telegraph learner, and several years later was transferred to the Controller's staff, and has passed through practically all stages to the highest but one Executive position. I will not attempt to dilate on this side of his work. Throughout it all he has remained a TS man. Notwithstanding the difficulties of his position he has maintained his fellowship with the staff generally. He has entered whole-heartedly into all our social and other activities. His interest has not been merely platonic, it has been very practical and personal. In this respect, I think, he is absolutely unique.

"I suggested just now that his retirement marked the passing of an epoch. The earlier part of the last 40 years witnessed the rise of the Telegraphs; now, I am afraid, we are seeing its decline. It is being overshadowed by its younger sister the Telephone. Such changes are, I suppose, inevitable, but those who have grown up with the Service cannot help but feel somewhat affected when thinking back. Needless to say we are delighted in having Mrs. Edwards with us to-night. She has ably supported her husband in most of our social gatherings. As an appreciation of this, we will at a later moment ask her to accept a small token of regard."

At the close of the chairman's speech Mr. May asked Mr. John Lee to make the actual presentation. Mr. Lee gave a review of Mr. Edwards' career from different angles, his official contributions, his contributions to the social life of the office and to sport, his great work in encouraging intimacy with St. Bartholomew's Hospital, by which St. Bartholomew's Hospital was aided on the one hand and the Central Telegraph Office granted especial benefits on the other hand. Mr. Edwards was a life governor of St. Bartholomew's Hospital, and in that capacity had done excellent work both for the hospital and for the Central Telegraph Office. Mr. Lee concluded by asking Mr. Edwards and Mrs. Edwards to accept the gifts offered to them by the staff as a memory of their long association.

NOTES ON TELEGRAPH PRACTICE.

BY G. T. ARCHIBALD.

(Continued from page 215.)

XVIII.—Concerning the Final Treatment of Telegraph Forms.

NONE who have had access to official papers relating to the transfer to the State of the various Telegraph Companies, and to the subsequent building up of the public telegraph service, can fail to pay tribute to the work of Mr. Scudamore and his assistants. They could not, of course, foresee the development of printing telegraph systems, but they built up an organisation which except for a few alterations in details has stood the test of time. They were cautious to a degree, realising as they did, that

the public administration of a service which it was desired to encourage demanded not only accuracy and secrecy but also the safe delivery of telegrams to their destination.

Nevertheless, some of the precautions taken to ensure the delivery of telegrams seem useless and extravagant to modern telegraph officials. Five abstract schedules were used at the larger offices. At the telegraph counter a record was made in respect of every telegram handed in of the date, the serial number, the surname of the addressee, the office of destination and the amount collected in payment, either in cash or stamps. On arrival in the Instrument Room the telegram was again abstracted; a record being made of the date, the serial number (which had to agree with the counter number) and the name of the office of destination.

Transmitted and received telegrams received similar careful treatment. The transmitted abstract included the date, the transmitted serial number, the surname of the sender, the name of the office from which the telegram was received, and the name of the office to which it was re-transmitted. There were two abstracts of received telegrams, one for use in the Instrument Room, the other for use in the Delivery Room. The first contained columns for the received serial number, the surname of the sender, and the office of origin; the second included particulars of the received serial number (which had to agree with the Instrument Room number) the surname of the addressee, the office of origin, the charges collected on delivery, the identification number of the messenger entrusted with the delivery of the telegram, and the amount paid out (if any).

It is surprising that after all the care taken during the transmission of a telegram the sequence was not completed by a signed receipt given by the addressee.

Unfortunately no precise records of lost telegrams are available for the early years of State control, but it may be conjectured that messages sometimes went astray notwithstanding the elaborate precautions taken for their safety. There is evidence that one complaint was made, for some reason or other, in connexion with every 600 telegrams handled in 1871; at present complaints are in the ratio of 1—1,600. It is interesting to note that in the above mentioned year the average delay on telegrams dealt with over the main London—Provincial circuits was 90 minutes; the average transit time in the Central Telegraph Office is now about 20 minutes.

It was soon found that the abstract system could not be maintained except at high cost and at the risk of delay, and in 1876 the counter abstract was reduced to a record of the serial number and the surname of the addressee, whilst the corresponding Instrument Room abstract was confined to a check on the counter serial number and the code of the office of destination. At the same time it was decided to restrict the transmitted abstract to a record of the transmitted serial number, the office of origin and the office of destination. The Instrument Room received abstract became a mere serial number record; at offices where it was not the practice to enter on the upper or office copy of the "C" form the name or identification number of the messenger responsible for delivery and the time of his departure from the office, these particulars were also entered on the number slip. In 1878 the upper copy of the "C" form was amended to exhibit all the necessary particulars relating to the delivery of a telegram in order that delivery abstracts might be abolished.

In the early eighties numbering machines were introduced at the larger offices and this innovation led to a further simplification of the abstracts, but it was not until 1905 that the counter abstract was universally reduced to a mere record of the serial number. From 1870 until 1922 ordinary telegrams, press telegrams and (later) phonograms were each numbered in a separate series. In the latter year, and in order to facilitate a change in the disposal of finished telegrams—which will be referred to later—it was

arranged to number forwarded telegrams at Provincial Head and Branch Offices in the following classes :—

- (i) Inland Press.
- (ii) Inland Ordinary Telegrams.
- (iii) Inland O.H.M.S. and Inland " Pass " Telegrams.
- (iv) Foreign Telegrams, including Radio-Telegrams.

Note.—(ii) includes all inland telegrams for which the charge is fully covered by stamps or Reply Vouchers, redirected " Collect Fee " telegrams, and paid telegrams for which a deficiency is signalled forward.

PHONOGRAMS.

- (i) Inland Ordinary Phonograms and Telephoned Express Services.
- (ii) Inland O.H.M.S. and Inland " Pass " Telegrams.
- (iii) Foreign Telegrams, including Radio-Telegrams.

In 1899 the transmitted telegram abstract was abolished, but all such telegrams continued to be numbered and date-stamped until 1904; from thence onwards, except at Railway Station Offices, the number of transmitted telegrams has been obtained by a special count which is applied during the slacker hours of the day. Previous to the year 1922 it was the practice to sort all transmitted forms roughly into quarter hour periods in the order of handing in time. This arrangement was made in order to facilitate the tracing of forms for inquiry purposes. In 1922 it was decided that transmitted forms need not, as a rule, be associated with the relative forwarded forms in cases of complaint, and it was then arranged to leave the forms in the order in which they reach the Finished Check Section. The effect of this simplification of the method of dealing with " dead " work was to save from four to five telegraphists at some of the larger provincial offices.

At the same time it was decided that forwarded telegrams should no longer be placed in serial order, the numbers being checked by a count of the forms in hand at the end of the day and compared with the last number recorded by the numbering machine, &c. Discrepancies up to two per thousand are passed; but greater deficiencies must be inquired into.

In 1876, coincidentally with the introduction of telegraph value stamps and the modification of telegraph abstracts, the statements containing full particulars of every telegram handed in and the daily telegraph account which, up to that time had been furnished daily, were abolished. This account, accompanied by the telegram forms, forwarded, transmitted and received, was sent to the Metropolitan Office where the forwarded, transmitted, and received forms relating to every telegram were associated. A daily docket upon which was recorded the total number of telegrams forwarded, transmitted and received, both ordinary and press, was then introduced and this system is still in operation.

When office copies of received telegrams were abolished in 1917 it became necessary to take special steps in order to ensure that correct received telegram figures should be reported to the Metropolitan Office. It was arranged that at 12 midnight, or at the hour of closing for delivery work, the received check officer should prepare and sign a certificate showing the first and last received numbers for the day, and the number of office copies prepared (see Chapter XVI). This certificate is filed locally, the officer responsible initialling the appropriate entry on the daily docket.

The abolition of office copies necessitated an important alteration in the method of sorting finished transmitted forms which had been in operation since 1870. In order that there might continue to be a complete check on telegrams handed in at offices in category (i) (Chapter XVI), the relative transmitted forms at the first transmitting office are now segregated for early reference; thus, in the case of a telegram handed in at office A for delivery

at office B, an office copy is prepared at the latter office; in the case of a telegram handed in at office A for office C no office copy is prepared at C but the relative transmitted form at office B, through which the telegram must pass, is available for checking purposes. These two illustrations serve to shew that it is still within the power of the Comptroller and Accountant General's Department to exercise a complete check upon telegraph revenue.

In the past twenty years there has been a movement generally in the direction of the devolution of authority from headquarters, and it may fairly be said that this, together with the abolition of office copies of received telegrams, smoothed the way for further changes which, otherwise, might have been regarded as revolutionary. During the years that it was the practice to forward all telegram forms to the Metropolitan Office every inquiry had to be referred to Headquarters so that the relative forms might be associated. This procedure delayed the process of inquiry and involved a considerable amount of correspondence between the Metropolitan Office of Account and the local offices concerned. In 1921 the question of the local retention of forms was inquired into, and in 1922, and with the entire concurrence of the Comptroller and Accountant General, a workable scheme was drawn up and approved by the Secretary to the Post Office.

The scheme provided for the retention at Head Post Offices, including the Central Telegraph Office, London, for periods varying from two to four weeks, of telegram forms including Sub-Office received forms (the double C form is still in use at Sub-Offices). Forwarded telegram forms (except Press, Inland O.H.M.S. and those franked by pass or docket) and transmitted forms relating to telegrams handed in at small local offices are retained for two weeks; all other transmitted forms are retained for a period of four weeks. Sub-Office received forms are retained for four weeks except in the case of those which correspond in function to the office copies made out at Head Offices; these are retained for only two weeks.

Foreign forwarded and Radio forwarded forms are retained for two weeks, and Inland Press, O.H.M.S. and Inland Pass forms are forwarded to the Metropolitan Office with the daily docket despatched on the evening following the date of the forms.

Phonogram A forms, except Inland O.H.M.S. and Pass Phonogram forms, are also retained for two weeks. The Central Telegraph Office, London, retains all forms relating to telegrams dealt with at London offices served by tube.

The procedure at Branch Offices is similar to that at Head Offices. All Town Sub-Office forwarded forms, except Foreign and Radio forms, which are retained at the Head Office as above, are forwarded to the Metropolitan Office on the evening of the day following the date of the telegrams, the Foreign and Radio forms being replaced either by duplicates or by a list shewing the serial number, the amount of the charge, and the destination of each message.

Railway Station Office forwarded forms are sent to the local Head Office where the Foreign and Radio forms are withdrawn, the procedure being similar to that at Town Sub-Offices.

At the end of the period of retention Foreign and Radio forwarded forms originated at Town Sub-Offices and Railway Offices are forwarded to the Metropolitan Office together with the Head Office forms and a covering list shewing the number of forms enclosed from each Sub and Railway Office. Foreign and Radio forms are only retained locally to facilitate service inquiries; public inquiries concerning foreign and radio telegrams are forwarded to the Secretary, General Post Office, the relative forms being enclosed, if possible.

Sub-Office received forms relating to telegrams for which a counterfoil would be prepared in the case of a Head Office are retained at the local head office for a fortnight, after which they are forwarded to the Metropolitan Office. All other sub-office received forms are retained locally for a month.

Undelivered telegrams are retained at the branch and sub-offices for two days, after which they are forwarded to the local head office. Covers containing Reply Paid Vouchers are forwarded to the Metropolitan Office at the end of a fortnight.

Forms retained at the local head offices are arranged in bundles convenient for reference and stored in date order for the specified periods, care being taken that none but authorised persons have access to the forms.

All date-expired forms are treated as confidential waste. Before 1922, when all forms were forwarded to the Metropolitan Office, waste was disposed of from that office. Since the introduction of the local retention scheme, time-expired forms have been forwarded by the local offices to twelve provincial offices, one in each Survey District. These offices are known as "despatching centres," to which all offices in the district concerned send their accumulations of time-expired telegram forms. At the close of the period of retention the forms are withdrawn from the storage presses and all string, pins and paper fasteners are removed. The waste forms are then made up into sealed sacks each containing 56 lbs. and forwarded to the despatching centre. The latter office treats its own waste in a similar manner, and forwards the entire collection at frequent intervals to the recognised pulping mills.

The daily docket shewing the first and last number of the telegrams dealt with in the various classes is signed by the Postmaster (the Telegraph Superintendent at offices with a separate telegraph establishment), or the officer in charge in the case of a branch office, and signing officers must satisfy themselves as to the accuracy of all the details.

The local retention scheme works smoothly and well; the Comptroller and Accountant General's Department has been relieved of a large amount of work. Valuable storage space at headquarters has been set free, and there has been considerable saving in transport charges and clerical work.

(To be continued.)

TELEPHONE KIOSKS No. 2.

With the advent of the receipt of the necessary stores from the manufacturers, kiosks of the type designed by Sir Gilbert Scott are beginning to make a brave show in the public thoroughfares in the Metropolitan Boroughs of London.

The London Telephone Service, after protracted negotiations with the Metropolitan Borough Councils, the Metropolitan Police and Ministry of Transport, has been able to arrange for prominent sites for these kiosks, and the accompanying photographs illustrate kiosks which have been erected in the Royal Borough of Kensington and Metropolitan Borough of Holborn.

The design, finished kiosk red in colour, is a dignified and imposing structure standing 8 ft. 6 in. in height with internal measurements 3 ft. 1 $\frac{3}{4}$ in. by 3 ft. 1 $\frac{3}{4}$ in. clear inside, made up in cast iron sections, and mounted on a concrete base 3 ft. 6 in. by 3 ft. 6 in. by 6 in.

The door is of teak, and the window openings in the two sides and door are each divided into 18 small panes glazed with 32 oz. sheet glass.

The interior, which is finished a flame colour, has a granolithic floor, and is designed with a flush surface, angles and projections being avoided as far as possible.

Ventilation is provided by means of a pierced inner ceiling, and the decorative crowns, at the top of the kiosk, which are also pierced.

A light is fixed in the centre of the inner ceiling which, in addition to lighting the interior of the kiosk, illuminates the word "telephone" which appears on the four sides.

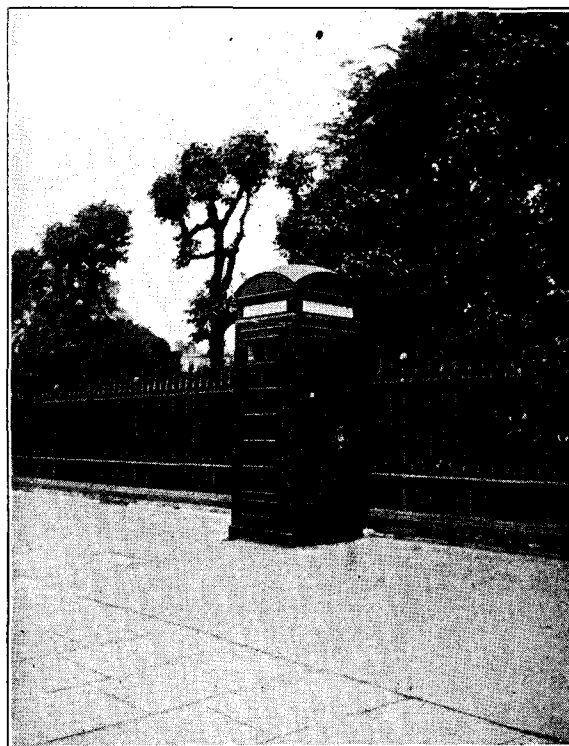
The structure weighs approximately 1 $\frac{1}{4}$ tons.

F.P.M.



STAPLE INN, HOLBORN.

[Photo Mathias.]



ROYAL CRESCENT, KENSINGTON.

[Photo Mathias.]

TELEGRAPHIC MEMORABILIA.

ONE OF TWO items of special interest to the C.T.O. have been delayed in their appearance in these columns due to Annual Leave and other circumstances, for which delays the writer trusts he will be forgiven. Always be it understood, however, that such tardy publication intends no slight upon the following quintette who retired upon reaching the age-limit during the last two months.

Place aux dames! Miss E. J. Broughton of the Supervisors' Class, whose geniality will surely be missed, especially by those who best knew her and her warm-hearted nature.

Then that much-respected superintendent D. E. Cartright, who hardly looked his three-score, W. J. Callow whose hearty hand-grip I still feel, the lively Docwra who will now be able to motor to his heart's content, and lastly, though he was actually the first to retire, the cheerful Dicks, who always struck one as the most grateful of men for the slightest assistance proffered or help given.

To all these good friends the most sincere and affectionate wishes for a happy retirement follow them into their various spheres of now interests.

Then alas, come; what Le Gallienne once called and upon a similar tragic occasion, "one sad little story out of all the heaped-up sorrow of the world," for on June 10, the beloved John Goble, Assistant Superintendent of the Cable Room, passed away swiftly, suddenly, and peacefully, while reading his morning newspaper prior to starting for the office which he had left the previous evening, to all appearances his old blithe self.

The funeral took place at Wallington on the 15th ult, about a hundred colleagues and friends following the remains of one of the whitest men that ever graced the supervising ranks of the C.T.O. "Jack" Goble was at his best in an emergency, whether that emergency was an official difficulty of the Department or the plight and need of friend or colleague. To his sorrowing wife and daughters the Cable Room staff tendered an affectionate sympathy mutely but beautifully expressed in floral tributes,—for he loved a garden!

Many of the old friends, both outside and inside the C.T.O., will join in expressing their sympathy with the one-time Assistant Controller of the Cable Room who, on the 16th ult. was hurled against the railings and stonework of a Streatham church by a motor-bus which got out of control. The latest reports state that the patient is progressing favourably.

The work of the war-time Post Office Relief Fund continues in its quiet unostentatious manner, and at a committee meeting of the C.T.O. Local Committee on July 1 there was continued evidence that the efforts of this Fund are still needed if the widows, children and dependents of our colleagues who were killed or maimed in the War are not to fall by the wayside in the struggle for existence.

One very gratifying case I am at liberty to disclose without publishing names, and that was the case of a young son of a Post Office servant whose education it would have been impossible to continue had not the Fund stepped in and made a grant of something just under £20 for a year's tuition at a London Technical College. This in itself has formed no small part of the general policy of the Fund wherever and whenever such a course seemed justified by the position of the widow and the suitability of the boy or girl.

The special feature of this particular case was the receipt of a communication from the college to the effect that the pupil, though its youngest member, had proved so thoroughly satisfactory that he had won a scholarship practically of the value of the amount granted, so that this amount was duly repaid to the P.O. Fund. A small allowance for travelling purposes was subsequently granted to the lad upon the representations of the Hon. Secretary of the C.T.O. Branch to the main Committee.

At the conclusion of the business of this, the C.T.O. committee meeting in question, Miss Phillips in a neat little speech on behalf of the members of the C.T.O. Committee, requested Mr. A. W. Edwards to accept a small token of their recognition and appreciation of the Deputy-Controller's services as Chairman of that Committee.

This was duly seconded by one of the representatives of the Superintendent's Class, who added that the committee very specially recognised the services rendered by Mr. Edwards in his tactful liaison with the Main Committee of the Fund and his happy influence in other useful directions in cases of need.

Mr. Edwards was visibly affected by the little gift, and paid a very generous and well deserved tribute to the work of Mr. Wood who, he said, had carried at least two-thirds of the burden these last dozen years.

Unfortunately, it was not then known that Mr. Edwards had been honoured by the addition of three letters to the end of his name, but he will no doubt accept at this later hour the hearty congratulations now submitted for his acceptance.

As a very pleasant sequel Mr. F. T. Wadley was elected chairman, vice Mr. Edwards, who now retires from that position, but NOT into oblivion!

During last month the first telegram forwarded from a moving train in Germany and received in this country reached the Cable Room en route for Limerick. It was handed in by a representative of a commercial interest on the Hamburg-Berlin Express and wirelessly from the express to the Berlin Haupt Telegraphen Amt and thence to the C.T.O. London forward,

and must have reached the addressee long before the express had completed its journey.

By-the-bye, Germany has added a new word to the telegraphic vocabulary, for ZUGFUNK is the word which now stands current to describe a wireless telegram received to or from a moving train.

There are evidences that in commercial and financial circles there is some little anxiety as to what will be the outcome of the Code Committee's deliberations during its meeting at Cortino this month. Cable and wireless users whose monthly bills for long distance cablegrams and radiograms amount to hundreds of pounds sterling are naturally disturbed at the possibilities of these international deliberations concluding in higher costs and further restrictions upon the use of code and cypher. The Cortino committee is, of course, an international one, and one of two or three sub-committees, the result of the International Telegraph Conference of last autumn which, after the lapse of so many years between its previous sitting and that which sat in the Sorbonne in 1925, was quite unable to deal with the arrears of questions without recourse to considerable delegation of its duties to sub-committees,—though it sat for six weeks. Failing definite information, rumours of heavy increases in cable and wireless rates are rife, and it is curious to note how comparatively little is understood by private concerns regarding the forces which govern the rules of international telegraphy. If increased rates result or if codes suffer some control as a result of the committee's discussion, the British Post Office will, quite unjustly, but most surely, have to bear more than its share of the onus in this country which always results from an upward trend of prices, though cable rates on the whole have enjoyed a downward trend since the War—quite unlike any other commodity of which the normal householder is aware.

The fall of the franc in Belgium has led, among other phenomenal measures, at least so it would appear, to the decision to transfer the Telegraph and Telephone systems from the State to a private company, described as *national* in the report of *The Times* correspondent in Brussels, who adds, "The capital value of the two systems is estimated at 1,800,000,000 francs. The new company will issue 3,000,000 francs preference shares of 500 f. each. The ordinary shares will remain in the possession of the State."

So far no statement appears to have been issued regarding the position of the staff in relation to the transfer, who, according to my information, are all State employees, and pensionable.

On June 29 the cable ship *Colonia* commenced laying the first section of the Western Union Telegraph Company's new "permalloy" cable across the Atlantic from Newfoundland, Bay Roberts, to Penzance, which she completed on July 9. She then proceeded to London, where she loaded the second section, and by this time has probably commenced if she has not completed her task.

Further developments in cable extension and facilities are seen in the work of the *Dominia*, the new and largest submarine cable-laying ship in the world, at present at Greenwich taking in 3,500 nautical miles of loaded cable, which is to be laid between Vancouver and Fanning Island as part of the scheme of the Pacific Cable Board for increasing telegraph facilities between Canada, Australia, and New Zealand. The ship has been built for the Telegraph Construction and Maintenance Co.

The following interesting item in connexion with "permalloy" cable and its manufacture, published by the *Electrical Review*, and how the manufacturers, The Western Electric Company of America, produced an artificial ocean for purposes of testing the experimental position under deep-sea conditions, must be unique in the history of submarine construction:—

It is not generally known, says the *Electrical Review*, that an artificial ocean played its part in the development of the Western Electric Co.'s "permalloy" loading material for submarine telegraph cables. An iron-nickel alloy tape is wrapped round the copper conductor to increase its inductance, and hence the efficiency of transmission. The new alloy has remarkable magnetic properties, which are quite sensitive to mechanical stress; in order to ascertain whether the customary methods of cable manufacture would be satisfactory, it was necessary to make sample lengths of cable and test them under deep-sea conditions, which are high pressure (somewhat more than a long ton per sq. in. at a depth of one statute mile) and low temperature (about 39° F.).

To reproduce such conditions specially designed pipes were made to contain 20-ft. lengths of cable core, and one pipe was made 50 ft. long; pressures up to 6,000 lb. per sq. in. are customary, and it was possible to maintain 10,000 lb. in one pipe, so it was thus possible to produce conditions similar to those obtaining more than four miles beneath the ocean. The temperature was regulated by jacketing the pipes with ice-cooled water. The first test conductors were made following as nearly as possible the standard cable practice of the time; the annealed, permalloy wrapped, copper conductors were coated with Chatterton's compound, just sufficient to cover the surface, before insulating with gutta percha, and inductance tests made at this stage in the manufacturing process showed that no serious mechanical stresses had been encountered during covering, but when the samples were inserted in the pipes and the pressure was allowed to increase slowly just as if the cable were sinking into the sea, the inductance of the samples began to decrease, and had fallen to only one-quarter of the desired amount before one mile depth had been reached. Evidently the old type of cable construction would not serve. The next test was to determine if the permalloy loading was really affected by the sea-water pressure, or if it was because the pressure was applied to the outside of the gutta percha only. An uncovered loaded conductor was tested under pressure, so that the water could penetrate under the permalloy

loading, and the full sea pressure was applied equally to both sides of the tapes. The inductance was not noticeably affected up to the highest pressures, which showed that if the permalloy floated in a liquid medium, it would not be injured by deep-sea pressure. A solution of the problem was finally found by the development and proper application of a compound that remains quite fluid at low temperatures. After the permalloy tape is applied and heat treated, the whole conductor is vacuum impregnated and coated with this compound, before the application of the gutta-percha insulation. Now as the cable is subject to increasing pressure, the gutta-percha compresses (as in the earliest tests), but it is supported by the semi-fluid compound, which conveys the pressure effect to both sides of the permalloy loading, thus leaving it unstressed.

The following item from the annual report of the Eastern Telegraph Co. appropriately follows the above item as proof that cables are not taking the competition of radio-telegraphy "lying down!"

Two recent improvements were mentioned by the chairman, viz: the use of "loaded" cables and the invention of a "regenerator" by the company's staff. The latter apparatus overcame the disabilities inherent in the old system of relaying from one cable to another which did not permit of successful operation of a chain of cables, except at greatly reduced speeds, owing to distortion of signals both in the cables and in the relay apparatus, which distortion became cumulative. The regenerator, which had been installed on the London-Porthcurnow-Carcavellos-Gibraltar cables for over eight months, had increased the speed by over 35%. The additional gain in traffic-carrying capacity due to reduction of stoppages and improved working amounted to 13%, making the total gain on this section over 48%. It had also just been installed on the Gibraltar-Malta-Alexandria station 3 sections with improved carrying capacity of 27%. Efforts were continuously being made on other circuits to increase speeds, and, as an instance of the results achieved, the present speed in and out of London on the Company's cables was 23% in excess of that existing in 1922.

AUSTRALIA.—In the House of Representatives on June 14, replying to Mr. Charlton, leader of the Labour Party, Mr. William Gerrard Gibson, Postmaster-General, stated that the delays in the completion of the "beam" wireless stations in England and Australia were due to causes beyond the control of the Amalgamated Wireless Co. The Government had received a cable from Marconi's Co. stating that the coal strike was holding up the supplies of material. In consequence, the Amalgamated Co. did not anticipate "beam" communication between England and Australia until October, or that there would be a service between Australia and Canada until about December.

From Melbourne, Reuter's Trade Service reports that an inter-State conference was held recently at Sydney, at which animated debates took place on the subject of licence fees and the future control of wireless in Australia. After a prolonged discussion it was recommended that the Federal Ministry should be asked to appoint an advisory board to assist in the administration of broadcasting regulations. Spirited discussion followed a proposal that a Royal Commission be appointed by the Government to consider the advisability of confining the commercial broadcast wave-length in Australia within the standard length of from 200 to 600 metres, but it was eventually decided to take no action with regard to wave-lengths. The conference decided to ask the Federal Postmaster-General to increase generally the margin of wave-length between the stations 4QG (Queensland), 2BL (New South Wales), 3LO (Victoria), 3AR (Victoria), and 5CL (South Australia).

BRAZIL.—The new high-power wireless-telegraph station at Rio de Janeiro, which was opened recently by the Brazilian Minister of Communications, has been equipped with a 20,000-metre-ampere valve transmitter by Marconi's Wireless Telegraph Co. The station is being used for telegraph communication by radio between Brazil and Europe, Africa, Australia, North America, and the other countries of South America.

EGYPT.—The Cairo correspondent of Reuter's Agency states that the Ministry of Communications has published the text of an agreement between the Marconi Co. and the Egyptian Government regarding wireless broadcasting. The agreement is for a period of 30 years, and will be renewable subsequently for periods of 10 years.

Lord Wolmer has informed Mr. Ammon that negotiations for the sale of the Abu Zabal wireless station had reached an advanced stage, but the transaction had not yet been completed. He was not, therefore, at liberty to disclose the proposed purchase price or the conditions on which the sale would be effected.

ESTHONIA.—**NEW STATION.**—The recently constructed broadcasting station at Tallinn is to commence operation shortly. Some 500 subscribers are said to have been registered.

FERNANDO PO.—Communication by wireless telegraphy between Spain and Fernando Po is to be established says a Madrid news agency.

FRANCE.—It is reported that the French Government has decided to place the radio broadcasting service under Government control.

From a Parisian source it is understood that in view of the difficulty of fitting refuge huts for mountaineers with the telephone, experiments have been carried out during the past three years with wireless. The Radio Club de France has now decided to equip some of the more generally frequented refuges with transmitting as well as receiving sets, those mentioned being La Charmette, in the Chartreuse; Blonay-Dufour, on the Tournette; Wallon, Oredon in the Pyrenees; Cerbier-des-Joncs; Aberouat and Arvieres. The

decision presents greater difficulties than are at first apparent; specially resistant apparatus has to be constructed, which, at the same time, is sufficiently light to be transported on the backs of men, no animals being able to reach the heights where the refuges are situated.

GERMANY.—Permission has now been accorded by the Inter-Allied Rhineland High Commission for the use of wireless transmitters and receivers on Rhine steamers when passing through "occupied territory."

GREAT BRITAIN.—It is understood that the first claim for insurance has been met by the Wireless Association and it has been paid. Entanglement in a lead was the cause of the accident, resulting in the whole receiving set being dragged on to the floor, completely smashing it.

When a man was fined £5 at Glasgow for having a wireless set without a licence, it was stated that, following a previous prosecution, 220 persons took out licences within two days.

The Gramophone and The Telephone. The Gramophone Co. Ltd. has taken a leaf out of the books of the B.B.C. It has recently contracted with the British Post Office for the use of any land line which it may require in any part of the United Kingdom. Its purpose in acquiring this facility is evidently to continue its own particular method of "broadcasting" by widening the field of its enterprise and making it possible to reproduce the actual musical performances of operas, church services, organ recitals, choir festivals, &c. on the usual gramophone discs. That is to say in those cases where it is not possible to bring the choir, the chorus or the musical instrument to the recording room of the Company, a telephone pair of wires fitted with special microphones, &c., in the church or hall is joined up to the Company's works during the performance and the matrix is then made in the ordinary manner. Thus Westminster Abbey, Canterbury Cathedral, the Albert Hall will now be available on the usual discs, a stored broadcast available day or night.

Answering a question recently in the House of Commons, the Postmaster-General (Sir W. Mitchell-Thomson) said the total number of wireless licences at present in force in Great Britain and Northern Ireland was about 2,076,000.

A wireless installation for the *Venture*, which has been built for Mr. R. C. Robb for a three years cruise, has been ordered by the owner. This yacht has a special Marconi outfit, which is an adaptation of the standard lifeboat set transmitter with a special receiver to include broadcast reception. There is no doubt that the latter will be a very welcome addition to the yacht's auxiliaries, for the great increase in broadcasting stations throughout the world will make it possible for the yacht to receive broadcast music and news during a large part of the voyage, which will add materially to the pleasure of cruising.

Radio fog signals at sea!—An installation of great interest to those concerned with harbour administration is referred to in an official notice to mariners, which announces that an unattended fog signal has been permanently established on Rosneath Beacon in the Firth of Clyde. The installation was put in for experimental purposes in January of this year, and the trials since carried out under actual working conditions have been so successful that a prolongation of the trial period is now considered unnecessary. Installations of this kind render possible the erection of unattended lighthouses and fog signals at many difficult situations where it is at present too expensive to provide light keepers, or to maintain a submarine cable connexion for an unattended light or fog signal.

The fog guns are fired by automatic signals, the explosions being obtained by a mixture of air and acetylene gas. The two guns on the Clyde have a system of wireless receiving apparatus fitted to them, and a transmitting set synchronising with the receiving sets is installed at Gourock Pier, 1½ miles from Rosneath Beacon. When fog is observed the transmitting installation is put into operation and the impulses sent out are received on the apparatus attached to the fog signals which starts them. The synchronising arrangement renders the installations immune from "atmospherics" and interference from other wireless waves.

A powerful new wireless station, it is reported, is to be erected by the Admiralty at Devil's Point, Stonehouse, Plymouth. Work upon it will be begun at an early date, but its completion may take some time, inasmuch as no provision has been made for the necessary expenditure in the current naval estimates. When in working order the new station, it is understood, will supersede the existing one at Rame Head.

ICELAND.—The concession of the Great Northern Telegraph Co., Ltd., in respect of the Iceland cable expires this year. Negotiations between the Danish and Icelandic Governments and the Company have, however, resulted in an agreement granting the Company a prolongation of its concession until the end of 1934, unless previously terminated by notice by either party. The agreement, which has been approved by the Parliament of Iceland, has only been secured by the company's making considerable sacrifices on various points, the total telegraph traffic exchanged with Iceland not being sufficiently large to make both cable and radio services remunerative. Under the new agreement the whole of the telegraph correspondence of Iceland, with the exception of news messages and meteorological telegrams, is retained for the cable route. In return, the company has agreed to make considerable tariff reductions, and to hand over the working of its telegraph station at Seydisfjord to the Icelandic Telegraph Administration.

I.F.S.—Mr. J. J. Walsh, the Irish Free State Minister of Posts and Telegraphs, has announced that the Government proposes to build a high-power station in the Midlands of the Free State, and three smaller stations

at Cork, Galway, and Bundoran, County Donegal. Thus, with the Dublin station, there will be five stations in the 26 counties. It is estimated that the four new stations will cost £29,000, that the smaller ones will be completed during the next 12 months, and the high-power station within two years.

NORWAY.—H.M. Consul at Bergen informs the Department of Overseas Trade that the new broadcasting station at Bergen is now working and the Broadcasting Company definitely formed. The station has been erected on the roof of the new telegraph building in the centre of the town; it is understood that the station has duplicate machinery and that it is intended to install one set at the Rundemand wireless station on one of the mountains near the town in order to see whether the results are better there. The present station may, however, be looked upon as permanent, and at present is working on a wave-length of 400 metres; the power is 1 k.w., and the antenna about 30 metres long.

PARAGUAY.—A radio club has been formed at Asuncion and has inaugurated a broadcast service, which has greatly increased interest in radio matters.

PERSIAN GULF.—Very satisfactory results are reported from the working of the Marconi wireless telephone sets installed on harbour vessels some twelve months ago by the Basrah Port Trust. The ships so equipped in the Persian Gulf are the control vessels *Alert* and *Yenan*, the pilot vessels *Nearchus* and *Liger*, and station ship *Harmag*, working with shore stations at Tanoomah and Fa'o. A wireless bell is included in each installation, which is of the Marconi YB type, so that there is no necessity for maintaining a continuous watch; any vessel or station can call any of the others with the facility of an ordinary telephone. The transmitters have a power of 100 watts, and the range for telephony, depending on local conditions, varies from 35 to 80 miles; the radius for telegraphy is from 100 to 200 miles. According to an official report, "all the stations are giving excellent results, and a considerable amount of traffic is effected." Indian signalmen man the stations, and they have rapidly gained proficiency in their work, speech generally being used.

SWEDEN.—The erection of broadcasting stations at Kalmar, Karlskrona, and Helsingborg, to work in conjunction with the permanent station at Malmo, has stimulated interest in radio in Sweden, says *Commerce Reports*, which claims that the sale of expensive sets has increased. The licence fee for receiving sets has been reduced to 10 crowns. There were about 182,000 licensed receiving sets in Sweden on March 31 last, an increase of about 63,000 during the preceding five months.

TURKEY.—La Compagnie Générale de Télégraphie Sans Fil has concluded a contract with the Turkish Government for the erection of radio stations in Angora and Constantinople; the latter station is to be equipped with automatic receiving and transmitting apparatus. In both cities the stations will be of 15 k.w., says *Commerce Reports*, which announces that the Electro-Radio Co. has been formed in Constantinople for the development of radio telegraphy. It has a 40-year concession, and will establish a factory in the city.

U.S.A.—The Chicago correspondent of Reuter's Agency reports that successful tests in the direction and operation of goods trains by radio-telephony have been completed by the New York Central lines, and indicate the "advent of a new era in goods operation." Tests were made with an engine and a guard's van, each specially equipped with radio-phones operating on 115 metres, and using three valves for transmitting and four for receiving. An official report on the subject says conversation between engine and guard's van was carried on for five hours during a severe electrical and rain storm, and no interference from steel bridges, power lines, or passing trains was detected.

VENEZUELA.—The British Consul at Caracas, reporting to the Department of Overseas Trade, states that the Empresa Venezolana de Radiotelefonía was formed towards the latter part of 1925 for the purpose of broadcasting entertainments, news, lectures, &c., and to import, construct, sell, rent, and maintain all classes of broadcast radio receivers. The broadcasting station is provided with a 1-k.w. transmitter, and an aerial supported on two 165-ft. lattice-steel towers, all of American manufacture, the installation and testing having been successfully concluded in May, 1926. The wave-length at present in use is 375 metres; public supply of electricity is relied upon for power, but, in spite of the use of an automatic regulator, trouble is being felt, due to the erratic nature of this power supply. It seems unlikely, however, that local broadcasting will be taken seriously, and, consequently, purchasers of receiving apparatus will probably still depend essentially on foreign stations for their entertainment.

I have been rather unfortunate of late. By an oversight I was absent from a very happy little function, that held at the Red Cross Restaurant in connexion with the presentation to Mr. Lange on his retirement. By all accounts it was a most successful and enjoyable affair.

I was also prevented even from putting in an appearance at the Cannon Street Hotel on the evening of the 16th ult., when a social function to bid au revoir to A. W. Edwards, Esq., O.B.E., upon his retirement from the C.T.O. as Deputy Controller (*pace* the *C. R. Magazine* not Assistant Controller please!) a post which he has held through several strenuous years.

Mr. Edwards was at his best in the field of sport of which he has always been an enthusiastic follower and supporter. There is also that other and gracious self of the ex-Deputy Controller's character which, as evidenced by his efforts in connexion with Bart's, the P.O. Relief Fund, already mentioned, and the manner in which a helpful hand was put out in numbers of instances

known to the writer and probably to few others except to the recipients, which revealed a real sympathy for the man whose "luck was out," though at times this sympathy expressed itself in a rough and ready use of the English tongue. "Edwards!" you were always very human and never hid your faults. Your name will surely be one with which to conjure in the C.T.O. for many a long day, and maybe just because you understood the freemasonry of human frailty so well.

However meagre be my worldly wealth,
Let me give something that shall aid my kind.

* * * *

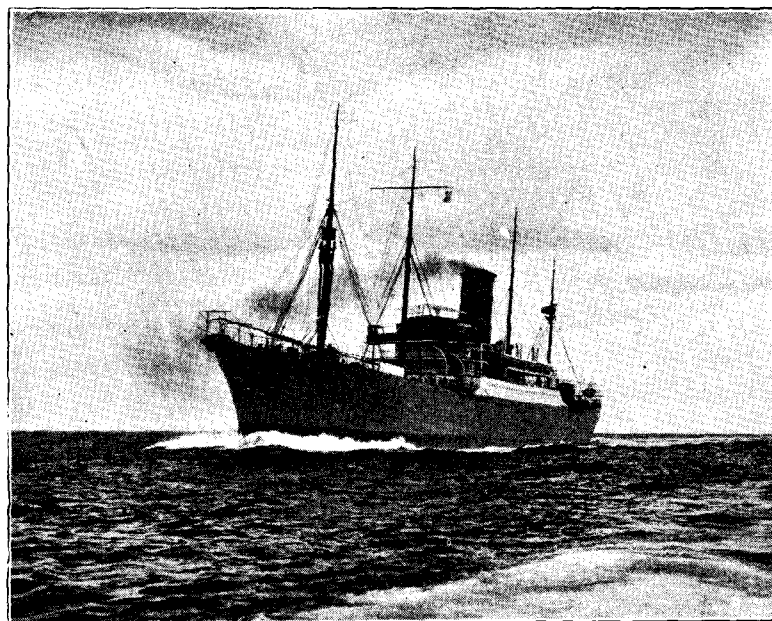
Let me to-day do something that shall take
A little sadness from the world's vast store.

"Desires" by E. W. Wilcox.

J. J. T.

THE CABLE SHIP.

At the instance of the Telegraph Construction and Maintenance Company quite a party of us were invited out to see their new Cable Ship *Dominia*. She lay off Greenwich, loading the cable for the duplication of the Pacific Cable. To those of us who had seen her launched a few months ago at Newcastle it was a very pleasant revival of memory. She is the largest cable ship ever built, being of some 9,000 tons, and she is to carry some 3,500 miles of cable and lay it across the Pacific from Bamfield to Fanning Island. She is admirably appointed, and there were few of us who visited her on this beautiful afternoon who did not wish that by some strange accident she would break loose from her moorings and take the lot of us just as we were across the Atlantic. She is so beautifully appointed in every way, and with a great spacious deck, that we could spend a few months quite pleasantly on board.



THE "DOMINIA."

Nevertheless, from a technical point of view she was replete with interest. There were hosts of appliances for picking up cable, for cutting the piece out of cable, for grappling along the sea bed in order to pick up the cables as required, that even the dullest amongst us was smitten with the romantic vista of all that is concerned in cable laying and in cable repairing. Those of us who are concerned in working the Imperial Cables, with their closeness of link with the Pacific Cable, must have felt an especial interest in seeing the *Dominia* on this occasion and in wishing her every good fortune in her enterprise.

J.L.

THE PROVINCIAL COURSE AT THE ENGINEER-IN-CHIEF'S SCHOOL OF AUTOMATIC TELEPHONY.

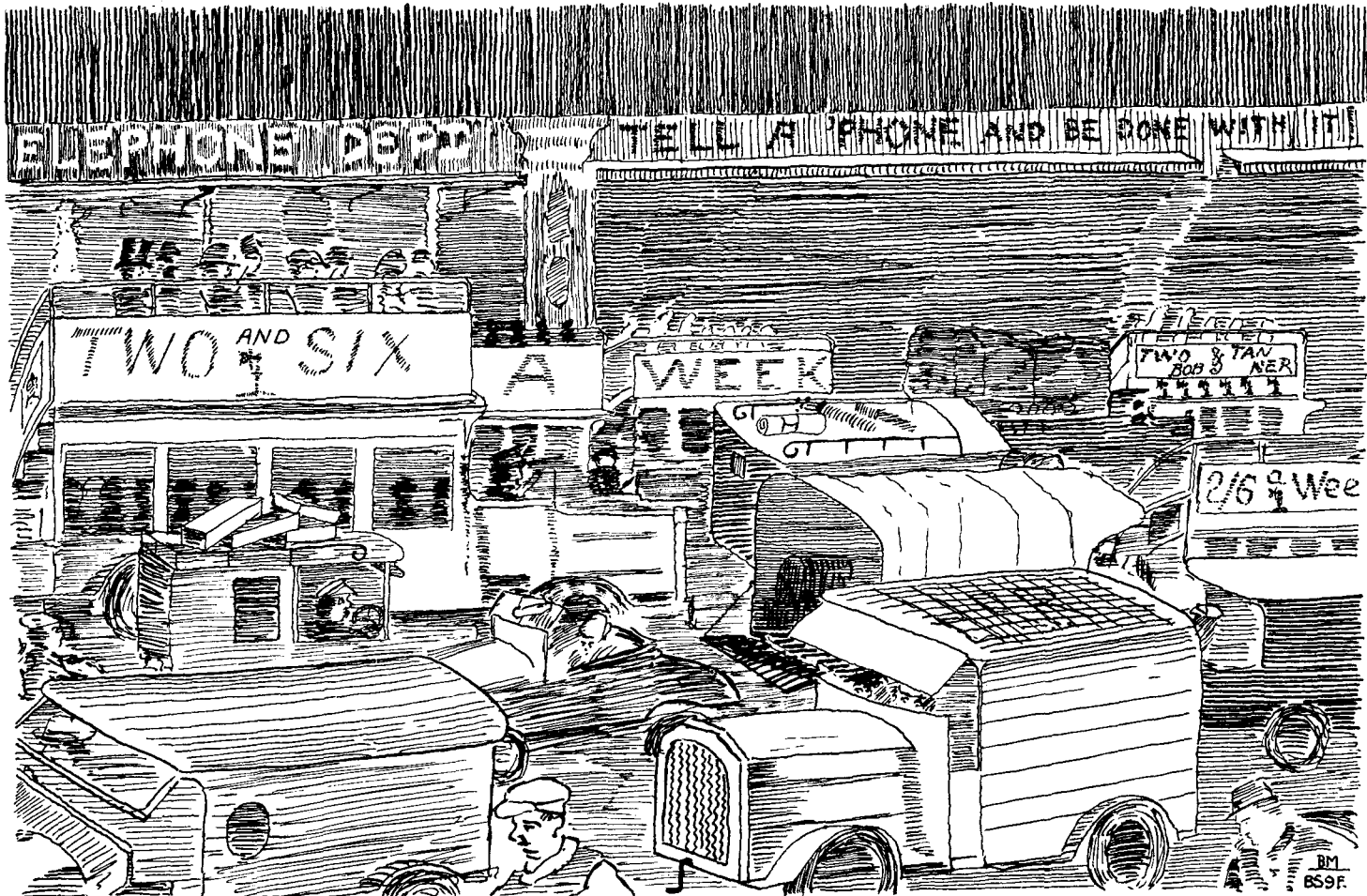
By BM/BS9E.

THE first impression a mere provincial visitor obtains of London is that the Metropolis is peopled by Scotchmen who have suddenly realised that time is money. On arrival at the Engineer-in-Chief's School it was clear from the distribution of really useful circuit diagrams that environment can modify inherited characteristics. The impression still remains, however, on account of the frequency with which northern accents were encountered, that if an earthquake occurred in Glasgow it would be difficult to obtain small change in London.

It is, perhaps, because we are so close to the event that it is difficult to realise that we are privileged as Post Office employees to be a part of one of the most interesting of this evolution's experiments. Since the days of the Craft Guilds, the social structure of this country has undergone ceaseless change, and it would seem to be seeking again a stable organisation similar to that furnished in the ancient guilds. Science applied to the mechanical problems of human needs has forced upon us simultaneously a blessing and a curse—the blessing of productiveness and the curse of surplus

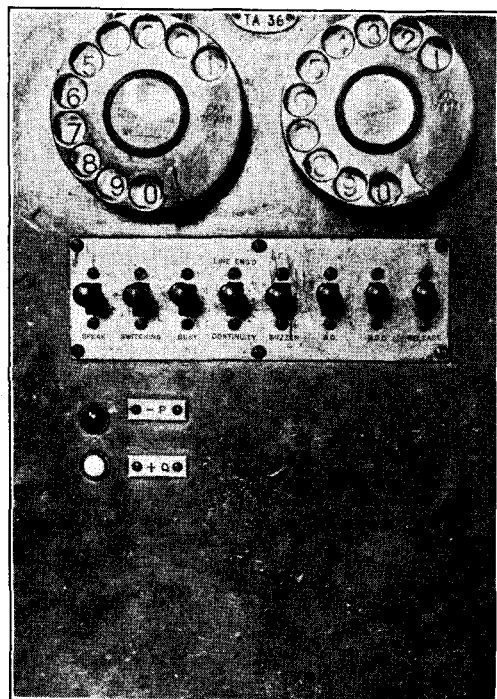
labour. The answer to the latter problem has developed in various lines of activity in various ways. In one industry we see the Coal Strike as a glaring failure to obtain equilibrium, at all events for the moment. From the stable industrial order typified by the Craft Guilds evolution seems to have chosen two courses, that of the segregation of employers and employed into two separate organisations, and that of the aggregation of both into one organisation, which in the ultimate becomes, of course, the Government. The ultimate fate of the first line of evolution is now in course of decision. To the second line of advancement taken by evolution another chapter is being enacted.

When the history of to-day comes to be written how many will point to the School of Automatic Telephony as a significant event? The salient points in the graph of growth in this line of evolution are: Penny Post 1840, Post Cards 1870, Parcel Post 1883, Postal Orders 1881, Telegraphs 1870, Telephones 1912. The last event brought with it conditions utterly unrelated to the previous experiments in the State control of industry. The transfer of the telephones to the State implied the onus of maintaining a certain level of public service which demanded modernised machinery. This is an onus difficult sometimes to discharge when subjected to critical survey by a non-technical public, with the result that playing for safety may prove too slow to be safe. In commercial industry the threat "modernise or sink" is too clearly written for the average master industrialist to ignore. In government-controlled industry the same law of economics holds good, though the process of sinking may be more protracted, for essentially the competitive system of society is applicable to a government-owned telephone system of which it could be said that its machinery was out of date and its service decrepit. Its customers—the public—would soon discover an alternative.



THE FIRST IMPRESSION A MERE PROVINCIAL OBTAINS.

Like the earthquake in Glasgow, all this may seem unrelated to the small change in London. But, one began to experience, as the course proceeded, at first a sense of pleasure and then of pride, that the British Post Office could so smoothly solve the Problem of the Age—and even so without anybody's photograph appearing on the back of any newspaper. Listening to the orderly, logical development of the theory of automatic telephony, one realised that professors of technology in their chosen field of labour did not equal the standard of instruction being given as a side-line to the Department's main purpose. The lecturer proceeded step by step from the consideration of a theoretical exchange system connecting ten, one hundred, a thousand, and then ten or more thousand lines. Concurrently he developed the evolutionary aspect of the growth of automatic telephones. It was not purely a dull exposition of "things as they are." Again in the discussions which such lively lectures provoked original technical difficulties and problems were analysed. The School was evidently not merely a place of study, but also, in a sense, a council of means and ways. Problems mooted for the first time in history brought their solution on the morrow. The second week of the course was devoted mainly to the special services and features of the exchange. The arrangements necessary for the production of the necessary tone for lines unobtainable, lines out of order, the grouping of the private branch exchange lines and the grading of trunks between the various banks of switches were very fully dealt with. From a



AN AUTOMATIC EXCHANGE TESTER

(which by the manipulation of the various keys sets up the conditions requisite for testing two-motion switches).

traffic aspect the metering arrangements (both those of subscribers and the congestion, &c., meters) were thoroughly fought over, and the cross fire of comments and criticisms finally left no doubts in any minds as to the perfection of the standard arrangements. Traffic men who had, for some days, listened to technical matters suddenly found familiar ground, and the result was almost an all night sitting. What was characteristic of the lecturer was also characteristic of the demonstrators; no nervousness in questioning them was induced in their listeners so that none who attend the course should fail to follow what is really a somewhat complex matter.

It is difficult in writing of the course, so different is it and all its implications from the "stereotyped," to find any constructive

criticism with which to enliven the story. It could be suggested that a small three dimensional wiring diagram of an automatic exchange giving the multiplying of say five lines would well repay construction. This, of course, would not be a working model. It is difficult at first to realise that the single preselector is wired to a number of first selectors which are common to others, and this mental picture is not clearly gained until late in the course for neither the wiring on the panels, which is difficult to trace, nor a



AN AUTOMATIC EXCHANGE TESTER

(which, by means of an internal rotary line-switch, automatically sets up conditions requisite for testing two-motion switches).

circuit diagram—which only shows one first selector, gives a clear picture. Again, the school at headquarters is undoubtedly perfectly adapted to its purpose, but there remains the multitude of problems and means of procedure comprised in the term Traffic as applied to automatic exchanges which could with advantage be incorporated to some extent in a supplementary Traffic Course. The Department has saved much valuable time spent in grappling with problems regarding which only indistinct notions had been gathered from books. The provincial traffic staffs and engineers have mutually struggled with new situations at the cost of much discussion. The Department will undoubtedly find the courses a productive expenditure.

Finally there remains a feeling of gratitude and admiration at the patience of those who daily continue the repetition of the task of remodelling the human elements of a virile social order to meet the relentless changes of progress.

PRESENTATION TO MR. H. TYLER, LEEDS.

On the occasion of his promotion to Traffic Superintendent, Class II, at Nottingham, Mr. H. Tyler, Assistant Traffic Superintendent, Leeds, was informally presented with a handsome oak timepiece by his colleagues in the West Yorkshire District.

Mr. Tyler was also presented with a solid leather attache case and a fountain pen by the staff of the Bradford Exchange, where he had recently held the appointment of Exchange Superintendent.

Mr. Tyler was a very popular figure among his colleagues, who, although pleased at his promotion, deeply regret his departure.

“LONDON 500,000.”

THIS number does not appear in the Telephone Directory. It is *not* a telephone number, but it *is* the number of a telephone. The instrument has found a home as a working line in the Press Gallery at the House of Commons.

In that impressive building which we know generally as the Houses of Parliament, there are many spots which visitors never see and which even members do not frequent. Such spots are often the scene of particular activities necessary to the convenience of members and to the proper functioning of the Legislative Assembly. They are to be found along those winding corridors of which the visitor obtains only a fleeting glance. The room in which the telephone is installed is full of bustle and activity when the House is sitting, for it is here that the representatives of the Press and News Agencies transcribe the shorthand notes of speeches to which they have listened when seated in the gallery above the Speaker's Chair and to which this room has access. In one corner a telegraph instrument ticks away, and in another a Post Office Official awaits behind a small counter to deal with messages. The room is panelled in oak, and through its centre is a long narrow table at each side of which the Press representatives sit. In this room has been installed London's 500,000th telephone. It is a standard pedestal instrument and has affixed to its base a silver plate inserted:—

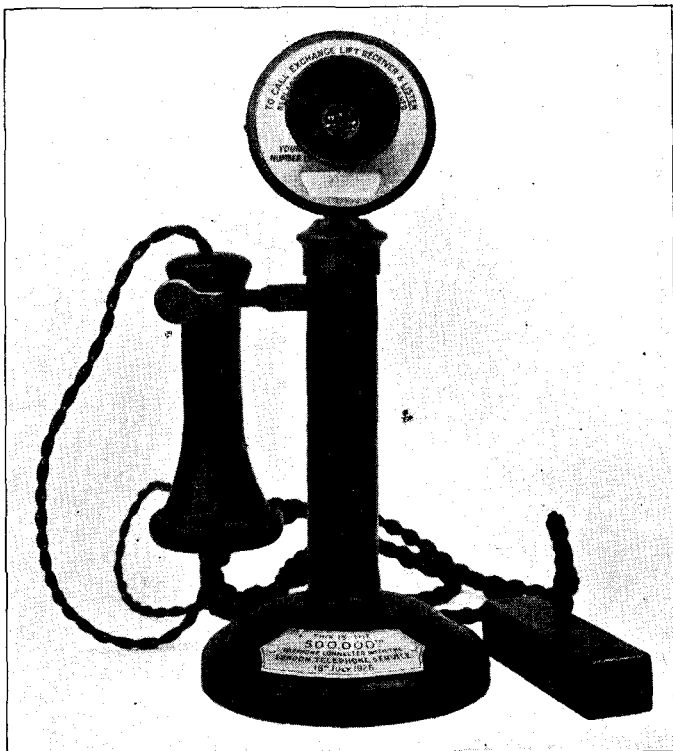
“This is the 500,000th telephone connected with the London Telephone Service, July 16, 1926.”

The instrument has been installed for the purpose of providing trunk telephone facilities in the Press Gallery. Such facilities have not been available hitherto from a telephone actually in the Gallery.

A very interesting ceremony took place at 2 p.m. on July 16 when the Controller, accompanied by a few members of the London Telephone Service and the London Engineering District, handed over the instrument to the Chairman of the Press Gallery Committee in the presence of a large number of Press representatives. In explanation of the occasion, the Controller enumerated a few of the most prominent features, illustrating the past and present development of the telephone both in London and in the country as a whole. The Chairman of the Press Committee expressed the appreciation of the representatives of the Press attached to the House of Commons at being so closely identified with a landmark in the development of the telephone system in London, and then proceeded with the establishment of a call to a newspaper in Aberdeen, to which he passed a message of greeting and an announcement of the fact that the first call on London's 500,000th telephone was then being used for the first trunk telephone connection made actually from the Press Gallery of the House of Commons.

It is some forty-seven years since the first Telephone Exchange was opened in London. Viewed in its right perspective, this merely emphasises the significance of the event now recorded, for the fact is that in a little over ten years the number of telephones in London has increased by about 100% and the indications are that the present development of half a million telephones in London will be doubled in a period appreciably less than ten years hence.

B. R. M.



PROGRESS OF THE TELEPHONE SYSTEM.

DURING the month of May 17,476 new telephones were added to the system, counterbalanced by 7,416 cessations, the total number of stations working at the end of May being 1,409,909.

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

Telephone Stations—	London.	Provinces.
Total at May 31	495,712	914,197
Net increase for month	3,508	6,552
Residence Rate Installations—		
Total	100,490	167,424
Net increase	1,362	2,010
Exchanges—		
Total	110	3,925
Net increase	1	7
Call Office Stations—		
Total	4,495	16,031
Net increase	25	79
Kiosks—		
Total	267	1,809
Net increase	11	56
New exchanges opened under Rural Development Scheme—		
Total	—	895
Net increase	—	7
Rural Party Lines—		
Total	—	9,916
Net increase	—	40
Rural Railway Stations connected with Exchange System—		
Total	—	765
Net increase	—	—

The number of inland trunk calls dealt with during April, 1926—the latest statistics available—was 7,328,014, an increase of 628,138 (or 9.4%) over the total for the corresponding month last year.

The number of calls made to the Continent during April last was 19,814, or 1,525 more than in April, 1925. Incoming calls numbered 21,827, representing 52% of the bothway traffic.

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

PROVINCES—Landaff, Southend-on-Sea (Relief), Morrision (Automatic),

and among the more important exchanges extended were:—

LONDON—Edgware, Palmers Green.

PROVINCES—Aberdeen, Birmingham (North), Clacton-on-Sea, Herne Bay, Reading, Solihull, Whitley Bay.

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

Norwich—North Walsham cable.

Brentwood—Chelmsford (Section of Brentwood—Marks Tey cable).

Bungay—Lowestoft cable.

Dorking—Chichester—Worthing cable.

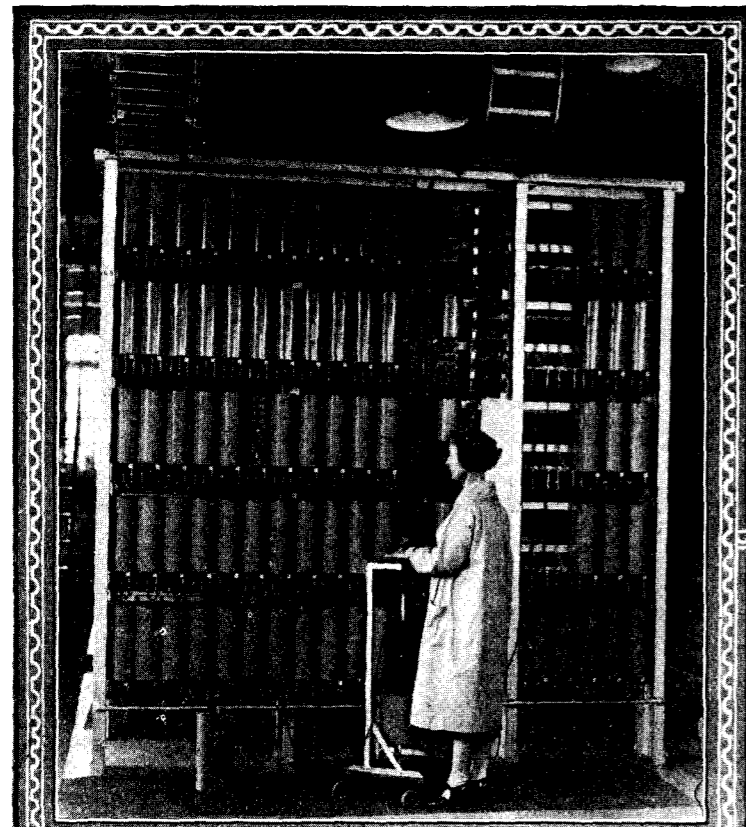
Walsall—Lichfield cable.

Ipswich—Aldeburgh cable.

Warrington—Wigan cable.

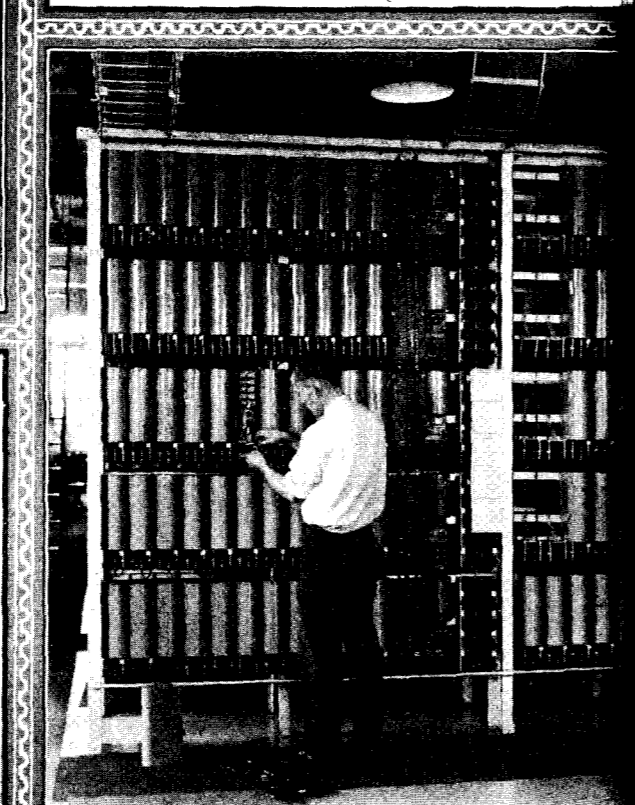
Hull—Driffield—Bridlington cable.

while 80 new overhead trunk circuits were completed, and 87 additional circuits were provided by means of spare wires in underground cables.



Simple Routine Tests

In scores of Strowger Automatic Exchanges in all parts of the World girls perform the simple routine tests that keep the equipment in good order and insure reliable service to the telephone user.



Easy Adjustments

Strowger Automatic Equipment Offers Unequalled Facilities . . .

For Simple and Inexpensive Maintenance

A few simple routine tests, made daily, weekly or monthly as laid out by our Operating Department—

A very small number of maintenance employees of average intelligence—averaging one for each thousand lines in service, and in some cases even less—

Adjustments quickly made without removing the switches from the shelves—

Service to telephone users undisturbed either by the routine tests or adjustments.

These are a few of the features that make the maintenance of Strowger Automatic equipment easy, inexpensive and effective.

Automatic Electric Inc.

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

The Telegraph and Telephone Journal.

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

Editing and Organising Committee - - -	}	J. STUART JONES.
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NOTICES.

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

VOL. XII.

AUGUST, 1926.

No. 137.

THE HALF-MILLIONTH TELEPHONE IN LONDON.

AN important milestone in the development of this country was reached during the past month when the total number of telephones in use in London reached 500,000. In the middle of 1916 there were 265,000 in existence, so that in ten years, despite four years of war and its after-effects, the London telephone system has nearly doubled itself. This, we think, is no small matter for congratulation. The Post Office, to mark the occasion, had the happy idea of installing the half-millionth telephone in the Press Gallery of the House of Commons and of commemorating its significance with a suitably-inscribed tablet. The first telephone exchange in Europe was opened at 36 Coleman Street, London, in August, 1879, and by the end of 1882 there were 15 exchanges working in the London district serving 2,386 lines, which probably represented 3,000 stations. It is estimated that number of stations reached 10,000 by the end of 1891, and it is certain that it passed the 100,000 mark in the middle of 1905. London now possesses more than one-third of the total number of telephones in Great Britain and Northern Ireland. This is a remarkable fact when it is remembered that Great Britain contains so many large centres of population in Lancashire, Yorkshire and the Midlands, not

to mention those on the Clyde and the Tyne, with well developed telephone systems. The only European country which can compare with Great Britain in number of industrial areas is Germany, and there Berlin has only one-sixth of the total number of telephones in the country. Paris, Brussels, and Copenhagen, it is true, contain more than one-third of the telephones in their respective countries, and Vienna actually two-thirds; but Vienna is in the unique position of including a third of the population of Austria within its limits. France has two great centres of population in Marseilles and Lyons, but their telephonic development is somewhat backward, while Belgium and Denmark have no second town with 500,000 inhabitants. To employ a favourite American formula—London has more telephones than Holland, Belgium and Austria put together, or than European Russia with Poland, Hungary and Italy thrown in.

At the present rate of progress another twelve years would see the number of telephones in the London area again doubled; but the rate of increase tends to accelerate, and taking into consideration other incalculable but favourable factors we shall probably see a million telephones working in the Metropolis by the end of 1935.

HIC ET UBIQUE.

WE heartily congratulate the following recipients of Birthday Honours:—C.B.E., Mr. W. A. Valentine, Controller of the London Telephone Service, and a member of our Editing Committee; O.B.E., Mr. A. W. Edwards, the retiring Deputy Controller of the C.T.O.; O.B.E., Mr. G. F. Mansbridge, Vice-Controller, Post Office Stores Department; O.B.E., Mr. John Scott, Postmaster, Birmingham (an old "National Telephone" man like Mr. Valentine); Mr. R. W. Hatswell, editor of our old friend *St. Martins le Grand*, also gets—we are glad to see, an M.B.E.

We are also glad to be able to congratulate our colleague Mr. J. Stuart Jones on his promotion to be Deputy Controller of the Central Telegraph Office, vice Mr. Edwards.

Mr. Sell has sent us a copy of his imposing volume the *Directory of Registered Telegraphic Addresses for 1926*, whose gigantic bulk now approaches 3,000 pages, and is of course, the standard reference book on the subject. He informs us that the new volume for 1927 will be printed in a handier shape, and the size of page will be about the same as the London Telephone Directory. In Section II, which gives the alphabetical list of Registered Telegraphic Addresses, reference is given to the column number and line number in Section I, which gives the list of firms having a registered telegraphic address in London and the Provinces.

The celebration of the Jubilee of the Telephone at the Institution of Electrical Engineers gave rise to and the dissemination of some mixed telephone history by the Daily Press. One paper stated that the first exchange in England was opened at Liverpool, and proceeded to *prove* it by reproducing a picture of the Liverpool exchange in

1884 showing the first operators at work ! The first exchange was actually opened in London in 1879 and was worked by boys.

A Wolverhampton paper put in a plea for that town as the possessor of the first exchange, and produces some evidence that Graham Bell made some experiments on a private telegraph system there in 1876 in which Sir Henry Fowler, afterwards President of the National Telephone Company, took great interest. It is certain, however, that Wolverhampton had one of the earliest exchanges.

An Exchange telegram says that the Swedish Telegraph and Telephone Board announce that direct telephone connexion between Sweden and England will be available from the end of August. The statement is, at least, premature. The provision of service to Sweden after the full Anglo-German Service has been inaugurated is receiving consideration, but there is no likelihood that it will be available so early as the date mentioned.

According to *Commerce Reports*, plans have been made by the Communication Department of the Kwantung Government (Japanese) for the installation of automatic telephones in the Japanese settlements in Mukden and Changchun. The estimated cost is 1,800,000 yen, and the work will not be completed until 1931.

According to another report of the Swedish Telegraph and Telephone Board, at the end of 1925 there were 434,594 telephone installations in Sweden.

The number of broadcasting licences granted in Sweden amounted at the end of June to about 200,000.

The outlook on the telephone of a Chinese poet whose verse on the subject is translated in *The Saturday Review of Literature* differs somewhat from that of an American "publicity" writer on the same theme :—

"All day long, said the Old Mandarin,
I closed myself in my study to think,
And all day long
I was aware of the telephone in the next room
Coiled there like a rattlesnake
Ready to strike."

According to the *Electrical Review*, the Mexican Government has granted the Mexican Ericsson Telephone Co., which is associated with the Swedish Ericsson Co., a concession on trunk telephone lines throughout the whole of the Republic of Mexico. The company has therefore increased its share capital.

Apropos of the 500,000th telephone, Mr. Valentine received the following letter from Lieut.-Col. C. B. Clay, V.D., well known to our readers as a former Metropolitan Superintendent :—

I was much interested to see the information you give about the number of telephones in London area. You may be interested to hear that I attended a meeting about 1884 or '85, when the question of the highest number of telephones ever likely to be required in the metropolitan area was discussed and with the exception of one man (myself) the meeting agreed that 10,000 was an outside figure. I said it was not enough, and being pressed to give my figure, I said 30,000. This was greeted with jeers as being quite impossible.

Yours sincerely,

C. B. CLAY.

Bromley, Kent, July 17, 1926.

THE RUGBY RADIO STATION OF THE BRITISH POST OFFICE.*

BY E. H. SHAUGHNESSY, O.B.E., M.INST.E.E.

(Continued from page 225.)

THE DESIGN OF INDUCTANCES FOR HIGH POWERS.

It is essential in a high-power transmitting station that the losses in the primary circuit and aerial circuit inductances should be reduced to a minimum. The losses which add together to form the equivalent resistance of the coil may be divided into the following three groups :—

- (1) Losses in the conductor itself.
- (2) Losses in surroundings.
- (3) Losses in the framework necessary to support the conductor forming the inductance.

The losses in the conductor itself (group 1) have been discussed mathematically in detail by Mr. Butterworth,† and although Mr. Butterworth does not deal with the case of a large coil with widely-spaced turns in a deep winding space, the formulæ he has given can be used without serious error to compare the efficiency of various designs of coils, &c. At the time the designs were being prepared the practical manufacturing limit as regards number of strands in a cable was 6,561 (= 3⁸) and for this number of strands, so far as conductor losses only were concerned, calculations indicated that the diameter of the coil should be as great as the limitations of the space permitted and the diameter of the wire used should be very small and of the order of 0.007 in. It was, therefore, decided to use a cable of 6,561 strands of No. 36 S.W.G. wire for both the primary and aerial inductances, each strand being insulated by enamel and one covering of cotton or silk. The cables were made to the Post Office specification by Messrs. Henleys Telegraph Works, Ltd., and Messrs. Connollys, Ltd. The maximum current-carrying capacity of this cable when wound into an inductance is probably of the order of 1,000 amperes.

With an efficiently designed coil of large dimensions for big powers, the losses in the surroundings and in the inductance framework must necessarily be of the same order as the conductor losses. The losses in the surroundings can only be reduced by having adequate clearances between the inductance and the floors and walls, and by avoiding as far as possible the use of materials for the construction of the building which are likely to absorb energy from the inductances.

A considerable amount of experimental work‡ has been carried out in the Post Office Engineering Department to ascertain a suitable insulating material for use in the construction of radio transmitting inductances, and it was found that American whitewood was very much better as regards dielectric losses than any other material or any other wood. The method adopted by the Post Office for the construction of transmitting inductances is to mount a cable formed of insulated and stranded wires on a framework of American whitewood. The cable is wound in slots on movable wooden spiders which are supported by rollers on a wooden framework, so that changes of inductance can be obtained by the relative movement of the spiders without the awkward mechanical construction of "tapping points" and the disadvantages of "overhanging" end-turns. The maximum width of the largest inductance coil is 14 ft. 6 in. The particulars and general dimensions of the aerial and primary circuit inductances are as follow :—

Aerial coil.—This consists of 5 spiders each of 8 turns wound in the form of a hexagon with 7 ft. 9 in. external side (5 ft. 9 in. mean side). Distance between individual turns 6 in. Inductance continuously variable between 900 and 4,000 μ H.

Primary Circuit Coil.—This consists of 3 spiders each of 4 turns wound in the form of a hexagon with 7 ft. external side (6 ft. 2 in. mean side). Distance between turns 6 in. Inductance continuously variable from 400 to 600 μ H.

Coupling Coil.—One spider wound with 2 turns 6 ft. 5 in. external side. This coil is mounted on the same framework as the intermediate circuit coil and is coupled thereto. Inductance 40 μ H.

One outside spider can be moved by a screw in order to get a fine adjustment of tuning. The method of making a joint in the stranded wire between the spiders is to splay out the strands on a number of insulated flat copper plates and semi-conical copper fittings so as to ensure proper circulation of current through all the strands and to keep a cool joint.

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

† *Philosophical Transactions of the Royal Society*, A, 1921, vol. 222, p. 57.

‡ E. H. SHAUGHNESSY: Chairman's Address to the Wireless Section, *Journal I.E.E.*, 1925, vol. 63, p. 60.

It was estimated at the time of the design, from previous comparisons between actual and calculated decrements of smaller coils, that the decrement of the complete primary circuit would be about 0.003 to 0.005 and that of the aerial tuning inductance would be about 0.002. The actual measured resistance at 16,000 cycles of the entire primary circuit as erected was 0.088 ohm, giving a decrement of 0.0053. The measured resistance of the aerial tuning inductance and coupling coil (2,500 μ H) at 16,000 cycles was 0.11 ohm, giving a decrement of 0.00137 for the coils. These values of decrements are very low and the author has not noticed details in the technical Press of any transmitting inductance which is as efficient as these have proved to be.

RELATIVE POSITIONS OF VARIOUS AMPLIFIERS AND AERIAL CIRCUIT.

Fig. 18 is a section of the transmitting building, showing the relative positions of the power units and their output circuit. It will be noticed that the condensers of the primary circuit and the smoothing condensers on the high-tension d.c. supply are placed on a floor immediately above the power units. A large opening is provided in this floor for light and observation purposes, through which are taken the high-frequency leads from the ground floor to upper floors.

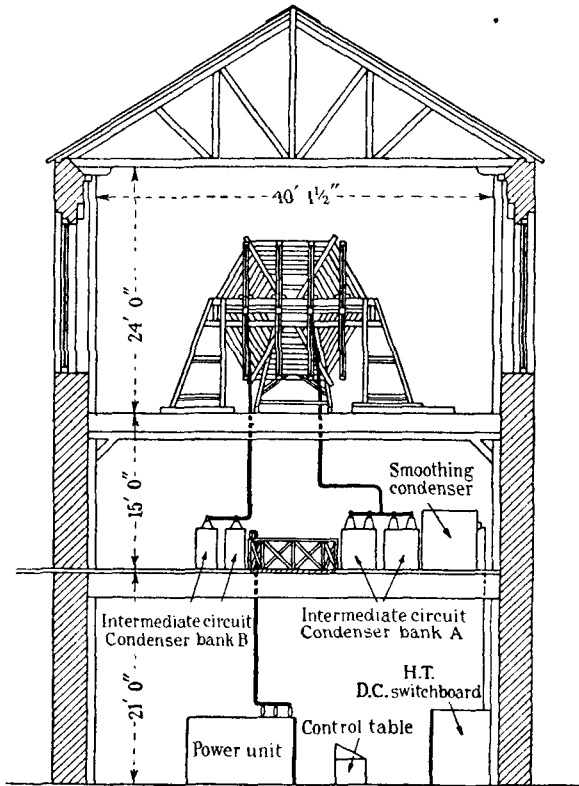


FIG. 18.—SECTION OF TRANSMITTING BUILDING.

The inductances for the primary and aerial circuits are mounted on wooden beams above the condenser floor. This arrangement places the inductances as far as possible from the floors, walls, &c. The metal work used in the construction of the building above the condenser floor is reduced to a minimum, and is a negligible quantity.

METHOD OF KEYING AND SHAPE OF SIGNALS.

One of the greatest difficulties experienced in the design of any type of large power radio transmitter is that of successful keying, and in each case the best method and best adjustment are obtained by experience and experiment. A considerable amount of experimental work on various methods of keying a valve transmitter was carried out with the 50-kW transmitter at the Post Office Northolt radio station, and as a result of those experiments it was decided to provide for the simultaneous operation of a simple "make" and "break" key at each of the three points in the circuit marked X in Fig. 10. The system has proved to be eminently satisfactory and no difficulties have been experienced up to the highest powers used at present. Creed pneumatic keys are used for points "a" and "b" and a magnetic relay for point "c."

It will be observed that there is no oscillation in the aerial when the key is "up" and that this result is obtained by breaking the feed to the grid from one stage of amplification to the next, as shown in Fig. 19, which is a skeleton diagram of the last inter-stage circuit.

There are two points of particular interest in the arrangement. The first is that the key splits the coupling condenser to the grid and leaves the

condenser E between the grid and filament when the key is up. This condenser is of sufficient value to make the impedance from grid to filament capacitive, and this counteracts any tendency that this stage may have to self-oscillate.

The second point of interest is the series circuit A B C from grid to filament. "A" is merely a high-frequency choke, "B" is an adjustable resistance (grid leak) and "C" is a d.c. (grid bias) generator. When the key is down the mean negative grid potential is the sum of that due to the grid leak and the generator; when the key is "up" the only bias is that due to the generator. By adjusting the proportions of the bias due to grid leak and generator respectively when oscillating, it can be arranged that the generator voltage is sufficient to allow a suitable d.c. current to pass through

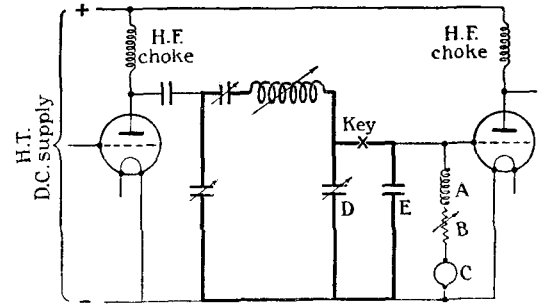


FIG. 19.—SKELETON DIAGRAM OF INTER-STAGE CIRCUIT.

the valves when the key is up. The advantages of this are two-fold and are shown below:—

- (1) The d.c. load with "key up" reduces the voltage "kick" on generator with keying.
- (2) The conductive path through the valve (due to the small grid bias) increases the damping of the aerial when the key is "up," with a corresponding improvement in the shape of the signals.

The latter is well illustrated by the group of oscillograms in Fig. 20, which shows the shape of the signal in the aerial for a series of dots at about 50 words per minute. The oscillogram of the rectified aerial current obtained from a local circuit shows quite clearly the different rates of change for growth and decay respectively of the aerial current.

From similar oscillograms of the aerial current the decrement of the aerial circuit for the rise of current has been calculated as being 0.0086, whilst for the decay it is as high as 0.024. The advantage of this method of keying as regards shape of signals is therefore quite obvious; the oscillogram indicates that, for higher speeds, advantage should be taken of the quick decay by decreasing the length of the "space" relatively to the "mark" and means for doing this are being developed. This method of keying is due to Messrs. Hansford and Faulkner.

The whole of the work of erecting and assembling the internal wireless plant, including the excitation units, valve panels, power units, oscillating circuits, and the winding and jointing of most of the inductance coils, was done by Post Office workmen under the supervision of, and to the detailed designs of Post Office engineers. The tuning-fork units were made in the Post Office experimental workshop at Dollis Hill.

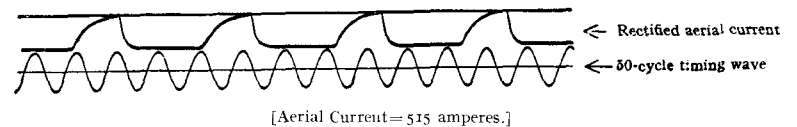


FIG. 20.—OSCILLOGRAM OF RECTIFIED AERIAL CURRENT.

MASTS.

The masts are 820 ft. in height from ground-level to the top of the aerial sheave and are of the stayed and pivoted type, insulated at the base (see Fig. 21). The pivot is about 17 ft. above ground-level; below this are columns of porcelain insulators and a granite cube (5 ft. 6 in. sides), the whole being supported by a steel column the top face of which is 8 ft. 2 in. above ground. The masts are of triangular form with 10 ft. sides, the vertical posts being formed of two channels fastened together at an angle of 60° by a bent bar plate. The bracing is arranged in panels 9 ft. high and is of the K form.

Five sets of stays, 3 per set, are provided and divide the mast into 5 sections.

The mast is not tapered but the mast sectional members are gradually diminished in size at each stay point from the bottom to the top of the mast.

The principal dimensions of the mast sections are :—

Vertical Posts.

- Channels—Bottom section, 10 in. × 3½ in. × 28.2 lb.
- Top section, 5 in. × 2½ in. × 11 lb.
- Bent bar plate—Bottom section, 8 in. × ½ in.
- Top section, 6 in. × ⅜ in.

- Bracing Angles*—Bottom section, 4 in. × 4 in. × ½ in.
- Top section, 3½ in. × 3½ in. × ⅜ in.

The masts were designed to withstand a uniform wind load of 60 lb. per sq. ft. of projected surface, and a horizontal antenna pull of 10 tons at the top. The maximum heel or deviation from the vertical allowed under load was 1° 0', i.e. 8 ft. at the top of the mast. It was specified that the maximum compressive stress in lb. per sq. in. was not to exceed

$$18,000 - 80 l/r$$

when l/r is equal to or exceeds 50 and not to exceed 14,000 lb. per sq. in. for ratios of l/r less than 50, where l is the length of the post between bracings, or the distance between stays, and r is the least radius of gyration of post or mast section. Under these conditions the maximum bending moment occurring at any section was 400 tons-ft. and the maximum shear force 15 tons. Throughout the length of the mast below the top stay the compressive load due to the weight of the structure and the vertical component of the stay tensions always exceeds the tensile load due to bending moment and the posts are therefore always in compression.

The solution arrived at is indicated in Fig. 22. The insulation is primarily provided by 12 columns of porcelain insulators arranged three in each column and placed between steel castings immediately below the pivoted joint. These insulators comply with the specified conditions of withstanding a high-frequency voltage of 25,000 (R.M.S.) at 50,000 cycles per sec. for 6 hours without overheating or breaking, the insulators having first been immersed in water for 2 hours. They were tested mechanically to a compression load of 270 tons, corresponding to a factor of safety of 6.

Each insulator is 9 inches in diameter and 3½ in. thick, with a recessed hole in each face 2½ in. dia. and 1 in. deep.

To ensure uniform distribution of stress between the columns all insulators have ground faces and those in each column were cemented together by a thin layer of Portland cement.

Wooden blocks were used in the place of the insulators during the erection of the masts. To insert the insulators, the mast was raised on hydraulic jacks, the wooden blocks were removed and the columns of insulators inserted with a thin layer of cement at the bottom. The mast was then lowered on the insulators but the full load was not taken off the jacks until the cement had properly set.

It will be noted (see Fig. 22) that the arrangement of the insulators permits of the insertion of 3 hydraulic jacks to raise the mast and replace any damaged or faulty insulator as required.

The stays are insulated at the base only. The same type of insulator is used as for the mast base, the method of mounting being indicated in Fig. 23. The insulators are in compression, the top column taking the load and the bottom acting as steadying insulators. A hydraulic press is incorporated

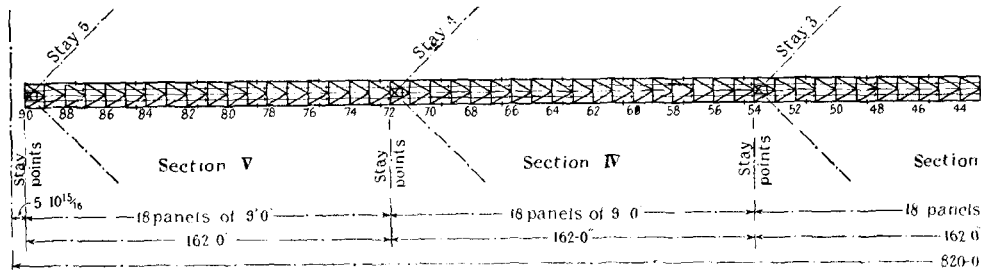


FIG. 21—Elevation of mast

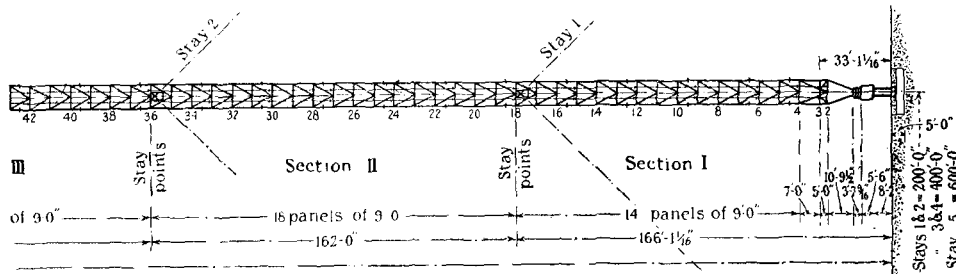


FIG. 21 (continued)

The total weight of steelwork in a mast is 170 tons and the weight of the 15 stays is 28 tons and stay anchorages, &c., 12 tons. Under maximum wind load the resultant vertical load on the base of the mast is 400 tons.

The foundations of the mast consist of a reinforced concrete block 20 ft. × 20 ft. × 6 ft. The reinforcement consists of one row of steel joists 18 in. × 7 in. × 75 lb. and a second row of steel joists of 12 in. × 6 in. × 44 lb. placed at right angles to the first row; the steel joists are bolted together and the steel supporting stanchion is bolted to the upper row of joists (Fig. 22).

The maximum load on the earth surface is 1 ton per sq. ft.

Borings were taken at mast positions to depths of about 25 ft. and averaged 1 ft. of soil, 3 ft. to 8 ft. of yellow loam and 12 ft. of soft blue clay, below which was stiff blue clay. In one case only running sand was encountered and the foundations were carried below this to the blue clay.

INSULATION OF THE MASTS.

Two considerations arose in determining the method to be adopted in insulating the masts :—

- (1) The choice of a dielectric capable of withstanding a high voltage at high frequency and a considerable compressive load.
- (2) Arranging the insulating medium so that the capacity of mast to earth was as low as possible.

in the stay-rope attachment which can be connected to a hydraulic pump and gauge on the ground and used to measure directly the tension of the stay.

The stays are of parallel strand construction and were made on the site. The maximum tensions imposed on the stays under full wind load vary from 30.5 to 37.6 tons in the different stays, the top and bottom sets carrying rather higher loads than the intermediate, and two sizes of stay ropes were adopted. The larger is composed of 151 wires of No. 10 S.W.G. having an area of 1.918 sq. in. and a circumference of 5½ in., and the smaller of 103 No. 10 S.W.G. and 6 No. 8 S.W.G. The factor of safety specified for the stay ropes was 4.

The individual wires of No. 10 S.W.G. have an extension, within the elastic limit, of 0.5% under a stress of 57.7 tons per sq. in., and a breaking load of 3,050 lb.

The aggregate breaking load of the larger ropes, assuming uniform distribution on all the wires, would be about 205 tons. Short lengths of rope with sockets attached were tested in connexion with experiments carried out to determine the best type of socket, and the ultimate strength of the rope was greater than 125 tons, the limit of the machine available for the tests. This type of stay has a great advantage over the usual small wire stranded variety in possessing a smaller extension under load. The parallel-strand type has an extension very little in excess of that of the individual wires and for the longest stay in use on the Rugby masts, this, under maximum load, does not exceed 17 in. irrespective of variations due to temperature, or, allowing for a temperature rise of 50 deg. F., 21 in. The best results obtained on stranded ropes of special construction and under similar conditions would be equivalent to 35 in. extension for the longest stay at Rugby.

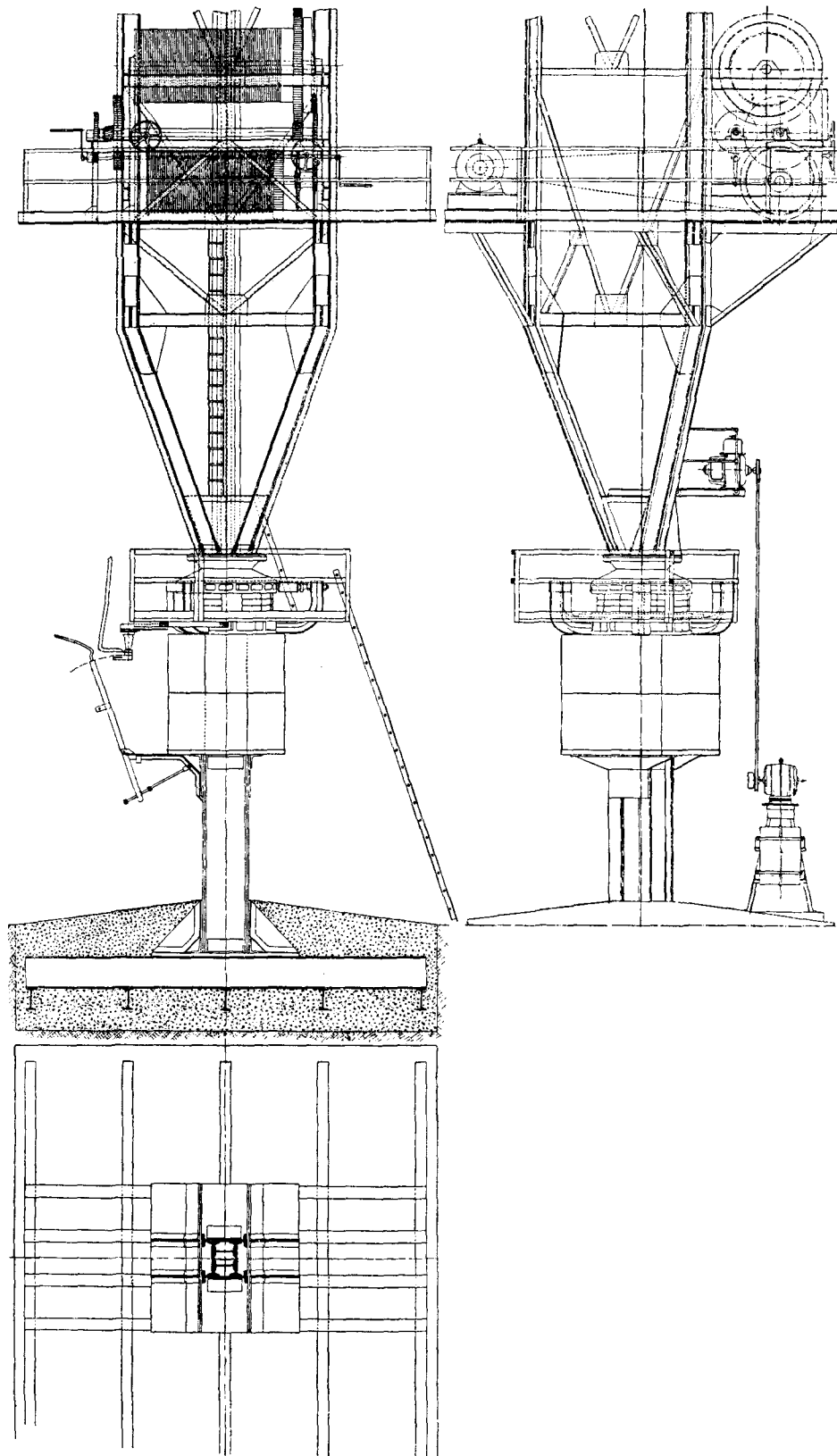


FIG. 22.—Base of mast.

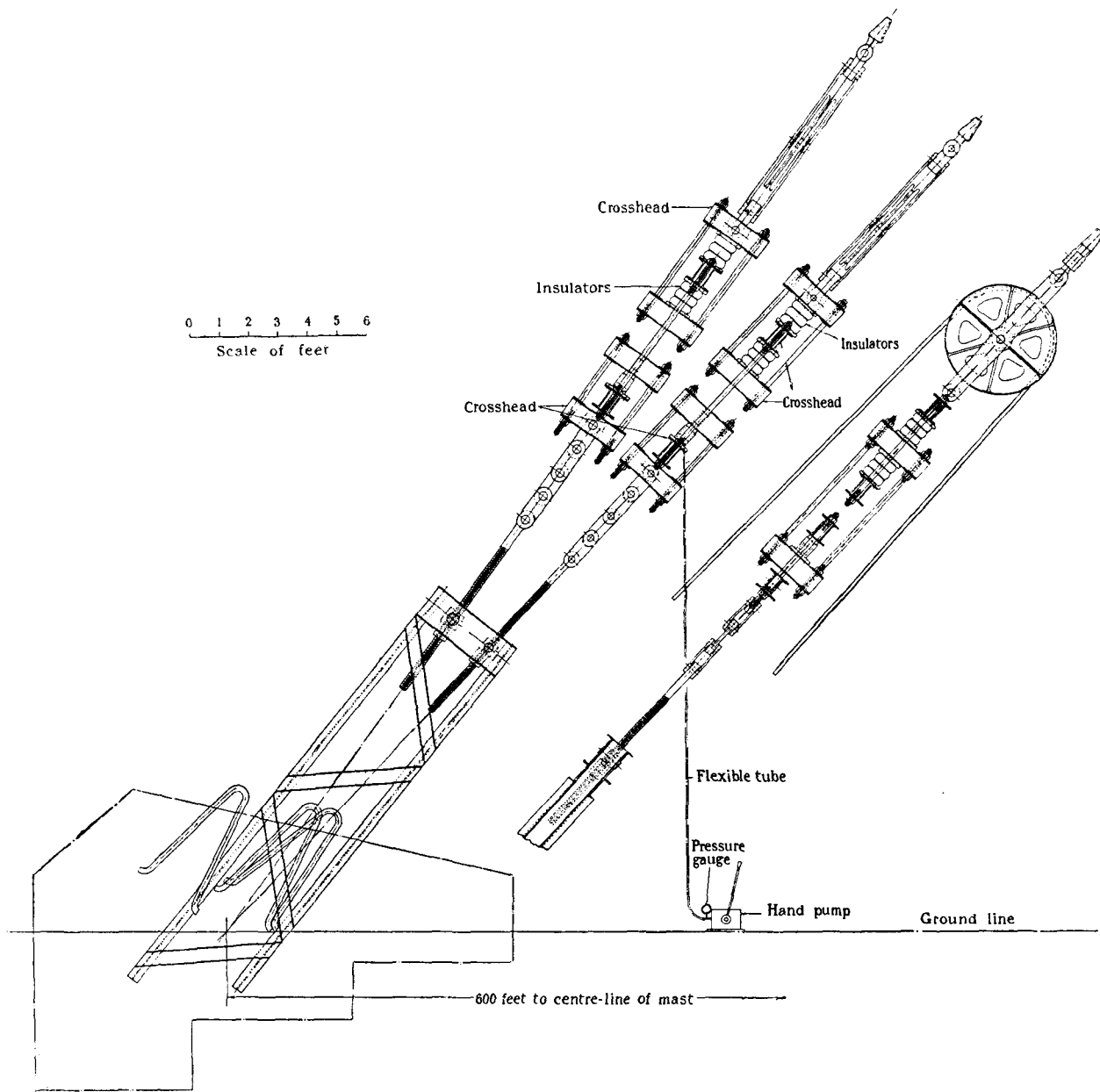


FIG. 23.—Stay arrangement and anchorage.

The advantage of the use of the parallel-strand construction is thus evident in limiting the heel of the mast under conditions of load. A further advantage of the use of parallel-wire ropes is that a more exact determination of stay stresses is possible. The masts were manufactured and erected by Messrs. Head Wrightson & Co.

Switches of substantial design are provided for earthing the masts when access to them is required and also for enabling transmission to be carried out at full power with the masts earthed. A spark-gap is also associated with the switch as a protective device against abnormal voltages on the masts or aerial.

In order to test the masts with the specified horizontal pull of 10 tons applied at the top, a steel rope was suspended between two masts and hoisted by means of the permanent mast winches until the required tension was reached. Fig. 24 illustrates the method employed. P_1 and P_2 are the vertical projections on the ground of the ends of the rope S_1, S_2 , suspended between the masts M_1 and M_2 . A theodolite was fixed at O such that the length $OP_1 = OP_2$. The angles of elevation α and β of S_1 and S_2 were measured accurately and also the angle of elevation α of the lowest point C of the steel cable. It was then a simple matter to measure the angle P_2OC , in the horizontal plane, C_1 being the vertical projection of C . Also the angle $C_1P_2O = \text{angle } C_1P_1O$ being known, and the length OP_2 having been accurately measured, the distance OC_1 was calculated. Thus it was possible to calculate the values of $S_1P_1 = OP_1 \tan \alpha$, $CC_1 = OC_1 \tan \alpha$, and $S_2P_2 = OP_2 \tan$

β , and so obtain the dip d of the cable. The mass per foot of the steel rope, w , and l , the distance S_1S_2 being known, the horizontal tension

$$T = \frac{wl^2}{8d}$$

was obtained.

A check on the aerial dip was also made by the same methods. The current taken by the electric motors of the winches, however, was found to give readings consistent with the value of the tension in the aerial suspending halyards and, during the erection of the aerial, reliance was placed upon these readings.

MAST AND AERIAL SYSTEM.

The mast and aerial system are arranged so that two separate aerials of different capacities may be used or alternatively the two combined to form one larger aerial (Fig. 1). Two of the masts, spaced symmetrically with regard to the station buildings and 1,320 ft. apart, are common to both aerial systems. The larger of the two aerials is the telegraph aerial and is supported on 8 masts arranged to form an elongated octagonal figure in plan, with sides of 1,320 ft., but with opposite sides on axes at right angles at distances apart of 880 yards and 1,210 yards.

The smaller aerial is supported on 6 masts with the same spacing but forming an aerial with two open arms. This arrangement is designed to permit of the addition of four more masts if necessary, for which purpose sufficient ground is available.

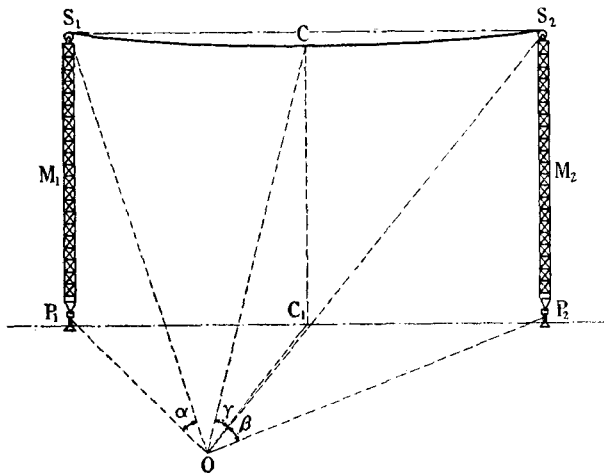


FIG. 24.—Method of load-testing masts.

Each aerial system is fed by a lead-up connected to two separate feeders, one attached to each of the masts nearest to the station. When using the whole system as one aerial the leads-up to the two separate aerials are connected together by an internal cable running the whole length of the inductance room.

(To be continued.)

PRESENTATION TO MR. VALENTINE, C.B.E.

It was with very great pleasure that members of the London Telephone Service learned on July 3 that His Majesty the King had appointed their Controller, Mr. W. A. Valentine, a Commander of the Most Excellent Order of the British Empire. There is a general feeling that during the recent difficult times the staff of the L.T.S. did consistently good work, and in this honour to their Chief the members of the L.T.S. saw a recognition of that general work, as well as an acknowledgment of the special contribution Mr. Valentine had himself made on this occasion and throughout his controllership to the successful conduct of London's telephone service. It was a happy inspiration which led to a gathering in the conference room at Cornwall House on the afternoon of Friday, July 16, when the Deputy Controller, Mr. W. Napier, presented the new "Commander" with a gold cigarette case and matchbox as a material reminder of the regard in which he is held by the staff he leads. Contributions to the gifts were invited from the higher officers of the department only, but Mr. Napier in the few well chosen words with which he offered the gifts for acceptance made it clear that the kindly feelings of which these are the outward and visible token are to be found in all classes and degrees of Mr. Valentine's staff. The Controller who had but just returned from the House of Commons where he had taken part in the ceremony of handing over for the use of the Press Gallery the five-hundred-thousandth telephone in London, made happy reference to his experiences there and to his visit to Buckingham Palace. He expressed his appreciation of these tokens of good-will, which he would always treasure, especially as a reminder of the kindly feelings they evidenced, feelings he fully reciprocated.

H. D.

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THE FUTURE OF TELEGRAPHY.*

BY G. T. ARCHIBALD.

(Continued from page 227.)

THERE may be some amongst you who see little or no room for further economies. The machine works so smoothly as a general rule that they have never felt it necessary to give more than a passing thought to the details of the organisation. Well I feel sure that many bright ideas have been lost to the Service because there has been no incentive to their development. Once upon a time there was an impression that the man or woman with ideas was a nuisance in a Government department, and in telegraph offices in particular, because the supervising officers did not care to be called upon to think. That impression may have been partly true up to a few years ago, but it is not true of the supervising officers of to-day.

The formation of a league or guild on the lines suggested would encourage everyone to think; bright ideas, however impracticable they seem, have a healthy germ somewhere, and these germs may often be developed into something really useful if they are treated with sympathy and understanding.

I make bold to suggest that if the bright ideas which inevitably spring from the minds of Post Office people in the various towns could be collected and discussed locally, much useful work could be done for the mutual benefit of the staff, the public, and the national purse. If we corporately are interested in running the telegraph service to the best advantage I can see no better means of displaying our interest than in taking pride in putting forward any suggestion however unimportant it may seem, because, as I have shewn, practicable schemes are often the outcome of impracticable suggestions.

Just think of the remarkable changes which have taken place since 1914. First we were able to get rid of the office copy of received telegrams. A small committee, consisting of Mr. J. W. Plackett, Postmaster of Bradford, Mr. T. Mackenzie, Assistant Controller, C.T.O., Mr. T. Morris, Chief Superintendent Telegraphs, Liverpool, and Mr. F. A. Carmichael, Chief Superintendent Telegraphs, Manchester—practical telegraph men—was appointed to consider the question. They drew up a scheme, which the Secretary consented to try, and it was introduced at Birmingham—with satisfactory results. It was then tried at Liverpool, Manchester, Glasgow and other large offices and proved so successful that within a short space of time it was adopted generally with the result that a saving of about £30,000 a year was registered. There is an illustration of economy without any one other than the paper manufacturer being a penny the worse off.

Then again there is the walk delivery system. Batching had been common enough during the years before the war when messengers were paid at docket rates and no one saw the least objection to it. During the war period the system was extended, and experience shewed that it might be regularised if a scientific basis could be discovered: the walk system was the result. I don't think there are many people who have studied the walk system who would be prepared to say that delivery is less efficient in consequence of the change. As a matter of fact we know that it is more efficient, and all because the work is arranged on an ordered system. There are fewer complaints of late delivery and the Department has saved about £100,000 per annum.

Now let us consider the local retention of forms—and the simplified method of sorting finished work. These again were the outcome of bright ideas, and considerable economies have been affected. Correspondence between Headquarters and provincial offices has been reduced, valuable storage accommodation at Headquarters has been set free and two much needed changes came into being without fuss and without opposition. These reforms achieved within a short space of time, go to prove what I said a few minutes ago. They should encourage us to look around for other means of simplifying our arrangements, for I believe it is in this direction that we shall find the greatest scope for our activities.

Our circulation arrangements are not yet perfect and they are expensive. Can anyone offer a suggestion?

In what other direction must we look for improving the telegraphy of the future? We have reached the stage when we must realise that the telegraph art is undergoing remarkable changes, and you will surely agree with me when I say that there is now a wide field for original thought and action. Machine telegraph apparatus is rapidly displacing Morse apparatus;

* A paper read before the Birmingham Postal Telegraph and Telephone Society on Dec. 10, 1925.

hand craft is now obsolescent and machine craft is becoming more and more the principal feature of our service. How does this affect us? In this way. We are changing our systems, we are changing our outlook; we are groping about for the right kind of change in our organisation. The future lies in machine craft, but we are at the moment endeavouring to work service with a handcraft organisation. Please don't run away with the idea that machine craft means cheap craft and that the status of the telegraphist is about to be lowered: that idea does not conform to our interpretation of the word economy. You cannot get the best out of expensive machinery unless you employ expert staff—and expert staff is not cheap staff. Machine telegraph apparatus requires more expert attention, more intelligent handling and more complete and highly skilled technical knowledge, than machinery employed in turning out tin tacks, chocolate boxes and, if I may say so without disparagement, the Oriental knick-knacks manufactured in Birmingham. Machine telegraphy is probably the highest form of machine craft employed in this or any other country, partly because of the intricacy of the machinery itself, partly because of the special equipment required in the operator, and partly because of the use to which the machinery is put.

If we can be persuaded to look at the development of machine telegraphy in this way, confident that out of the ruins of the good old Morse craft we are building up a better craft, we shall do much to rid ourselves of the conservatism of outlook which has always been a reproach. Nor is that all. We shall the sooner learn to appreciate the modern conception of telegraphy and play our part in its development.

I need scarcely mention that Morse Sounder telegraphy was largely accidental in its origin and popularity, and that but for this fact machine telegraphy might have made greater progress during the past fifty years.

As I said before, the future lies simply and solely in the direction of printing telegraph apparatus and the simplification of our methods. It must be perfectly obvious, therefore, as I have already mentioned, that a high standard of efficiency must be maintained both in operating and in non-operating work. Efficiency is not to be judged by numbers; bear in mind that too many cooks spoil the broth. It is useless to provide efficient staff and inefficient apparatus or vice versa; both must be maintained at a high standard or both become inefficient. Patience is tried and tempers become a bit ragged when machines are working badly; machines get out of order when the operator is indifferent and out of sympathy with his job. What we have to do then is to expect the Post Office to supply us with efficient apparatus so that we may make the most of it with the minimum loss of mental, physical and nervous energy.

We have seen, through succeeding generations, immense changes in telegraphy. Single needles, Double plate Sounders and Wheatstone A.B.C.'s have been displaced by Morse Sounders, Simplex and duplex, quadruplex and multiplex; Wheatstone working has been improved by the use of Creed apparatus; Morse has given way to telephones, to Automatic Multiplex, to Baudot Multiplex and to Start Stop machines. The old Wheatstone perforator has been knocked out by Gell, Kleinschmidt and Kotyra perforators. The pneumatic perforator will be knocked out sooner or later by a keyboard perforator capable of perforating four slips simultaneously. As far as the manipulative side is concerned, in nearly every case a keyboard of one kind or another is the significant feature of the change.

Another development which may have far-reaching effects is upon us. As you are no doubt aware, much attention has been given to the question of laying telegraph and telephone wires in the same cable, or, in other words, to telegraphic transmission over small gauge conductors. The advantages of such a development would be inestimable. We should be able to replace aerial lines by cable loops, increase our measure of stability and lessen the danger of inductive disturbances from high voltage and heavy current circuits.

One of the conditions is that the telegraph signals shall consist of alternating current of the same order of amplitude and frequency as is used in telephone working.

Such a system called the Tone or Voice Frequency system has been produced and is now under test in London. Three electrode valves are used as oscillators or generators and four electrode valves with a high amplification factor and a low internal impedance are employed as amplifiers and rectifiers. It provides six separate channels, each with its own frequency, on one loop which can be worked with any type of apparatus, Morse, Wheatstone, Multiplex, or Start-Stop. Moreover the frequencies can be tapped off at points between the terminal offices and extended on other lines.

If successful, the system is bound to play an important part in the reduction of wire mileage and there should be a consequential saving in maintenance charges. Obviously the apparatus will make new demands upon the skill and technical knowledge of those who may be called upon to control it.

We are refurnishing and we must set our house in order. We are introducing labour saving devices to make our work more pleasant and to enable us to do it more quickly and less expensively. But we have not so far done much to adapt ourselves to the changed conditions. We are developing a new technique—we must develop a new organisation based on that technique.

What does that mean? May I ask you to examine the question from the point of view of the organiser, bearing in mind what I said earlier on the question of economy which we agreed to mean the frugal use of men, material and money. You will agree that it is not immoral to expect a better output from a new machine if it does not make a greater demand upon the energy of the operator. It is important that this point should be quite clear in our minds. The criterion is not the number of telegrams an operator disposes of in a given time but the amount of energy he or she uses up in disposing of the telegrams. We are paid for the energy we use up just as we pay for the energy consumed in our homes whether coal, gas or electricity. We may have five small fires burning no more coal than one large fire, we may have five small lights consuming no more current than one decent gas-filled lamp. We don't pay for the number of fires or the number of lights but for the amount of energy used.

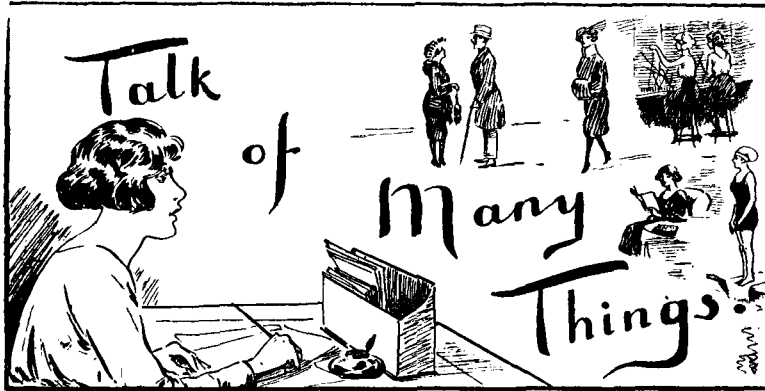
In conclusion, let us consider the question of organisation. I pointed out a few moments ago that we are endeavouring to work our machine craft instrument rooms with an obsolete or at all events an obsolescent hand craft organisation. This is perhaps one of the most difficult questions with which we are faced. It is a question in which we are all intimately concerned; it is one which we must face boldly, without prejudice and without thinking too much of our own immediate interests. Admittedly it is difficult to look at the matter dispassionately if it cuts across our preconceived notions of what is due to us as individuals, what is due to our families, and what we have a right to expect as loyal and zealous officers. History supplies us with innumerable instances of changes, social and economic which have proved disastrous to whole communities as well as to individuals. The war made many people poor and enriched many more. Changes in habits, dress, locomotion, etc., etc. have all left their mark. One of the latest instances is supplied by the quick transition from horse-drawn to motor cabs and buses. Many cases of individual hardship were the result of these changes. Men who were willing but unable for various reasons to drive the newer vehicles found their means of livelihood gone. That sort of thing is impossible in the telegraph service, we retain our security of tenure in any circumstances; any revolution in methods of working can do no more than influence our prospects, it cannot jeopardise our means of livelihood. But if progress is inevitable, then changes in prospects are inevitable, but the consequences to the individual should be no more serious than the circumstances demand.

What then does this new technique require? Obviously it demands changes in the organisation, but what form the changes shall take requires very careful and serious consideration. Printing telegraph apparatus requires greater attention than Morse apparatus, and we must first fix the dividing line between the work of the mechanic and the telegraphist. It is now generally accepted that the mechanics shall be responsible for the cleaning and repair of apparatus, motors, etc., and that the commercial side shall be responsible only for such adjustments as can be made whilst a machine is in use and for changing apparatus which is definitely out of order. The line is a fairly clear one and what we have to determine is whether that may be regarded as circuit adjustments including the running in of Multiplex apparatus shall be performed by members of the rank and file, by some new class, or by supervising officers. At present circuit adjustments are made by members of the rank and file who have made it their business to understand the newer types of apparatus. An allowance is paid to the Sorting Clerks and Telegraphists who undertake these duties in connexion with multiplex apparatus and on the whole it may be said that the system works very well. The sectional supervising officer is relieved of all work in connexion with the adjustment of apparatus, he is free to supervise the traffic and staff but he is not, of course, relieved of responsibility for the apparatus. It is sometimes urged that this system makes for divided control, that the sectional officer does not care to interfere with the dirigeur even though he may not feel quite satisfied when things are not working smoothly, and that in consequence the freedom of action of the supervising officer is too much restricted. Others again urge that the dirigeur class encourages telegraphists to take a keener interest in the technical side of the work and for that reason desire its continuance.

On the other hand it is urged that quasi-supervising allowances are undesirable, particularly in large offices where the organisation should be sufficiently elastic to preclude the possibility of resorting to such an expedient. Those who take this view also believe that the better arrangement would be to place Overseers in charge of smaller sections with full responsibility for apparatus, traffic and staff. I make no suggestion to you, I express no opinion except that a change may be necessary. Neither scheme may be ideal, but if we consider them—and any alternative which may be suggested—from the point of view of what is most desirable for the efficiency of the Service we shall reach a sound conclusion. Some of us may be disappointed, some of us may be gratified, but when the matter is settled I would ask those who are pleased to be sympathetic and considerate in their attitude to those who are disappointed.

All that I have endeavoured to do in this paper is to plead with you to widen your outlook, to look ahead, and to be prepared for the further changes which must take place as inventors improve telegraph apparatus. The future will make greater and greater demands upon the technical skill of the staff, both supervising and operating, and we should shape our course accordingly. We cannot afford to stand still, and if I have succeeded in persuading only one amongst you to ponder on the various points in my paper I shall feel that its preparation has not been in vain.

WE TELEPHONISTS



Cows.

It must not be supposed that I am going to write about cows, but I must have some sort of title, and this one seems as appropriate as any other just at present. As a matter of fact I don't think I could write about cows because, although I know nothing of them and am therefore eminently fitted to write quite a lot about them, I don't like them sufficiently to take the slightest interest in them. I could say a great deal more regarding calves, but even that presents difficulty since the adoption of Russian boots. Cows have their uses, of course, and so I suppose, have I, although no one has yet told me. I should miss them at tea-time and in the strawberry and junket season, and I do like cheese with my bread and cider. But to consider cows as cows raises no poetic emotion within me. They stare at me in a particularly senseless manner when I cross a field, as though I really was the extraordinary person they seem to think I am—and I am sure I am not. They appear to chew thoughtfully as if they were considering weighty problems, but that, I firmly believe, is a pose. Whoever thought of a cow thinking, and who can think of a thought that a cow would think? Some suppose that cows are affectionate because they nestle, but I believe that is merely a vile pun. Others say that cows are beautiful and that a sad soul stares from out their solemn eyes, but how is it possible to be beautiful or soulful with a perpetually wet nose? Poets have prated of the music of the "lowing of the herd o'er the lea," but it is quite certain that these same poets have never tried to drive a car past a lowing herd in a narrow lane.

Cows are examples of that type of useful and patient being whom everybody ignores until, by some mischance, their normal unobtrusive services stop suddenly. Then it is that everybody is vexed because of the resulting inconvenience. Such beings are intensely irritating, and our irritation increases in proportion to their submissiveness. The knowledge of their indispensability and the unassuming manner in which they bear their responsibilities acts as a constant and silent reproach. If only they would rebel on occasion and run amok we should probably love them. But no, they won't: they just plod on in meekness and in sweat until we hate our comfort and sloth. That is why I refuse to write about cows.

PERCY FLAGE.

My Tennis.

Who will play, who will play, who will play with me, upon the tennis court so green after we've had tea? I haven't been "discovered"—kind of just dropped down from Heaven—but two of all the balls I "serve" reach the right court out of seven (that's three point one four two eight five seven one out of eleven). Who will play, who will play, who will play with me? I cannot "drive" or "chop" or "smash" but "love" I'll guarantee. Whene'er I make a quick "return," my ball to Heaven goes soaring, while my opponents call "away" and still they go on scoring; (a practice which, if overdone, becomes a little boring).

A little sparrow used to sing so sweet and merrily within our lofty garden trees, but then—alack, ah me—I knocked a ball so high, so high, that spite of special search, we couldn't find the ball again or the sparrow on its perch (which made us say a word or two you'd hardly say in church). Who will play, who will play, who will play with me? Practice makes me perfect as all of you will see. My "volleys" and my "ground-strokes" shall cause envy and dismay—the crown of all achievement in a sportsman's perfect day (though it sounds a little better if expressed another way)!

G. M. TURNER,
Sydenham Exchange.

Another "Echo."

Attend all ye who list to hear
Of Albert Dock's just praise.
I tell of the long, tiring walks
She took in "Striking" days,
When that great fleet of char-a-bancs
Right nobly took its flock
Of demoiselles, North, South, and West
But *not* to Albert Dock.

And were they daunted in the face
Of undeserved flout?
Ah no, you little know the race
That Albert Dock sends out.
For when they came where lies the road
They "trammed" the former year
There upon the cobbly stones
They tramped it with good cheer.

Up to the board the T.T. went
O'er "Urgents" to preside
Marshaled her forces wellnigh spent
And "howled" the countryside.
Out of their holes the cycles came
Rusty, decrepit, grey,
With a creak and a clatter of old iron frame,
They rushed into the fray.

Not a sound was heard save the new-born din
Of the grinding brakes and wheels;
Bootleather and tempers were wearing thin
To say nothing of blistering heels.
One after one we limped to our work,
The "beads" upon each brow:
But we managed to gasp with an agonised jerk,
"Number, Please" soft and low.

Spite of these drawbacks—borne so well—
We handled a record load,
And thousands of subs. with lines at A.L.
Serenaded us out in the road.
And when the story was told to the "heads,"
They decided, with splendid dash,
Because we'd been troubled our pay would be doubled,—
Or it would if they had the cash!

W.M.G.

Song of the Busy-Back.

Look! to the clock, 'tis the hour of noon,
We shall be lunching very soon.
Like to a cloud passing over the sky
The sign of a busy-back meets the eye.
Yellow the flash, then dark as the night,
When more than one 'tis a dazzling sight
Coming and going and singing a song,
First a buzz short then a buzz long.
"Bank" had a busy-back better than all
But, sad misfortune, could not call.
It did not possess that golden ray,
'Twas easy to miss and caused delay.
From morning 'till night the busy-back hums
Like to the echo of distant drums.
"Number engaged" it wearily weeps
As over the switch-board its influence creeps.
Whispering, murmuring, cord in the Jack,
Song of the gold light tired Busy-Back.

V. M. G. CLIFFORD.

An Encomium.

It is not generally realised what a remarkable affinity there is between telephonist and engineer. Where else can she turn for that complete understanding and appreciation that we can give? The Press criticises her, her parents tell her she is undisciplined, the subscriber says she is rude and inefficient, others insist that she is frivolous, even her young man sometimes calls her modern, which—when used in reproach—means she is heartless, unromantic, selfish, tantalising, superficial, and thoroughly unworthy of his love.

Now, we engineers have a remarkable admiration for the telephonist of to-day. Most of us think she is deserving of the highest praise and has a right to the best we can give her. She is just wonderful. So we think. And why? It is not her operating adeptness, or articulatory qualities, or even the literary ability displayed in the answering of a T.18 that we admire. It is the girl herself—modern of the moderns in all likeable senses. She

alone can inspire that veneration, and may I say, affection, that we have for her. Her good sense, which is only one of her many good qualities, especially appeals to us. It is perhaps best displayed in her dress (her good taste is, certainly). Surely here she has reached the climax of attainment. Low-heeled shoes, silk stockings, short skirts, open-necked and short-sleeved blouses, and hats that are worn rather than carried about by the wearer. She "bobs" her hair or "crops" it—a rare compliment to the other sex. A little powder enhances her beauty. A few girls are indiscreet enough to use lip-stick, which, I am quite certain, is not at all necessary: besides, who likes the taste of lip-stick? Not one fellow in a hundred, I assure you.

By the way, I do wish girls would not perform the operations of the toilet when walking down the street. It isn't nice! I don't know where they find the courage to do it. These girls who, when asked to dance, blush slightly and very shyly acquiesce, will walk along the public highway using their hand-bags as dressing tables, without a tremor. (Just like a woman!) But apart from one or two indiscretions our "modern" telephonist is superb—she is perfect. In this matter of dress—in common with her sisters of other arts and crafts—she has improved tremendously during the last few years, so that she has now, I think, reached perfection. I do hope she will not go on "improving." You can't improve upon the perfect, can you? and in the matter of dress, the irreducible minimum has surely almost been reached. And why should the male sex limit its choice of suitable clothing to the field of sport? It is a pity we cannot become as courageous as the girls and throw off superfluous clothes—though I suppose that in both cases there will be much delightful diversity of opinion as to what *is* superfluous.

Within the next few years more than half of the girls will, I suppose, have transferred themselves to more domestic activities. Is it too much to hope that they will carry the spirit of revolution into that sphere; that they will then let good sense carry more weight than conventional practice; that not being satisfied merely with the breaking down of old standards, they will set up higher and newer; discarding the old not because they are old, but because they are not the best; that they will so build up while breaking down, reversing all that is good in the past so that they may be helped to build better in the future? If beauty of face and form are the outward expression of beauty of ideals in the modern girl, then all this must follow.

C.V.L. (Gerrard).

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," *Telegraph and Telephone Journal*, Secretary's Office, G.P.O. (North), London, E.C.

LONDON TELEPHONE SERVICE NOTES.

Half a Million.

On July 16 the Controller handed over London's five-hundred-thousandth telephone to the Chairman of the Press Gallery Committee in the House of Commons.

The event was made the occasion of a small ceremony, and in the course of a short address Mr. Valentine drew attention to some interesting points regarding the progress of the service. He remarked how the telephone service was becoming more closely interwoven in the fabric of business and social life, and said that although pessimists may point to the fact that some forty-seven years had passed since the first telephone exchange was opened in London, a more significant fact was that during the past ten years the number of telephones in London had increased by nearly 100%. He added that the present indications are that the million mark would be reached within nine years.

Mr. Valentine referred to the progress which was being made in developing the Anglo-Continental Services, and envisaged the time, probably not far distant, when, by the aid of wireless, conversations between people in London and New York would be commonplace.

Later in the day Mr. Valentine attended a more informal function, when Mr. Napier, on behalf of a number of friends in the service, presented him with a gold cigarette case, suitably inscribed, to mark the occasion of having had conferred upon him the honour and distinction of Commander of the Order of the British Empire.

The speeches accompanying the presentation and reception of the memento were in happy vein, and Mr. Valentine was assured of the pleasure which is felt throughout the service on account of his being so honoured by His Majesty the King.

* * * *

Sport.

The annual cricket match between the Traffic Branch and the Night Staff took place at the Civil Service Sports Ground, Chiswick, on June 29.

At this, the fourth attempt, the traffic team at last succeeded in coming out on top, winning by a margin of 20 runs. Notable performances were put up by Mr. Holdstock of the E.C. district for the Traffic Branch, who made 57 runs and took 5 wickets: by Mr. Gordon who made 57 runs for the Night Staff and by Mr. Kent who took 6 of the Traffic wickets. The Assistant Controller and Mrs. Pink watched the game.

The scores were:—

NIGHT STAFF.		TRAFFIC BRANCH.	
Harrison, c. Niles, b. Shepherd	1	Shepherd, b. Kent 18
Montague, b. Holdstock	... 13	Cracknell, run out 0
Kent, c. Gregory, b. Shepherd	4	Grove, lbw. b. Montague 7
Gordon, b. Grove	... 57	Holdstock, b. Kent 57
Whitehouse, c. Gerrard, b. Holdstock	... 1	Mears, b. Kent 1
Trussler, b. Holdstock	... 5	Adams, b. Riddler 11
Riddler, b. Holdstock	... 0	Gerrard, run out 3
Fisher, b. Shepherd	... 2	Webb, b. Kent 5
Carpenter, c. Gerrard, b. Shepherd	... 3	Gregory, st. Whitehouse, b. Montague 5
Holliman, st. Cracknell, b. Grove	... 6	Niles, not out 6
Bonnet, not out	... 5	Hancock, b. Kent 0
Pausey, b. Holdstock	... 3	Maiers, b. Kent 2
Extras	... 4	Extras 8
Total	... 104	Total	... 123

The Traffic Branch met the Secretary's Office Traffic Section on the cricket field for the first time at Thornton Heath on July 13, and succeeded in winning the match by 133 runs for 8 wickets to 86. Messrs. Grove and Berry did well with the bat for the winners, scoring 38 and 26 not out respectively, whilst Mr. Shepherd took 7 wickets. For the Secretary's Traffic Section Messrs. Lennox and Earle scored 37 and 16 respectively and Mr. Finley took 4 of the 8 wickets which fell. The full score is given in another column.

* * * *

Accounts Branch Cricket Club.

A very enthusiastic meeting was held in the Conference room on June 7, presided over by Mr. Hugh Williams, when it was unanimously decided to form a club. The following officers were elected: Mr. Hough, Hon. Sec.; Mr. Allen, Hon. Treasurer; Mr. Widdup, Capt; and Mr. Moon Vice-Capt. Within a few days 32 active members were enrolled and over 50 honorary members, among the latter being the Controller, Deputy Controller, Assistant Controller and Superintendent of Accounts; all of whom contributed generously to the club funds. Thanks to the support given the club was able to provide itself with full equipment and have arranged inter-branch matches as well as matches with other departments.

* * * *

Swimming Association.

The Hon. Sec. of the L.T.S.S.A. wishes it to be known that the Annual Gala has been fixed for Oct. 8 at Pitfield Street Baths, followed by the prize distribution and dance at Westminster Palace Rooms on Friday, Nov. 12.

TELEPHONE NOTES.

SOME interesting observations on the possibilities of Empire Wireless communication are contained in *The Electrical Review*, which reprints an abstract of a discourse before the Royal Institution of Great Britain by W. H. Eccles, D.Sc., F.R.S., M.R.I., M.I.E.E.

It is pointed out that the Empire will shortly possess the most up-to-date wireless equipment in the world, and preparation ought to be made to utilise fully the new facilities. For instance, twice a day *Rugby* transmits a summary of news prepared by the Foreign Office, and conceivably other news services may be arranged. A settler in Uganda, or the owner of a remote sheep station in Australia, need only instal a simple receiving set to keep in touch with the world: but, as this implies learning the Morse Code, it would be more practical, in small communities where there is a local news sheet, to pay an operator to listen regularly and decode the messages for the printer.

In the Empire there are innumerable remote settlements to which the cabled news messages leak very slowly, and there are many which depend entirely for their news on the occasional visit of a ship.

All such outposts can now, by the aid of a simple receiving set, be made to feel that they are within five minutes of Fleet Street. Moreover, if those stations were registered, messages could be specially addressed to them from England just as telegrams are going from Rugby to-day to ships on distant oceans.

Another method of distributing the Morse messages from home when received, say, in New Zealand, is to announce them, after decoding, through the local broadcasting stations

* * * *

It is gathered from announcements in *The Electrical Review* that rapid development is taking place in the telegraph and telephone services in Australia. The authorities are to lay, at a cost of £250,000, a cable from Sydney to Newcastle to provide at least 100 direct lines between the two cities. There has been a large increase in the use of the telephone service in New South Wales. The subscribers now number 114,182 as compared with 92,329 two years ago. The building and equipment of new automatic exchanges is proceeding.

* * * *

In an article which appears in *Telephony*, and deals with "Routing," the chief operator of the Illinois Telephone Company gives some indication of the complexity of the telephone traffic circulation arrangements in the United States.

An example is given of the work involved in tracing the circulation of a call from Jacksonville, Illinois, to Borden. The lists consulted are described as follows:—

- (1) First reference list book of Illinois Company. Refer under State "Indiana" to obtain toll centre, New Albany.
- (2) Long lines block route book. Refer under State "Indiana" to find outlet for New Albany which is Louisville, Ky., and verify that communication is practicable.
- (3) Reference is next made to ascertain routing from Jacksonville to Louisville, and this is traced by a system of block numbers to St. Louis.

The block number system is also utilised for the purpose of indicating when repeaters are required on specific calls.

* * * *

A somewhat novel feature of American telephone practice is indicated by an announcement in *Telephony* regarding the authorisation by the Wisconsin Railroad Commission of certain seasonal rates of charges by the Eagle River Telephone Company.

It is stated that the order by the Commission provides that seasonal service for telephone subscribers beyond the exchange base rate area, such as summer homes, summer resorts, canning factories, &c., shall be paid for in advance on an annual basis at the scheduled rate for the class of service afforded. Upon written request from the subscriber, the Company will disconnect the equipment, and allow a credit of 75 cents. for each entire month that the equipment is actually disconnected during the contract year. About 16% of the total subscribers to the Company's system are stated to be summer season customers.

No indication is given of the ratio which the rebate of 75 cents. per month bears to the scheduled monthly rental.

* * * *

Two recently revised publications of "Technical Pamphlets for Workmen," issued by the Post Office Engineering Department, "Telephone Testing Equipment" and "Automatic Telephony Step by Step Systems" are on sale at H.M. Stationery Office, price 6d. each.

* * * *

Telephony states that according to the report of an United States Consular Service Officer, the superposition of a Radio service on the ordinary telephone service is contemplated at The Hague. It is stated that the local company has in mind the erection of an antenna on the building of its Marnixstraat Telephone Central. This station will serve subscribers to the radio service who will, therefore, require no receiving apparatus. The subscribers will receive from the telephone company a small box and a plug, but will have to furnish their own headpieces and loudspeakers. No interference with the ordinary telephone service is expected to occur through the switching on of the radio apparatus. Should a telephone subscriber, who is listening in on the radio programme be called, the radio will automatically be disconnected. The listener can also connect the telephone himself.

It will likewise be possible for persons who are not telephone subscribers to be connected with the municipal radio without necessitating their subscribing to the telephone service as well. The amount of Fls. 18.00 (dollars 7.20) per annum is mentioned as the probable subscription for telephone subscribers desiring the radio service.

H.J.E.S.

CRICKET.

T. AND T. TRAFFIC SECTION (SECRETARY'S OFFICE) v. TRAFFIC SECTION (LONDON TELEPHONE SERVICE).

PLAYED AT NORBURY, JULY 13, 1926.

<i>T. and T. Traffic Section.</i>	<i>Traffic Section, London Telephone Service.</i>
Lennox, b. Shepherd 37	Cracknell, c. Findley, b. Earle 5
Cooper, b. Berry 5	Adams, b. Earle 11
Bradley, b. Shepherd 4	Grove, b. Findley 38
Higham, b. Berry 5	Holdstock, b. Findley 7
Earle, c. & b. Shepherd 16	Shepherd, run out 12
Leaver, c. Holdstock, b. Shepherd 5	Berry, not out 26
Bailey, b. Shepherd 1	Webb, c. Saffery, b. Lennox... 3
Key, not out 7	Mears, b. Findley 4
Macdonald, b. Shepherd 1	Niles, b. Findley 0
Saffery, c. Berry, b. Shepherd... 0	Handcock, not out 0
Findley, b. Holdstock... .. 0	
Extras 5	Extras 27
<hr/>	<hr/>
86	133 for 8
<hr/>	<hr/>

Shepherd took 7 wickets for 23 runs. Barry did not bat.

SECRETARY'S OFFICE C.C. INTER-BRANCH COMPETITION : T. AND T. TRAFFIC SECTION v. STAFF AND INVESTIGATION BRANCHES.

AT NORBURY, TUESDAY EVENING, JUNE 29.

<i>T. and T. Traffic Section.</i>	<i>Staff and I.B.</i>
Magnall, retired 104	Kemp, c. Whiffen, b. Magnall 8
Lennox, hit wkt., b. Allan ... 20	Plouviez, b. Findley 16
Burton, c. Whitehurst, b. Allan 3	Ching, b. Findley 2
Higham, b. Allan 5	Allan, hit wkt., b. Findley ... 2
Leaver, l.b.w. Smith 0	Spiller, b. Magnall 2
Macdonald, b. Smith 0	Smith, c. Higham, b. Magnall... 0
Earle, b. Plouviez 2	Whitehurst, b. Earle 10
Leaver, not out 4	Cramp, c. Macdonald, b. Earle 1
Whiffen, not out 13	Brodie, b. Earle 2
	Hughes, not out 0
	Hunter, c. Leaver, b. Earle ... 0
Extras 10	Extras 11
<hr/>	<hr/>
Total ... 161 for 7 wkts (declared).	Total ... 54

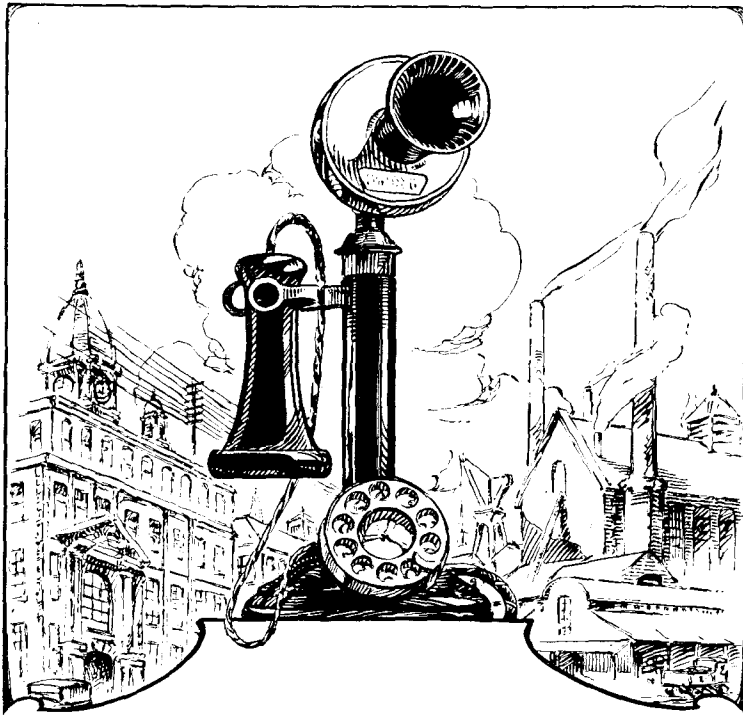
Messrs. Bradley and Bailey did not bat.

MAILS BRANCH v. BUILDINGS AND SUPPLIES BRANCH.

AT CHINGFORD ON JUNE 30 1926.

<i>Mails Branch.</i>	<i>Buildings and Supplies Branch.</i>
Lester, b. Hambridge 61	Waters, b. Abramovitch 23
Viney, b. Rixon 17	Banton, l.b.w. Dalby 3
Dalby, b. Drew 6	Bray, b. Wood... .. 5
Abramovitch, b. Drew 30	Rixon, c. & b. Abramovitch ... 27
André, b. Hambridge 6	Colyer, b. Wood 10
Howard, b. Hambridge 3	Pearce, b. Viney 0
Fignes, b. Pearce 0	Garrett, run out 0
Wood, l.b.w. Hambridge 1	Hambridge, not out 56
Twinn, l.b.w. Bray 12	Scholes, b. Wood 0
Sellars, not out... .. 9	Drew, b. Abramovitch 5
	Still, b. Abramovitch 1
Extras 14	Extras 14
<hr/>	<hr/>
Total ... 159	Total ... 144

Brookes did not bat.



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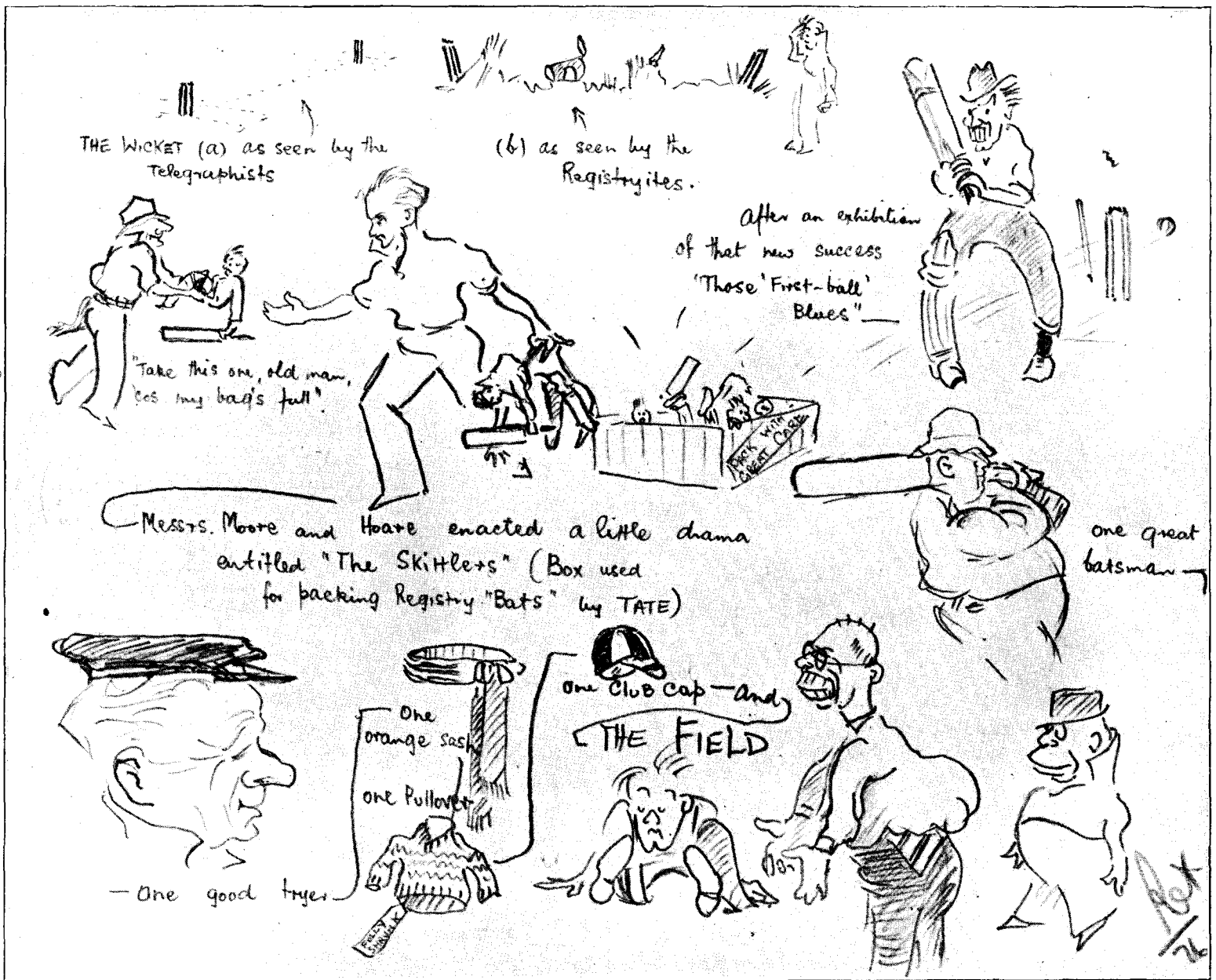
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TELEGRAPH BRANCHES v. THE REGISTRY.

AT CHINGFORD ON JULY 13, 1926.

Telegraph Branches.		The Registry.	
Welch, retired ...	76	Rudd, l.b.w. Moore ...	14
Mason, b. Davenport ...	0	Asplin, c. Welch, b. Moore ...	4
Birkett, b. Asplin ...	16	Skinner, run out ...	7
Moore, b. Skinner ...	46	Russell, st. Welch, b. Moore ...	5
Price, b. Davenport ...	13	Davenport, not out ...	28
Gavey, b. Skinner ...	4	Rieusset, b. Hoare ...	20
Cox, b. Davenport ...	3	Douch, b. Hoare ...	1
Roberts, c. Hawkes, b. Skinner	4	Brown, run out ...	0
Mallett, not out ...	1	Hawke, c. Cox, b. Moore ...	0
Hoare, not out ...	17	Stickland, c. and b. Hoare ...	0
		Edney, c. Price, b. Hoare ...	0
Extras ...	13	Extras ...	9
Total ...	193	Total ...	88
	for 8 wkts. declared.		
	Hoare took 4 wickets for 5 runs.		

An exuberant correspondent in the Telegraph Branch sends us the following comment on the last match:—

"Cricket is the funniest game ever. Laugh!—why, the very seats split themselves! Shirts billowing, sun-hats on which the bands will become

awry, rainbow-hued waist-scarves which simply do not function as such, and at least one bowler who imagines that his job is to score Rugger goals by hand.

"The occasion was a very much vermilion-tinted affair, when the Registry Branch (G.P.O.) played cricket against the Telegraph Branch (G.P.O.), the respective scores being 88 and 190. Some brilliant hitting and bowling revealed itself amongst the latter, and the Telegraph's wicket-keeping was as "great" as its batting. But what do mere figures matter?—it's the capers and fancy dress which count."

MIDDLESBROUGH TELEPHONE DISTRICT.

A PRESENTATION of a Gladstone travelling bag was made to Mr. T. HANN, Chief Clerk, Middlesbrough, on June 25, to mark the occasion of his promotion to the position of Chief Clerk at Sheffield.

The presentation was made by Mr. H. G. McFarlane, District Manager, who spoke with appreciation of Mr. Hann's long period of service in the district.

Representatives of the Traffic and Contract Sections, together with members of the Accounts Section, also contributed remarks and extended their best wishes to Mr. Hann for success and happiness in his new sphere.