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## TELEPHONE MEN.

### LVIII.—ALAN ROBERTS.

ALAN ROBERTS was born in Liverpool on Aug. 16, 1867, and educated at St. Mary's School, Edge Hill. Being one of a very large family it was necessary for him to enter business earlier than most boys, but this fortunately, as after events proved, was not detrimental to his future success.

His entry into commercial life was found in the Lancashire Telephone Company under Mr. R. H. Claxton, but there was not much for him to do there as a boy in those days, and Mr. Claxton soon found him employment in a firm of Liverpool cotton brokers with whom he received a valuable commercial education. After a few years this firm closed their Liverpool house, and Mr. Roberts, who had in the meantime made himself proficient in shorthand, was on Jan. 5, 1885, again taken into the telephone service by Mr. Claxton.

By the time of the amalgamation of the Lancashire and Cheshire Telephone Company, Limited, with the National in 1889, Mr. Roberts had passed through and had charge of most of the Clerical Departments. He was then appointed Head Bookkeeper and took instructions from Mr. Chambers, the present Northern Provincial Superintendent, as to the compilation of the National Company's returns which had to be got out for the past three months without delay.

Leaving old methods with some diffidence, he entered on this new departure, and by almost continuous day and night work he completed the work in a satisfactory manner.

Part of Mr. Roberts' duties at that time was to check and examine all electrical and engineering estimates, which gave him an insight into the technical part of the business. This he found very fascinating, and followed it up by attending evening technical classes. At the same

time he found the Liverpool staff very ready to assist him in this direction

In September, 1895, Mr. Roberts was appointed Chief Clerk, a position he held until Jan. 1, 1903, when he was appointed Local Manager for the Northern division of Liverpool, with local offices at Bootle.

It was immediately after this that he suggested to the Engineer-in-Chief the method now adopted for ventilating call office cabinets.

Finding plenty of technical work in his new sphere of labour and much to interest him in underground construction and reconstruction, the opening of new exchanges and the reconstruction of exchanges, he assiduously applied himself to these questions, and continuing his evening studies soon had a real grasp of the engineering side of the business.

Crosby Exchange was the first common battery exchange opened in the Liverpool district. During its construction Mr. Roberts followed the work in close detail, and the change-over from magneto, though attended with considerable difficulty owing to the scarcity of spare underground circuits, was successfully carried out.

On the amalgamation of the Liverpool and Birkenhead districts in July, 1909, Mr. Roberts was appointed Chief Electrician, and during the succeeding twelve months had a very busy time reorganising the department and in carrying out the work in connection with the successful opening of four new common battery exchanges—Bank, Bootle, Anfield and Wavertree.

In September, 1909, he was appointed Lecturer on Telephony at the Central Technical School, Liverpool, but was obliged to cancel his appointment for 1910, as his services were required on the "Inventory" staff as a Divisional Officer.



Further promotion awaited Mr. Roberts in December, 1910, when he was appointed District Manager for Middlesbrough. His duties on the Inventory staff have not yet permitted him, however, to take up his position in that town.

The whole of Mr. Roberts' long telephone experience has been obtained in Liverpool (a splendid training school for any telephone man), where the changes in managership have been few—viz., Mr. R. H. Claxton, Mr. Arthur Martin and Mr. E. J. Hidden, and with which he has many old and happy associations.

Mr. Roberts is well-known to his many friends as a man of almost unbounded energy, happy optimism, and much self-confidence: all qualities which, aided by continual hard work, have enabled him by his own efforts to rise from Office boy to District Manager with a most useful intervening experience in both the commercial and technical branches of the telephone business.

Whilst a strict disciplinarian, he is just and handles his staff well. As indicating the esteem in which he is held by the Liverpool staff he has just been presented by them with a fine "Cutler" roll-top desk and Mrs. Roberts with a gold bracelet.

Among Mr. Roberts' recreations may be classed singing, and he was thirteen years solo bass at Christ Church, Liverpool. He was a keen Rugby football player in his younger days, but has now taken to bowls and golf. Walking also has always been one of his favourite pursuits.

### BRUIN AND THE TELEPHONE POLE.

[The humming of the wires led the bears to believe that the poles were the headquarters of bees, and they pursued that enticing goal. Their longing for honey gave rise to fresh destruction. But the shaggy dwellers in the forest learned by their disappointment; the number of attacks on lines decreased more and more, and eventually the humming of the wires lost its attractive power for Bruin.—*Zeitschrift für Post und Telegraphie.*]

In the dark Norwegian forests  
Snug beneath the pine trees couching  
Slept the bear, the honey hunter,  
Slept and slumbered through the winter.  
O'er his dreams a sound came stealing,  
Louder now and now retreating,  
Like the humming of the wild bees.  
And he dreamt of feasts of honey—  
Feasts of wild and luscious honey—  
Woke and started from his couching,  
Started out to find the humming  
Which came faintly on his senses,  
Through the pine trees still appealing.  
Stiffly moved he through the forest,  
Still with sleep his limbs were heavy,  
And the snow lay thickly round him,  
Blinded was he by his dreaming,  
Never once thought of the season,  
Never thought that it was early,  
Very early for the wild bees.  
Lunged and lumbered through the forest,  
Till he came where rose a pine tree,  
Straight and bare it rose up stiffly,  
And it seemed the wild bee humming  
From the topmost branch was coming.  
So he climbed with pain and groaning,  
Often slipping, often moaning,  
Gained the top and reached out blindly,  
Searching for the magic honey.  
But no honey did he find there,  
Only china insulators—  
Cold white china insulators.  
Got all tangled in the wiring,  
Slipped and fell and broke the wiring,  
Came to earth a sadder Bruin.  
Slowly to his couch repairing,  
Thought he sadly, thought in this wise,  
"Though the humming goes on coming,  
"I shall know 'tis only mumming,  
"And the bees that make the drumming,  
"Bees that sting but make no honey."  
And the gang who came to mend it  
Murmured sadly "Drat the bear."—E. M. BUCKLAND.

### A "TELEPHONE AUTHORITY" FOR GREAT BRITAIN.

At a meeting of the London Chamber of Commerce, held at Oxford Court, Cannon Street, London, on Feb. 17, 1911, Mr. Herbert Laws Webb, M.I.E.E., gave the following address (Lord Desborough, K.C.V.O., the president of the council, was in the chair):—

A short time ago a young lady acquaintance of mine advanced the theory that silk petticoats and silk stockings should be supplied gratuitously to young women by the State. Her argument was that the wearing of these articles of apparel made young women feel so "nice" that the result would be for the general good of the community. This is an illustration of how far the modern feeling of reliance upon the State for all sorts of benefits has extended. At the present time the State is expending approximately a million a year in providing business men and the racing community with telegrams at under cost price. If my young lady friend had known this she would have been greatly fortified in her argument. It is well known that the principal users of the telegraph service are business people and that section of the community which attends horse races or bets on horse races. It is also generally known that the telegraph service is conducted at a large annual loss, but it is not so well known how this state of affairs has arisen, and I purpose now to trace briefly the history of the Government telegraph monopoly, which has had such a disastrous effect on the telephone industry of the country.

It has come to be regarded as a natural thing—a sort of divine right—that the telegraphs of a country should be a Government monopoly, but there is no real reason for this. All the pioneer work in telegraphy was done by private enterprise, the submarine cable service of the world is operated—and operated at very high efficiency—by private enterprise, and the telegraphs of North America, both of the United States and of Canada, are operated by private enterprise and apparently with satisfactory results to the public. In many continental countries, where the Government is extremely centralised and the local government really depends on headquarters, the telegraphs are an important part of the political machine and the public telegraph service is, so to speak, a by-product—and often a by-product of very inferior quality. These conditions do not apply in this free country, where there is no necessity for the Government to control the telegraphs in order to communicate with governors of provinces or prefects. There has never been a suggestion that Government control of the telegraphs here was a political necessity, and the present State telegraph monopoly was set up 40 years ago as a business proposition; and it is as a business proposition that it should be judged, both because it is just that the users of the telegraph service should pay a proper price for the facilities and because such an important electrical industry should be worked under sound financial conditions.

The State telegraph monopoly had its origin in 1865, when the late Mr. Frank Ives Scudamore, then a Second Secretary of the Post Office, was directed to report whether in his opinion "the Electric Telegraph Service might be beneficially worked by the Post Office, whether, if so worked it would possess any advantages over a system worked by private companies, and whether it would entail any very large expenditure on the Department beyond the purchase of existing rights."

Mr. Scudamore was an enthusiast but not a business man, and his report was strongly in favour of the acquisition of the telegraphs by the State, and he prepared estimates to show that the telegraph service in the hands of the State would be what the City would call a safe business proposition. The language of the reference is somewhat vague, as it is difficult to say what is meant by whether the State control of the telegraphs would entail "any very large expenditure" on the Department beyond the purchase of existing rights. Mr. Scudamore, however, allayed all misgivings on this point and convinced the Select Committees which inquired into the matter that profit and not "large expenditure" would result. As a matter of fact, the result has been a total expenditure up to date, for capital expended and unextinguished, for loss of interest and for excess of working expenditure over receipts, of approximately £35,000,000. The asset against this is the telegraph system of the Post Office as it exists to-day, but, as already noted, the system is being worked at a large and increasing annual loss.

If you will glance at the tables you will find there summarised the progress of the State telegraph monopoly on the financial side. Mr. Scudamore's first estimate was that the properties of the six telegraph companies then existing could be acquired for two and a half millions and worked at a sufficient margin of profit to provide interest on the money and sinking fund for extinguishing the capital. The second estimate, made two years later, brought the capital required up to £3,100,000, but still showed sufficient margin of profit to meet interest and sinking fund, as a net revenue of nearly 6 per cent. was calculated. The two committees of Parliament which sat on the Telegraph Bills that were based on Mr. Scudamore's report and estimates asked many questions on the financial features of the scheme, and it is evident throughout the proceedings that the scheme was treated as a business proposal and that there was complete confidence that under State management the telegraphs would not only pay their way but would yield sufficient profit to enable the capital to be rapidly extinguished by a sinking fund. The various tables show how completely these expectations were falsified in actual practice, but they also show how little practical investigation the original estimates received. It will be seen that the estimate of capital cost was first two and a half millions, then £3,100,000, and was a short time later raised to six millions, which became seven millions by the time the Telegraph Act of 1869 was voted. The reason for the rapid increase of estimated capital expenditure from three millions to six millions was that Mr. Scudamore found when he came to close quarters with the telegraph companies that their properties were worth much more than he had estimated in the seclusion of his office at

St. Martin's le Grand. The bearing of this increase in the capital expenditure is seen in table 2. At first Mr. Scudamore's estimates of capital and gross revenue gave very encouraging figures, as he showed first a gross revenue of 27 per cent. on the capital, and then of 19 per cent., and he estimated to obtain a net revenue of 8.8 per cent. at first and then of 5.9 per cent. But when he raised his capital expenditure from three millions to six millions his percentage of gross revenue dropped from 19.6 to 12.3 per cent., and it was only by estimating the gross revenue at very liberal figures and cutting down the working expenses very materially that he was able to show on the increased capital expenditure sufficient margin of profit to provide for interest and sinking fund. I have made this brief analysis of the figures in order to show that the scheme on its financial side received very little practical investigation, as the estimated figures for gross revenue and working expenses were clearly manipulated when the estimate of capital required was doubled, in order still to show a sufficient balance of profit. This is made additionally clear by the ratio of expense to gross revenue, which in the first estimate was put as high as 67½ per cent., and in the third was reduced, with no apparent justification, to 51½ per cent. The remaining figures in the tables show how completely unreliable all the estimates were as a guide to the actual financial results of the State telegraph monopoly. When the Telegraph Act was passed the maximum capital expenditure was put at £7,000,000, but within a very few years it grew to almost £11,000,000, and a very large proportion of this was spent in extending the telegraph system after it passed into the hands of the Post Office. The actual expenditure on purchase of telegraph properties was, as finally estimated, between six and seven million pounds. The increased capital expenditure would not have mattered if the estimates of working expenses had been justified in practice; but, as will be seen by the tables, the working expenses rapidly and steadily increased. Within a few years they were 90 per cent. of the gross revenue, and for a good many years past they have been over 100 per cent. of the gross revenue. The result has been that no payments have been made to sinking fund to extinguish the original capital, and the interest on that capital has now to be paid by the taxpayer, while all additional capital for the development of the telegraph system has to be supplied by the taxpayer and is not charged to a capital account. This is not a satisfactory state of affairs for a great electrical industry, which, in the hands of private enterprise, would be made to pay its way.

POST OFFICE TELEGRAPHS—1866-1909.

(Table I.)

ESTIMATED AND ACTUAL CAPITAL EXPENDITURE.

Year	Description	Capital Expenditure
1866	Mr. Scudamore's 1st Estimate	£2,500,000
1868	" " 2nd "	3,100,000
1868	" " 3rd "	6,000,000
1869	" " 4th "	6,750,000
1869	Telegraph Act Vote	7,000,000
1871	" " Expenditure	8,000,000
1872	" " Expenditure	8,656,000
1875	" " Expenditure	9,790,198
1876	" " Expenditure	10,071,536
1876-77	" " at closing of Capital Account	10,948,173

ESTIMATED AND ACTUAL GROSS REVENUE AND WORKING EXPENSES.

Year	Description	Gross revenue.	Working expenses.	Ratio of	
				expense to revenue.	Surplus.
1866	Mr. Scudamore's 1st Estimate	£676,000	£456,000	67½	£220,000
1868	" " 2nd "	608,000	425,250	70	182,250
1869	" " 3rd "	737,000	379,000	51½	358,000
ACTUAL RESULTS:					
Year					
1870		612,301	350,376	57.8	261,925
1871		735,390	494,002	67.2	238,695
1872		973,332	833,908	86	139,424
1873		1,049,162	956,170	91	92,992
1874		1,167,745	1,039,912	89	85,808
1879-80		1,469,795	1,136,291	77.2	296,508
1889-90		2,323,423	2,073,835	89	249,588
Loss.					
1890-1900		3,330,542	3,421,323	103	90,781
1908-1909		4,325,723	4,837,125	112	511,392

The reasons for the failure of the Government to run a business on business lines are several, but they may be summed up in the general statement that under political control a technical business cannot be operated on business lines. There is constant pressure brought by the public or by bodies having political influence to obtain reduction in rates, and there is constant pressure brought by the staff to obtain improvements in pay and conditions. Moreover, it is a well-known fact that the same general efficiency of staff cannot be obtained in a Government Department, where employment is permanent, as can be obtained in private employ, where pay and promotion depend upon efficiency. Some of these causes were very early at work in the State telegraph monopoly, as within four years the working expenses had more than doubled, although the increase of traffic was only 50 per cent. The estimated staff required was 1,529 clerks and 1,283 messengers. Within six months there were 4,193 clerks and 3,116 messengers, or nearly three times the estimated staff, and more than double the aggregate staff of the various telegraph companies which were taken over. These facts were brought out by a committee appointed in 1875 to investigate the increased cost of the telegraph service since the acquisition of the telegraphs by the State, and this committee found that the ratio of working expenses to gross revenue had risen from 57 per cent. to over 96 per cent. within four years,

Since 1876 there has been no enquiry into the working of the State telegraph monopoly, and matters have been allowed to drift, and currency has been given to the convenient explanation that the large annual loss in working is due to the high price paid for the telegraph properties at the time of the purchase. The figures I have given show that the capital expenditure has no bearing on the present financial results, since there is an actual loss on working and no interest on capital can be paid out of telegraph revenue.

POST OFFICE TELEGRAPHS.

(Table II.)

PERCENTAGE OF GROSS AND NET REVENUE ON CAPITAL.

A.—GROSS REVENUE.				
		Capital.	Gross revenue.	Percentage.
1866	1st Estimate	£2,500,000	£676,000	27
1868	2nd "	3,100,000	608,000	19.6
1868	3rd "	6,000,000	737,000	12.3
1869	4th "	6,750,000	737,000	10.9
1869	Vote	7,000,000	737,000	10.5
1871	Expenditure	8,000,000	735,390	9.2
1872	"	8,656,000	973,332	11.2
1875	"	9,790,198	1,276,662	13
1876	"	10,071,536	1,313,107	13.1
1877	"	10,948,173	1,333,543	12.2
B. NET REVENUE.				
		Capital.	Net revenue.	Percentage.
1866	1st Estimate	£2,500,000	£220,000	8.8
1868	2nd "	3,100,000	182,250	5.9
1868	3rd "	6,000,000	358,000	5.95
1869	4th "	6,750,000	358,000	5.3
1869	Vote	7,000,000	358,000	5.13
1871	Expenditure	8,000,000	238,695	2.98
1872	"	8,656,000	139,424	1.6
1875	"	9,790,198	82,618	.84
1876	"	10,071,536	110,913	1.19
1877	"	10,948,173	125,108	1.4

A fact which is a crushing indictment of State ownership of a technical industry is that, notwithstanding all the improvements which have been made in telegraphy in the past 40 years, the working cost per message is higher to-day than it was 40 years ago. The message of to-day averages not much over half the length of the message of the old days of 1s. for twenty words of text, with free address and signature. During the past 40 years there have been innumerable improvements in telegraphic methods and appliances. The use of hard-drawn copper wire instead of iron wire, the adoption of duplex, quadruplex and multiplex working, the Wheatstone automatic system and other systems of rapid machine telegraphy have all tended to increase the output of the telegraph plant. Yet with all these advantages, and with an average message of about half the length of the message under the 1s. rate, the working cost per 1,000 messages is to-day £42 as against £40 in 1870.

Such is the financial working of a State monopoly in which in one way and another some 35 millions of money have been sunk, and which has a present revenue and expenditure approaching five millions a year. Before discussing the effect of the existence of this monopoly upon other means of electrical communication, it is worth while to take one more dip into history on the question of monopoly. When it was first proposed that the State should acquire and work the telegraphs, a monopoly was not asked for. In fact, the Post Office disclaimed the desire for a monopoly, and argued that in efficiency and economy they would be able to beat all comers. The first Select Committee which examined the Telegraph Bill reported "that it is not desirable that the transmission of messages for the public should become a legal monopoly in the Post Office." In the following year the Post Office pressed for a legal monopoly, on the score that without a monopoly opposing schemes might be started for the purpose of being bought out. The second Select Committee was reluctant to grant the Post Office a legal monopoly, and it is evident that public opinion at the time was opposed to putting such absolute power over the telegraphs in the hands of the Post Office. However, the monopoly clause was inserted in the Telegraph Act of 1869, and henceforward electrical communication became a State monopoly under the control of the Postmaster-General.

EFFECT OF THE TELEGRAPH MONOPOLY ON THE TELEPHONE.

Some years after Parliament granted the Postmaster-General a monopoly in telegraphs the telephone was invented, and when companies were organised in Great Britain to put this marvellous invention at the service of the public the Postmaster-General brought suit against those companies for infringement of his telegraphic monopoly. The result was that the telephone was found to be legally a telegraph within the meaning of the Act, and the telegraph companies had to accept the Postmaster-General's terms or give up their business. At this date (1880) the Postmaster-General had acquired sufficient experience of the unprofitable nature of the telegraph business under Government ownership to be unwilling to experiment with a new invention, the commercial capabilities of which his advisers distrusted. Consequently the Post Office did not at once go into the telephone business, but licensed the telephone companies to continue the business—under very rigorous terms and conditions. In fact, the early licenses were so rigorous, confining the operations of the telephone companies to certain extremely limited areas, that in a short time the Postmaster-General was forced by public opinion to grant a more liberal license, abolishing the restricted

areas and extending the license to the whole country. From the very beginning, however, the telephone was looked upon as a competitor of the telegraph and was compelled not only to pay tribute to the telegraph, but to remain in a relatively subsidiary position. A royalty of 10 per cent. of the gross receipts from telephone exchange business had to be paid to the Post Office and the telephone was forbidden to be used for written messages, and numerous other difficulties and restrictions were imposed. Probably the greatest of these difficulties, and one which has worked the most harm to the development of the telephone, was that statutory powers for the telephone companies to run their wires were refused them. All efforts to obtain these very necessary statutory powers have been consistently opposed by the Government. Another great difficulty, which has become increasingly acute as the present year has approached, was that the license was made for 31 years from 1880, terminating on the last day of 1911, but no provision was made for the continuance or conduct of the telephone service after the expiry of the license. The Government reserved the power in the license to give notice of their intention to purchase the telephone business at intervals of seven years, but this option has never been exercised. The telephone companies therefore have been in the unfortunate position of carrying on a difficult technical industry under these great adverse conditions of lack of statutory powers and of a limited life with an uncertain end. These conditions have completely prevented any broad policy of development of the telephone, and the British public have been the sufferers.

At the present time we have 644,000 telephones in service in the United Kingdom, whereas if the telephone were developed in the same ratio in proportion to population as it is in the United States, we should have nearly 3,000,000 telephones in service, and consequently vastly improved means of communication, in every city and throughout the whole country, compared with those which now exist. It has been said by very competent observers that one of the most important items contributing to the commercial and industrial efficiency of the United States is the widely developed and highly efficient telephone service enjoyed by the American community. This service puts city in instant touch with city, and every part of large city areas in instant touch with every other part. The value of such rapid and general communication can hardly be over-estimated, and it is difficult to estimate the loss which other industrial communities suffer from the lack of it. There is no difficulty in building up in this country an extensive and as efficient a telephone service as that which exists in America to-day. It is a question simply of capital, management and adequate powers.

Time will not permit of tracing in detail the vicissitudes of the telephone business in this country. I have just shown that the fundamental conditions of limited license and absence of statutory powers have been ever-present obstacles, but the fact that the telephone has been regarded as a sort of chartered infringer of a State monopoly has caused it to have a most eventful career during its brief life of 30 years. The State telegraphs, despite the millions of public money which they have swallowed up, have had no inquiry since 1876, and have been allowed to go their way in peace, but the telephone business, which has been a commercial business, and paid its way, has been subjected to one inquiry after another and to one change of Government policy after another. At first the telephone companies were chained like a convict by the leg and limited to small areas. Then they were allowed to roam freely over the country and to build trunk lines to connect various centres together. Then the Government decided that it would take the trunk lines, in order to protect the telegraph revenue—which had long ceased to exist! There has been a succession of Select Committees on the "telephone question," and for some years in the nineties the telephone companies were hardly left any time to look after their business, so many questions did the management have to answer. In 1899 came the late Mr. Hanbury's policy of municipal competition and of Post Office competition with their own licensee. This policy was frankly intended either to make the purchase of the Telephone Company's system at the end of the license an easy matter, or else to render it unnecessary for that purchase to be made at all. When it became clear that this policy had failed, the agreement of 1905 was made. Under this agreement the National Telephone Company engages to sell its plant to the Postmaster-General at its value as working plant, and the present aspect of the telephone business is that within a short time it will become a complete State monopoly.

No business man, I believe, looks forward without misapprehension to the establishment of a State monopoly in the telephone. No business man expects either the high efficiency or the wide development of the telephone which his business interests require if the telephone industry is to be subject to political control and to the uncommercial methods of a Government Department. We have drifted into the present position through the unfortunate error made 40 years ago of granting the Post Office a legal monopoly in the telegraph, a step which by many was considered an error at the time, and which was totally unnecessary if the State had been capable of operating the telegraph business efficiently and economically. The telegraphs, as a recent Postmaster-General has said, are past praying for, but no business man wishes to see the telephone industry (which is capable of far greater development and usefulness than the telegraph) go the same way and become a financial incubus for which annual apologies have to be offered. Under such conditions the rapid development which is so desirable would become impossible, as even the Government would not continuously put large sums of money into the development of an unprofitable venture. Even if the Government telephone service showed a profit, it would still not be developed at the rate necessary to meet the business requirements of the country, for the simple reason that the financial control would vest in the Treasury and not in those directly responsible for the conduct of the business. Treasury control of public money must in its nature be narrow and rigorous, and cannot be stimulated by the commercial considerations which are of the first importance in dealing with a rapidly expanding enterprise.

#### THE REAL REQUIREMENTS OF THE TELEPHONE SERVICE.

There has been some discussion lately in different parts of the country of a single aspect of the telephone question, the question of rates. To the business

man this is by no means the most important part of the subject. The business man wants a highly developed and highly efficient telephone service. He wants to be able to reach by telephone everyone with whom he has business and to reach them quickly and effectively. If he has that general and efficient service he is perfectly willing to pay a fair price for it. To bring the telephone service of Great Britain to the pitch of development and efficiency which the commercial interests of the country require, that is, to plant five telephones for one that is now working, will require a large expenditure of capital and an enterprising and progressive management. To secure this flow of capital—several millions a year for many years to come will be required—and to secure the progressive management necessary for the upbuilding of the service, it is essential that the solution of the telephone question shall be on commercial lines and not on those of a State-owned monopoly. Much prejudice has been aroused against the extension of the telephone license to an ordinary private company, and there is a large body of public opinion which is opposed to State monopoly. A solution can be found which meets both these views.

#### A TELEPHONE AUTHORITY FOR GREAT BRITAIN.

This solution consists in creating a Telephone Authority on the lines of the Port of London Authority, which would take over the telephone plant both of the National Telephone Company and of the Post Office, and would operate and develop the telephone service of the whole country on commercial lines.

The present position of the telephone business is that four-fifths of the local service is conducted by the National Telephone Company, the Post Office owning the trunk lines and portions of some of the local systems. Of municipal telephone systems there remain but two, those of Hull and Portsmouth, which are operated in competition with the National Company's systems in those towns. Under the agreement of 1905 the National Company is to sell its plant at the value that may be fixed by arbitration. The Telephone Authority would take over not only the plant of the National Company on the terms and conditions fixed by the agreement, but also the telephone plant of the Post Office and of the two municipalities on similar terms. The whole system would then be consolidated and operated by one organisation, which would have for its single object the development and improvement of the telephone service of the whole country.

The financial operation involved would be of considerable magnitude, but presents no insuperable difficulties. When the valuation of the plant is arrived at the Telephone Authority could exchange its stock for the existing securities or could raise money if necessary to purchase the plants for cash. In the case of the Post Office telephone plant some difficulty might be found by the Government in parting with its property except for cash, but this point might be got over either by the Telephone Authority assuming responsibility for the terminable annuities on which the Government telephone capital has been raised, or by issuing in exchange for the Government telephone plant debentures redeemable at an early date.

The difficulties which there may be in dealing with the present capital of the combined telephone business of the country, amounting to approximately £26,000,000, are nothing compared with the advantages of placing the whole telephone business under a single Telephone Authority, which would be a commercial body and would readily obtain the continuous flow of new capital necessary for the rapid development of the telephone service throughout the country. For some years past the telephone business has been almost in a state of arrested development. To provide for the real needs of the country in telephone facilities and to bring the entire service to an adequate pitch of efficiency will require the expenditure of several millions of capital every year for many years to come. Such a flow of capital can only be obtained if the enterprise is to be a productive one, and it can only be productive if operated under commercial conditions. If operated under commercial conditions, giving continuously improving facilities to the public at reasonable rates, and economically administered, it is certain to be productive, and consequently there will be no difficulty in obtaining the continuous supply of capital necessary for wide development. The dividends would be fixed at a figure which would tempt the investor, and if excess profits are made as the result of more economical methods of conducting the service, part of such excess profits could be devoted to a bonus on the capital and part to a reduction of rates or to the increase of facilities for the benefit of the public.

The Telephone Authority would take over the staff of the National Telephone Company and the telephone staffs of the Post Office and of the municipalities, thus securing the continued services of those experienced in a highly technical and specialised business. This would not only benefit the business itself, as the continued effort of those long experienced in the work is essential in such a technical industry, but it would allay the feeling of unrest and disquietude in a large body of skilled workers up and down the country. It is well known that political agitation has become permanently established among all branches of the Post Office staff, and the addition of some 18,000 employees to that staff, which would occur under the contemplated transfer of the whole telephone system of the country to the Post Office, is calculated to increase that agitation, with the results of which all members of Parliament are familiar. If the whole body of telephone workers were placed under a commercial management this political agitation would entirely disappear so far as that body is concerned, and it is a large body at present and will increase very greatly if the telephone service is adequately developed. Not only that, but the conditions of employment, the opportunities, and the general results to the workers would be more satisfactory to the great majority of them in an organisation imbued by the commercial spirit than in a Government Department.

The general direction of the Telephone Authority would be conducted by a board of management, on which, besides the stockholders, the Post Office, the Treasury, the municipalities, and the chambers of commerce would be represented. Such a broad representation would give, besides the commercial and financial control which I maintain is essential to the sound operation of a great technical industry capable of almost indefinite expansion, the requisite measure of public control to safeguard the interests of the Government and the interests

of the general public with regard to efficiency, sound development, and reasonable rates. The Post Office and the Treasury would be entitled to a voice in the management as representing the Government, because, presumably, the Telephone Authority would continue to be a licensee of the Post Office, and would pay the Post Office a royalty, which would in time, no doubt, more than fill up the annual telegraph deficit. The municipalities and the Chambers of Commerce should be represented on the Board, in order that those bodies may be properly advised as to the real merits and difficulties of the telephone business. At present a good deal of agitation is being conducted by some of the municipalities and Chambers of Commerce, but it is, in my opinion, a misguided agitation, as it is based almost entirely on the question of rates, whereas the main interest of the business community is that the telephone service should be developed more widely and brought to a higher state of general efficiency. This cannot be done unless the payment for service yields sufficient margin of profit to make the business self-supporting and to tempt new capital into it. If the telephone is widely developed and the service made highly efficient, the business public will never grumble at reasonable rates which enable these results to be accomplished. Therefore it would be an advantage that the municipalities and the Chambers of Commerce should be represented on the board of management of the Telephone Authority, in order that they may be able to inform their constituents of the real merits of the telephone business, of its difficulties and of its requirements.

It is not possible to develop fully in the course of a brief paper all the advantages of the proposal which I have outlined, but I might summarise them as follows:—

Under a Telephone Authority for the whole country, conducting the entire telephone service of the country on commercial lines—

1. The interests of the public would be more effectively safeguarded than under a Government monopoly.
2. By maintaining a commercial organisation the development of the telephone service would be continued more rapidly, more economically and more efficiently.
3. The Post Office would be assured of a growing income in royalties. Under Post Office ownership a deficit on the working of the telephones would probably occur, as has happened with the telegraphs.
4. Direct political control being eliminated, the development of political agitation and pressure on members of Parliament, already an evil of considerable magnitude in the Post Office, would be arrested so far as the telephone staff is concerned.
5. A large body of skilled workers would be employed under conditions promising steady improvement and development with the rise in magnitude of the industry.

The King some years ago said: "Wake up, England!" Lord Furness, in a spirited letter to *The Times* the other day on the commercial future of Great Britain, said: "I cannot resist the feeling that we are half-hearted about it all. We say 'Wake up, England!' and we mean that some other body is to wake up. . . . For an overmastering and consuming passion to capture trade on scientific lines one has to look elsewhere."

Now, on this most important question of the future of the telephone service, I hope the London Chamber of Commerce will wake up, and wake up loudly and quickly and effectively. The telephone service is a great channel of trade and commerce. There is no other means of communication which comes within measurable distance of the rapidity and directness of telephonic communication. In telephone development we have achieved only 20 per cent. of that which we ought to have achieved by this date. That 80 per cent. of un-development represents a vast daily loss to the community in time, effort and money. If the London Chamber of Commerce uses its great influence to prevent the telephone service from being consigned to the stagnation of a State monopoly it will do a signal service to the commercial interests of the whole country. That it will also relieve the political authorities of much embarrassment I believe also to be true, for no sensible statesman really wants to make a huge inflation of the civil service or a great addition to Government trading. The present position is due to a policy of muddle and drift, because no one with a voice to be heard has woken up. But it is not too late to wake up to the realities of the telephone question.

### METROPOLITAN STAFF HOSPITAL COLLECTIONS.

THE third annual general meeting was held at 57, London Wall, on Wednesday, Feb. 1, the attendance being very gratifying from the point of view of enthusiasm and interest, if not in actual numbers.

Mr. Caparn, of the Head Office Stationery Department, who presided, stated his regret that the Metropolitan Superintendent, who had consented to take the chair, was, by his doctor's orders, obliged to abandon his intention and that Mr. Harvey Lowe and Mr. Stirling were also unable to be present through illness.

The report of the hon. secretary for the year 1910 was then read and adopted. This showed the total subscriptions for the year to be £750 19s. 5d., being an increase over the previous year of £35 os. 4d., the benefits issued to the staff and their relatives being 739, an excess of 33 over 1909.

Mr. A. W. Davis, secretary of the Hospital Saturday Fund, with which institution the staff collections are associated, gave a most interesting address, covering details of the work done through the fund during the past year, and much valuable information on some of the vexed questions which arise from time to time between contributors and collectors in connection with letters issued to non-subscribers, the impossibility of preferential treatment at hospitals, and the methods of dealing with complaints made against institutions.

Mr. A. C. Gresning proposed that a very hearty vote of thanks be accorded to Mr. Davis for his attendance that evening, humorously regretting that he was not a "telephone man," since he showed the same enthusiasm and eager propensity to spend his evenings at meetings or studying problems in connection with his daily work. Mr. Davis briefly responded.

The re-election of Mr. J. Leslie as hon. treasurer and Miss F. J. Minter as hon. secretary was then proposed and unanimously agreed.

The re-election of 25 and election of eight newly nominated delegates to the Hospital Saturday Fund was then put and carried unanimously.

With a hearty vote of thanks to Mr. Caparn for presiding, to which he suitably responded, the meeting closed.

The following particulars from the hon. secretary's report are of interest:—

Another record has been established in the collections for the Hospital Saturday Fund. The total subscriptions amount to £750 19s. 5d., being an increase of £35 os. 4d. over 1909, to which the principal contributors were—

	£	s.	d.
Head Office .. .. .	68	10	3
Metropolitan offices .. .. .	71	9	3
Traffic Department .. .. .	302	4	4
Engineers' .. .. .	91	14	0
Maintenance Electricians .. .. .	64	14	1

Thanks are due to the Company for the part they continue to take in their staff's work in aid of hospitals by bearing the working expenses of the collections (thus enabling the actual amount annually subscribed to be paid in to the fund), to Miss Reekie and the organisers of the Bank whist drive for the substantial addition to our subscriptions for 1910.

The total number of letters, etc., issued was 739, showing an increase of 33 over 1909, and forming a record in this respect also.

These were distributed among the following departments:—

Head Office .. .. .	70
Metropolitan Office .. .. .	56
Maintenance Electricians .. .. .	66
Construction .. .. .	30
Engineers' Department .. .. .	133
Traffic Department .. .. .	243
Contract .. .. .	11
Stores .. .. .	69
Metropolitan Workshops .. .. .	14
Necessitous cases outside the staff .. .. .	47

It will be seen that a big advance has been made in the number of letters issued to non-subscribers—an increase of 22 over the previous year. The hon. secretary has no hesitation in stating that these were, without exception, deserving cases.

The following are the members of committees, and against each committee is shown the number of regular meetings which the members are called upon to attend. In addition to these, there are also many sub-committee meetings throughout the year:—

Executive committee (24 meetings yearly): Mr. J. Stirling, Mr. T. Caparn.  
 Finance committee (12 meetings yearly): Mr. J. Stirling, Mr. P. Mantle.  
 Distribution committee (25 meetings yearly): Mr. G. Buckeridge, Mr. T. Caparn.  
 Surgical appliance committee (61 meetings yearly): Miss A. Reekie, Mr. G. H. Wilkinson.  
 Collection committee (15 meetings yearly): Miss E. Richards, Mr. A. Macfarlane, Mr. G. Ruppertsberg.  
 Ambulance committee (12 meetings yearly): Mr. G. Sandell.

### INSTITUTION OF POST OFFICE ELECTRICAL ENGINEERS—METROPOLITAN CENTRE.

THE fourth ordinary meeting was held on Jan. 16, when Mr. L. J. Sell read a paper on "Testing Paper Core Underground Cables during Construction."

At the outset, Mr. Sell enumerated the tests applied during the process of drawing in and jointing of paper core cables. These tests are (1) electrostatic capacity; (2) continuity; (3) absence of crosses; (4) conductor resistance; (5) freedom from contact; (6) insulation resistance; (7) absence of cross-talk; (8) pressure. These are applied at various stages of construction to the three principal classes of cable in use by the Post Office, viz., main trunk cables, subscribers' main cables, distribution cables.

The usual method of taking these tests on single wire, twin, multiple twin, and quadruple pair cables, and the effect of faults on working, were very fully described.

The fifth ordinary meeting was held on Feb. 13, Major W. A. J. O'Meara, C.M.G., R.E., in the chair, and Sir Matthew Nathan, G.C.M.G., R.E., the Secretary to the Post Office, being present.

Mr. E. W. Pettitt read a paper on "Conveying Systems," with special reference to their adaptability for use in post offices.

The paper was of more than ordinary interest, inasmuch as it is now generally known that the authorities of the Post Office have been considering this matter and making experiments in connection therewith for some time past, and there is not much doubt that every effort will be made to instal conveyors in the future.

During the discussion which followed, Mr. H. C. Gunton, Principal Power Engineer to the Post Office, stated that he had visited most of the principal towns in the United Kingdom with a view to seeing whether conveyors could be suitably employed in their respective post offices, and briefly outlined what attention headquarters had given to the matter.

Major O'Meara, in his closing remarks, said that conveyors were very often desirable in cases where the work had outgrown the size of the office, and they might then be installed to save the erection of a larger building. This was one point of view from which the question should be looked at.



## CALL OFFICES WORKED BY ATTENDANTS.\*

By O. ROBINSON, *Inspector, Paddington.*

The call offices in London are divided into three classes, namely: Automatic call offices, attendant call offices where the attendant is *not* supplied by the Company, and attendant call offices where the attendant *is* supplied by the Company.

The latter class, which forms the subject of my remarks, is decidedly smaller than the other two, as will be seen from the following table:—

In view of this fact, there are, of course, only a few points of interest connected with them. However, there are some.

	Total lines.
Automatic pay box .. .. .	2,655
With Company's attendants .. .. .	92
" other .. .. .	215
<b>Total</b>	<b>2,962</b>

Number of separate sites with Company's attendants	19
Principal sites.	No. of boxes.
Piccadilly Circus Station .. .. .	10
Bank (C. & S.L.Ry.) Station .. .. .	7
Monument (District) Station .. .. .	6
Cannon Street (S.E. & C.) Station .. .. .	5
Holborn Station .. .. .	4

The structure of an attendant call office is so familiar to every one that it will be only necessary to describe it very briefly. In most cases there is a row of cabinets at the end of which is placed the attendant's booth. At one exceptionally busy call office there are two booths.

There are some call offices which do not possess a booth at all. As a matter of fact, they have only one instrument and one cabinet each. I refer to three call offices in the Holborn district. They



FIG. 1.—ATTENDANT CALL OFFICE.

are termed kiosks. These are little iron huts built on the side of the road. The attendant stops inside until a caller comes, then waits outside while the caller speaks—a most unpleasant circumstance if the weather happens to be wet—which is a not unusual occurrence in London. The sides of the kiosks are covered with advertisements of different railways.

\* Paper read before London Operators' Society.

The booths are fitted in front with a desk, underneath which is a till. At the back of the booth a locker is placed, usually screwed on to the wall from 2 to 3 feet above the ground. This locker, in many cases, does duty for a seat. A somewhat curious circumstance in connection with these seats is that new attendants, after using them for an hour or so, exhibit a peculiar tendency to stand up at



FIG. 2.—KIOSK.

their work. At the side of the booth, usually the left side, is the attendant's switchboard. This consists of a row of keys, the number, of course, determined by the number of cabinets at the call office. The instrument for the attendant's own use is usually a pedestal set, but in two or three cases the traffic is so heavy that it is impossible to cope with it if the attendant has one hand constantly occupied with holding up the receiver. In such cases a head set is used.

A book, which might be termed a day book, an indelible pencil and a clock complete the attendant's outfit.

Experiments have been made recently with the object of ascertaining the best method of entering the calls in the book. I will describe three methods. The one which was in vogue before the experiments were made and two new methods, one of which was finally adopted.

In the old method directly a call was given in to the attendant he entered the exchange and number on his sheet, simultaneously passing the call to the exchange. When this was done he took the fee and informed the caller on which instrument to speak. He then filled in his sheet—and his counterfoil. The entries on sheet and counterfoil were coincident. On each he entered the exchange and number required, the time, the number of the cabinet on which the caller spoke, and the fee—if the call was effective. If for any reason the call was ineffective it was struck out, and, if the caller waited, re-entered every time it was tried. The disadvantages of this method are obvious. In the first place, the counterfoil was quite unnecessary; it was so seldom referred to that it was practically useless. In the second place, the filling of so many details—ten entries per call—was so long a process that the attendant during a rush had to leave practically everything but the exchange and number and fill them in by guesswork afterwards.

In the two new methods tried the counterfoil is dispensed with entirely.

In the methods of the two which were not adopted every number passed to the exchange was not entered, but only the

ineffective ones. It was considered unnecessary to make a record of the effective ones. The caller had his conversation and the Company had the fee. Nothing further need be said or done over the transaction. Not so, however, with the ineffective calls. A note of these numbers must be kept, because they have in most cases to be tried again. If this were not done it would necessitate the attendant's asking the caller afresh for the number every time he tried it—a process which would rouse the ire of a good many callers. In the money column, instead of the figure 2 being made, a tick is put.

In the method finally adopted the calls are entered just the same as in the old method, but, there being no counterfoil to fill in, exactly half the time is taken over each call. This method is by far the most satisfactory.

Now we come to the most important part of the subject. The attendant call office from the point of view of the public. First of all, let me say, judging from the remarks made by callers, the average caller most certainly prefers the attendant call office to the automatic call office. There are some exceptions, however. One particular class of caller is constantly remarking: "Can't I do it myself," and so on. He seems to get especially particular when he has anyone with him, and still more so if it happens to be a lady. He wants to demonstrate his cleverness. It is really surprising to what lengths some people will go under these circumstances.

There is another class of caller who appears to imagine that the attendant is going to tell every person with whom he comes into contact what number the caller rang up, to whom he spoke and all about his business. He takes it for granted that the attendant listens to his conversation from beginning to end. He will often enquire where the nearest automatic box is on the plea that he wants more privacy.

One section of the public—and it is not so small as one would imagine—is apparently under the impression that the Telephone Company is an institution formed solely for the purpose of swindling it out of twopence. The attitude of this particular caller, if it was not so absurd, would be quite amusing.

In spite of all these, however, by far the greater number of callers think that the attendant call office is a long way ahead of anything else the Company has in the way of public telephones. We often hear said such things as "Oh! I think this is a much better idea; all you have to do is to speak to the people, the attendant gets you on." For business men, too, the system is much more convenient than the automatic box, especially if they want several numbers. They give the attendant the list of numbers, pay the fee, and have the numbers put on to the particular cabinet into which they go, one after another, without having to fuss about getting coppers. Ladies, also, appear to appreciate the attendant's presence very much. One lady is often heard remarking confidentially to another: "You know, I never *could* manage these 'slot things.'"

Some callers just can't get that automatic box out of their minds, and some of their actions in consequence of this are quite amusing. A caller will ask the attendant for a number, put his money on the desk, and when he is advised to go into the cabinet pick up his money again with the intention of putting it in the slot, and does so if the attendant isn't quick enough. Some callers even put the money in after paying the attendant once. This is done in spite of the fact that there are notices stuck in the slot of the money boxes to the effect that the attendant is to be paid.

The funniest case of this kind I ever saw was when one caller, after asking and paying for his call, went into the cabinet and found the busyback on. He immediately started putting pennies in the slot. After he had put *six* in we discovered what he was doing. When asked the reason he said he thought he had to keep putting pennies in until the buzzing stopped!

There is one subject upon which all callers, however much they may differ upon other subjects, seem to agree. It is in their objection to the prepaid call. The one common reason is that they don't like to be treated as if they intended to get out of paying at every opportunity that presented itself. They admit that there are some people who are always on the look-out for a chance to do so, but they claim that the average caller is quite honest. Many of them take it as an insult when the attendant asks them for the fee

before he allows them to speak. Some even get quite angry and threaten to write in to the Company about what they term the attendant's insolence. A caller will often say, "When I go into a shop for anything they don't ask me to pay before I have what I ask for." They hold that it is not in accordance with the ordinary laws of business to charge a man before he has his goods. "A man," they say, "never expects to have his bill paid before he delivers his goods." Regular callers especially object to it. When a caller comes every morning in the week for his number or numbers he doesn't like to be asked morning after morning for his money in advance. One will often say, "Surely you know by now that I don't intend to go away without paying." It places the attendant in a very awkward position; he requires all his tact to smooth the callers over. A big percentage of the callers are regular ones, so it is easily understood that a lot of unpleasantness is caused by the enforcement of the rule. At busy call offices the calls must, of course, be prepaid to preserve order, but, personally, I think that if the attendant was allowed to use his own discretion a tremendous amount of unpleasantness would be avoided. Most of the attendants hold this view.

There is another important part played by the attendant with reference to the public—that of educator.

The ignorance of the general public on telephone subjects is surprising. A very common idea people have about the exchanges is that the operators are having tea all day, and only get up to answer a call when the bell rings. A very large percentage of callers have either never used a telephone before or have only used one on very rare occasions. These people, for some unaccountable reason, get horribly nervous when speaking on the telephone; they perspire and fidget about in the cabinet the whole time they are speaking, and emerge therefrom in a state of semi-collapse. Before they go into the cabinet they ply the attendant with numerous questions, and when they get inside forget every word he has told them. A very common mistake is to take the instruments for speaking tubes, speaking into the transmitter and then turning the ear thereto and listening. On such occasions a caller will come out of the cabinet and want to know why he can't get on. Some go still further. I had a taxi driver once who, after looking at the instrument for about two minutes, unscrewed the mouthpiece and put it to his ear.

These are the kind of people whom the attendant has to educate chiefly, but there are, of course, many points on which the rational caller desires enlightenment.

The last point in connection with the public about which I wish to speak is advertisement. The call office is, I think, one of the best ways of introducing the telephone to likely subscribers. If a non-subscriber goes to a call office and is connected to his number smartly he begins to think the telephone is an extremely good investment. In this connection operators should realise that every time they advise a caller "No reply" the Company loses *2d*.

Now just a word in closing about the attendants. All that is necessary I think to say on this point is that the attendants as a whole do their best for the Company.

The position of call office attendant is not at all an unpleasant one to hold, though, of course, it has its drawbacks.

I will close my remarks by saying that, in my opinion, if employees generally were treated with the consideration with which the Company's attendants are treated by the authorities over them we should hear a lot less about labour unrest than we do at present.

[As regards payment for calls in advance, it was pointed out in the discussion which ensued on Mr. Robinson's interesting paper that payment for railway and all kinds of public service is invariably made in advance. Moreover, the present system is more satisfactory to the attendant, as he would feel morally responsible for all defaulting callers' fees under a system of payment in arrear.—Ed., "N. T. J."]

"Local Office Work."—The writer of the paper published in the January issue should have been described as "W. A." instead of "W. H." Taylor. The paper was read before both the Cheltenham and Bath Telephone Societies.

## GLASGOW NOTES.

ANOTHER step towards the unification of the system. The transfer of the Company's subscribers at Springburn Exchange to the new Post Office Exchange has been fixed for Saturday, March 18. About 150 subscribers are involved.

THE fifth meeting of the Telephone Society, Glasgow and West of Scotland districts, was held in the Lecture Hall of the Technical College on Friday, Feb. 8, Mr. C. J. Millar presiding. Two papers to be submitted for the Head Office premium competition were read, one by Mr. H. C. Sutherland, entitled "Steel Suspenders," and the other by Mr. J. D. C. Mackay, entitled "First Account to Dividend." The writers dealt with their subjects in an interesting manner, and after answering a number of questions which were put, were accorded a hearty vote of thanks. Thereafter an adjournment was made to the refectory.

THE members of the staff and friends of Tron and Gorbals Exchanges held their annual dance in the Trades Hall, Glassford Street, on Jan. 21, when about 72 couples were present. A most enjoyable evening was spent.

THE National Telephone Society, Glasgow and West of Scotland districts, have lost yet another office bearer, Mr. J. K. Murray, secretary, having been appointed to Inventory duty at Head Office. In order to fill the vacancy, a committee meeting was held on Jan. 26, when Mr. G. C. Dewar undertook to accept the joint duties of secretary and treasurer for the remainder of the session.

WE regret to record the death of Mr. John Fullarton, who was for about seven years an employee of the Company. The deceased, who was of a quiet, unassuming disposition, left the service some months ago, and had been in indifferent health for some time back.

THE fifth meeting of the National Telephone Operators' Society and Club was held on Wednesday, Feb. 15, in the Masonic Halls. This meeting was one of the red-letter nights of the club, the society being favoured with the presence of Mr. Napier, of the Engineer-in-Chief's Department, who delivered a very interesting and instructive paper on "Traffic," which was illustrated by lantern slides. The lecturer dealt with the standardisation of operating methods and the advantages to be gained by a knowledge of the reasons for doing things in a standard way, as well as the careful execution in the manner laid down. Owing to shortage of time, discussion had to be foregone, but Mr. Valentine, District Manager, who was present, made a few remarks touching on the advance in operating methods and taking a peep into the future with its probable advancement along semi-automatic lines. At the conclusion Mr. Napier was accorded a very hearty vote of thanks. Thereafter the social and musical part of the programme was proceeded with. The punctuality prizes for the evening were won by Miss M. Kinloch, City Exchange, and Miss E. M. McKenzie, Royal Exchange.

WE are looking forward with some pleasurable anticipation to Friday, March 3, when what may be the last Glasgow dinner during the Company's term will be held in the Grosvenor Restaurant. This dinner has come to be regarded as a Scottish function owing to the satisfactory attendance from other centres. There are special features this year which will no doubt bring a good attendance.

A VERY severe storm of wind and rain visited these parts on Thursday and Friday, Feb. 16 and 17, this being the worst which has been experienced since 1904. It is satisfactory to report, as a feather in the cap for the Engineering Department, that little damage to the plant was sustained, only odd wires in various parts of the district being broken down.

IT is with regret that we record the serious illness of Mr. C. T. Grant, a friend of the Company in Glasgow, who has rendered useful service. The best wishes of the staff are extended for his speedy recovery.

THE golfers in the district are again getting into trim. The opening meeting of the club will take place on Saturday, Feb. 18, when Carnynte will be the venue. So far the number of entrants has not come up to last year's figure, but this is accounted for by a number of the enthusiasts being absent on Inventory duty.

THE members of the staff and friends, numbering about 1,000, visited the Theatre Royal Pantomime on Friday, Feb. 3, Harry Lauder being the premier attraction, the pit and upper circle being reserved for the company on that occasion. The night unfortunately was of a rather unsatisfactory character, the city being enveloped in fog. This, however, did not militate against the enjoyment of the audience.

THE members of the Hillhead Exchange and friends held their "At Home" in the Charing Cross Halls on Saturday, Jan. 21, when about 75 couples were present.

## BOLTON DISTRICT BENEVOLENT SOCIETY.

THE annual meeting was held at Hamer's Commercial Hotel on Thursday, Jan. 26, Mr. A. C. Haley (the District Manager) being in the chair. The chief business was the election of officers. Mr. Haley was re-elected president for the ensuing year, Mr. Fallows treasurer, and Mr. J. Turner hon. secretary. The accounts showed receipts of £58 14s. 6d. and a balance in hand of £17 2s. 11d.

## IRON IN ITS RELATION TO ELECTRICAL ENGINEERING.\*

BY THOS. PETTIGREW, Glasgow.

A CERTAIN famous scientist once remarked to an audience that of all the many wonderful substances in nature, perhaps the most wonderful of all was water. A moment before the lecturer had held his audience enthralled by his lucid and fascinating explanations of many scientific phenomena, and the remark seemed to suggest a sudden fall from the sublime to the ridiculous. The audience did not seem to take the remark seriously, but as the lecturer proceeded to open up the subject, it was borne in upon every listener how very much was wrapped up in the remark, and how very little heed we gave to seemingly commonplace substances and materials.

Water is so very closely associated with our very existence that we entirely fail to appreciate its very remarkable characteristics, and if we follow for a moment along the lines of the lecturer's explanations, it will show the truth of this remark:

Water is a necessity to animal and vegetable life. It is a colourless liquid. Its liquid state is maintained through a wide range of temperature—viz., from freezing to boiling point.

At low temperatures water freezes. The liquid becomes a solid. In the transition stage a sudden expansion takes place, and ice is some 10 per cent. greater in volume than an equal weight of water. The expansion is wellnigh irresistible, and is the cause of a tremendous amount of damage to water pipes, etc., when a severe frost sets in; but it is also a very wonderful provision of nature for the preservation of the fish life of our lakes and rivers, as ice, being some 10 per cent. lighter than water, is formed on the surface; and, further, the water under the ice is some 7 degrees warmer than ice, i.e., is about 39° F.

Under different circumstances water in the form of vapour in the air becomes frozen, and the beautifully light, soft and fleecy snowflake is formed. Every snowflake is a wonderful construction of beautifully designed geometrical figures, and it is significant to note that every design is hexagonal.

When water is heated, it finally boils and gradually disappears in the form of vapour. The temperature of boiling point depends upon the atmospheric pressure. At sea level it is higher than in the rarefied atmosphere at the top of a high mountain. When we confine this vapour as in the steam boiler, it becomes absolutely invisible.

Ice and snow are melted and become water by the absorption of heat.

Steam and vapour are condensed, and in coming back to the form of water deliver up heat.

These few facts do not by any means exhaust the wonders of water, but two more must suffice.

Water is incompressible. It is, therefore, very widely used in hydraulic machinery. Under pressure and confined, water may be said to be a liquid solid, as it is capable of doing work even through long and intricate passages in machines.

Lastly, water consists of two parts of hydrogen to one of oxygen in chemical combination. By electrolysis we can break up the water into its elemental gases. In these proportions the gases form a very violent explosive, and if ignited water is again formed.

The gases can be united to form water without explosion or noise, by using each gas as the plate of a "gas" battery.

Sufficient has been said to indicate how very true it is that we pay very little heed to many commonplace things, which, when looked into, prove to have remarkable and wonderful characteristics.

And now you may ask, What has all this to do with telephone work? My reply is—nothing. But we may ask ourselves, Have we any material or substance in common use in telephone engineering, which is very commonplace, and is so widely used that, like water, we merely accept the fact, and pay no more heed to it?

\* Prize paper read before the Glasgow and West of Scotland Telephone Society, 1909-10.



I venture to think we have, and were the supplies of that material to fail it would be nothing short of a universal calamity. The material I speak of is IRON.

Iron is the most wonderful metal we have. Man has used it in the construction of articles for ages, but we have to come down to modern times for its more extensive application. Write the story of the gradual expansion of the use of iron and steel during the last two centuries, and you write the history of the civilised world.

Think of the manifold uses of iron and steel at the present day!

Think of such monumental works as the Forth Bridge, the *Lusitania*, the *Dreadnought*, the modern naval gun, the locomotive and motor car, etc. Then consider the development in the production of the small article, such as the needle, the pen point, the ordinary nail, etc., etc., and the imagination simply staggers under the immensity and comprehensiveness of the development of the scientific application of iron and steel.

That immense industry embraced under the head of electrical engineering exists because iron exists and depends for its very existence on the supply of iron.

Now we all know that iron and steel are employed on structural work because of the enormous strength of these particular metals, but that does not explain why iron should be of such vital importance in electrical engineering. Practically every piece of apparatus which goes to make up that elaborate structure—the modern telephone exchange—has certain vital parts constructed of iron. From this you will conclude that iron must possess some valuable property or power which is absent from other metals.

It is to this peculiarly valuable property of iron that I want to direct your attention to-night, and, as the magnetic field may be said to be the fundamental basis of electrical engineering, I need offer no apology in bringing such a subject before you, especially as we are very apt to underestimate the importance of the part played by iron in conjunction with the magnetic field, and to accept as a matter of course the various results obtained.

We are all more or less familiar with the ordinary permanent magnet which can be bought for a few pence, and who amongst us has not at some time in his boyhood possessed a knife the blades of which would attract needles, pen nibs, etc., to the envy of his boy friends who were not so fortunate?

The knife was, to speak scientifically, permanently magnetised. Later we shall see what this means, and what conditions are necessary to bring it about.

The ancients knew of the lodestone, or natural magnet, an iron ore which exhibited magnetic powers found in central parts of Asia, and the history of the magnet is an interesting story, but we have not time to touch upon that phase of the science. The discovery of the electro-magnet in modern times gave great impetus to experiment and research, and when Faraday discovered electro-magnetic induction great possibilities were opened up. This was the birthday of electrical engineering, and if, as is the popular cry, electricity be still in its infancy, it is at all events an exceedingly well-developed and vigorously healthy child, and bids fair to be an enormous giant when maturity is reached.

Faraday did not rest content with the mere discovery of something novel and startling, but by patient investigation and laborious research, succeeded in establishing certain laws governing the various phenomena, and in formulating a theory to account satisfactorily for the various observed effects.

Faraday's laws form the fundamental principles of electro-magnetics, and it is absolutely necessary that we know something about them if we wish to take an intelligent interest in our work. Let us for a moment then touch upon Faraday's laws, and by experimental illustration show that the facts as laid down are correct.

First, when an electric current flows along a conductor, that conductor is surrounded by magnetic lines of force. They spring into existence with the start of the current, and are withdrawn when the current ceases to flow. So long as the current is steady the field round the conductor is steady, and it changes in value with a change of current strength. A reversal in current direction reverses the direction of the lines of force.

The second law is that if a conductor cuts, or is cut by, magnetic lines of force an E.M.F. is set up in that conductor.

To show that it is not necessary to have mechanical motion if the field is varying or alternating, connect two coils of wire, one to a galvanometer and the other to a battery.

If now our conductor be formed into a helix, the magnetic field will become much more concentrated than when the conductor was straight, and such a helix carrying a current shows all the properties of a magnetic needle.

And now we come to a most astonishing effect. If an iron core is inserted into the helix, although other conditions have not been altered, there is an enormous increase in the effect; in fact, the magnetic effect may be increased a thousandfold or more.

On this wonderful property of iron is built the vast industry of electrical engineering. Man has done nothing to the iron to give it such powers—the property is the work of nature.

Many theories have been advanced in explanation of the phenomenon, but the theory held at the present day is due to Professor Ewing, an illustrious Dundonian, than whom no one has given more study to the magnetic field.

The theory is simple, is very interesting, and will repay our study for a few minutes before proceeding further.

*Ewing's Theory.*—Iron in the mass is built up of molecules each of which is a natural magnet, is pivoted at its centre, and is capable of movement like a compass needle. The molecular magnets under natural conditions form themselves into closed magnetic chains or groups, are in a state of equilibrium and show no magnetic effect external to the mass of iron.

Consider now what happens to an iron bar when it is placed inside a solenoid and subjected to the magnetising force of an electric current, first of low value, then increasing step by step until a certain limit is reached.

The lines of force due to the current immediately thrust themselves through the iron bar from end to end. The molecular magnets are now subjected to two forces.

The first due to the controlling action which each group of magnets exerts on its component members, tending to preserve the symmetry of the group. The second due to the lines of force produced by the exciting coil tending to overcome the first force and deflect the molecular magnets so that they may take up a position with their N. and S. poles lying along the lines of force, *i.e.*, pointing towards the end of the bar.

The magnets actually take up a position which is a resultant of the two forces producing distortion.

The iron bar will, under such conditions, exhibit low values of magnetisation and if the current be cut off, will cease to show magnetic powers. This is accounted for by the fact that the molecular magnets were only deflected out of their original position, were in an unstable condition, and returned to their original formation with the removal of the disturbing force. This is known as the first stage of magnetisation.

A most remarkable change takes place when the magnetising force is increased to a certain value. The lines of force begin to exert an enormous influence on the groups of molecular magnets. The controlling influence of the group on its individual members is overcome; by the directing influence of the lines of force, the molecular magnets are forced round on their pivots, and take up a position with their N. and S. poles lying along the lines of force. This is known as the second stage of magnetisation, and throughout a fairly wide range of magnetising forces, small increases in these forces produce very large increases in the resultant magnetisation values.

A point is reached where comparatively large increases in the magnetising force show relatively small increases in the magnetisation, indicating that the groups of molecular magnets are all pretty well broken up, and that the increase is due to a more perfect alignment of the molecules generally.

The iron is then said to be approaching saturation. This point is reached in wrought iron about B (*i.e.*, the density of magnetisation) = 16,000 — 17,000.

It will be evident that if we can measure the magnetising force of the solenoid, and the value of the resultant magnetisation in the specimen, and if we can make a succession of these observations, beginning with low values and gradually increasing the magnetising

current step by step to a maximum, we shall have all the necessary data to plot the results graphically.

In practice a given specimen is tested through a complete magnetic cycle. This means that the specimen is tested from zero magnetising current, by gradually increasing steps, to saturation, and then by gradually decreasing the magnetising current, to zero. The current in the magnetising coil is then reversed and the same routine is gone through. At each step a careful note of the magnetising force, and the degree of magnetisation obtained, is made. The data enables us to plot a full characteristic curve for the given specimen under test. Fig. 1 shows such a curve.

B is the density, degree of magnetisation, or number of lines of magnetic force per sq. cm., often referred to as the "magnetic induction."

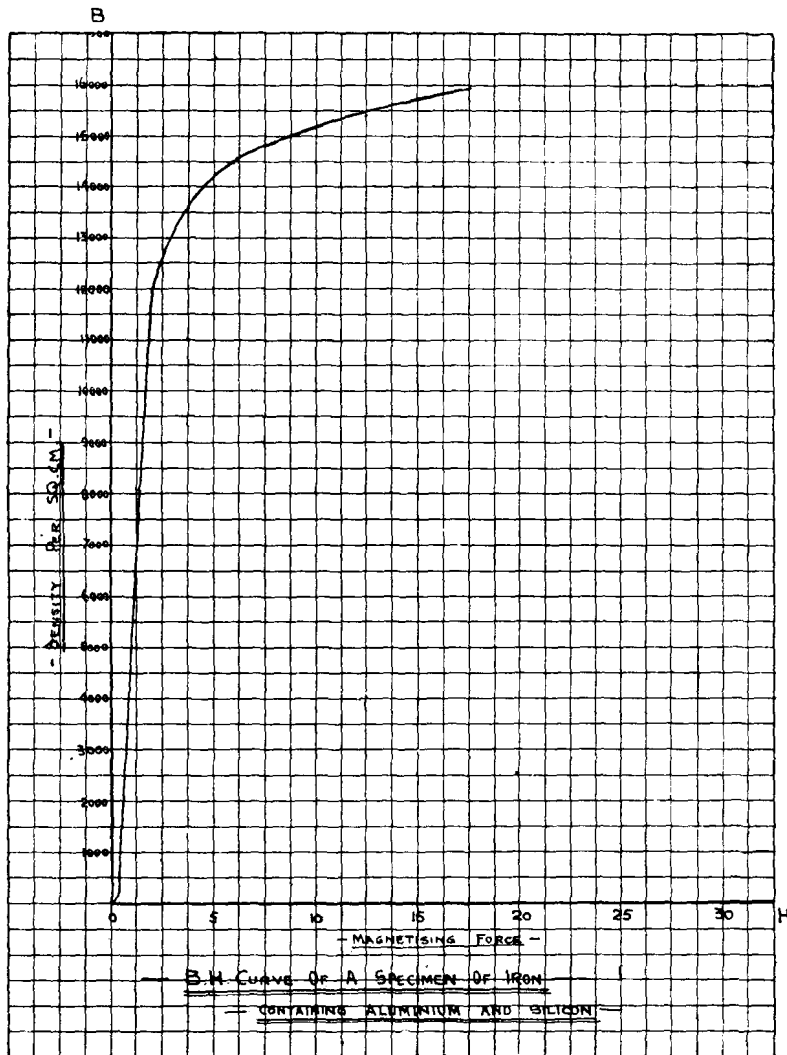


FIG. 1.

H is the magnetising force which was applied to obtain the corresponding value of B and is a measure of the number of magnetic lines of force which are produced by the magnetising coil when there is no core. H is calculated from the formula—

$$H = \frac{4\pi n C}{10 L} = 1.257 \text{ ampere turns per cm. of length.}$$

The junior members would find the following a profitable exercise:—

Plot out the data for a good average specimen of iron on a sheet of squared paper, and add the following extra particulars, viz.: Calculate out the pull in lbs. at the various densities per sq. cm. and per sq. in., and fill in the curve.

H, the magnetising force, can then be modified to show also the number of ampere turns per cm. and per inch of length.

The curve will then be found to be very useful indeed.

The B H curve shows very clearly the three stages of magnetisation as outlined in Ewing's theory.

*First Stage.*—The value of B is practically proportional to the value of H. This portion of the curve is of great importance to telephone engineers.

*Second Stage.*—Small increases in the value of H are accompanied by very large increases in the degree of magnetisation. This portion of the curve is of great value to designers of alternating current apparatus.

*Third Stage.*—The curve bends over with a kind of knee, and thereafter rises but slowly, indicating the approach of saturation. This portion of the curve is of importance to designers who have to provide a steady field, not subject to much fluctuation with change in current strength, as in continuous current machines, etc.

*Hysteresis.*—Notice particularly in the B H curve that when the magnetising force is gradually withdrawn, the magnetism tends to remain. There is a resistance to change in magnetic condition. The iron does not demagnetise along the line of magnetisation, but lags behind the magnetising force. Professor Ewing first discovered this effect, and gave to it the name of "hysteresis."

The complete loop obtained as the result of a test through a complete magnetic cycle is known as the "hysteresis loop," and its area is a measure of the energy expended in carrying the iron through that cycle. The energy so expended goes to heat up the mass of iron, and is therefore wasted; hence where rapidly varying or alternating currents are to be used, it is imperative that a very good brand of iron, with low hysteresis characteristics be employed, if reasonable efficiency is required. This is specially the case in telephone apparatus carrying speech currents, which have a frequency of 800 per second, i.e., the iron is carried through 800 magnetic cycles in one second, and, of course, the loss of energy is 800 times the area of the hysteresis loop for the particular brand of iron at the corresponding working density.

It is necessary also that in such apparatus iron wire cores be employed instead of solid iron cores. The reason for this will be made quite clear by reference to Faraday's law, which tells us that if a conductor cuts, or is cut, by magnetic lines of force an E.M.F. is set up in that conductor. Now, where an E.M.F. exists a current will flow, provided there is a path available, and, of course, in a solid iron core a very low resistance path is presented, and parasite currents, known as Foucault or eddy currents, will flow in the core at right angles to the lines of force producing the E.M.F. These currents are effectually prevented by using fine iron wire for the cores.

Their effects are harmful, of course, the efficiency of the apparatus is cut down, and the iron becomes heated as the result of their existence.

If we rotate a magnet close to, but not touching a pivoted copper or brass disc—the disc will revolve in the same direction as the magnet—the magnetic lines of force cut the copper disc, set up a drag and so produce motion.

A second experiment will show how very powerful the effects of eddy currents may be. A copper disc is introduced between the pole pieces of a powerful electro-magnet, and is rotated by a weight, acting on a string, wound on the spindle carrying the disc. When there is no magnetic field the weight descends very rapidly and drives the disc at a high speed, but when the current is switched on the copper disc becomes a powerful brake, due to the drag produced by the disc cutting the lines of force. So heavy are the eddy currents that the copper rapidly becomes too hot for handling.

I direct your attention now to Fig. 2, where B H curves for wrought iron, cast iron, and hard steel are shown, and after what has been said their main features ought to call to your mind some of their special characteristics.

These curves are to the designer something like what the indicator curve from an engine is to an engineer—not quite that, but the parallel conveys the idea of their usefulness.

Let us examine the curves for a moment, and, without doing more than simply touching on the subject, see what they convey to us as regards the characteristics of each metal and its suitability for certain specific purposes.

*Hard Steel Curve.*—The shape of the curve suggests stubborn characteristics. The metal is exceedingly difficult to magnetise, but what is more important still, it is also very difficult to free it of

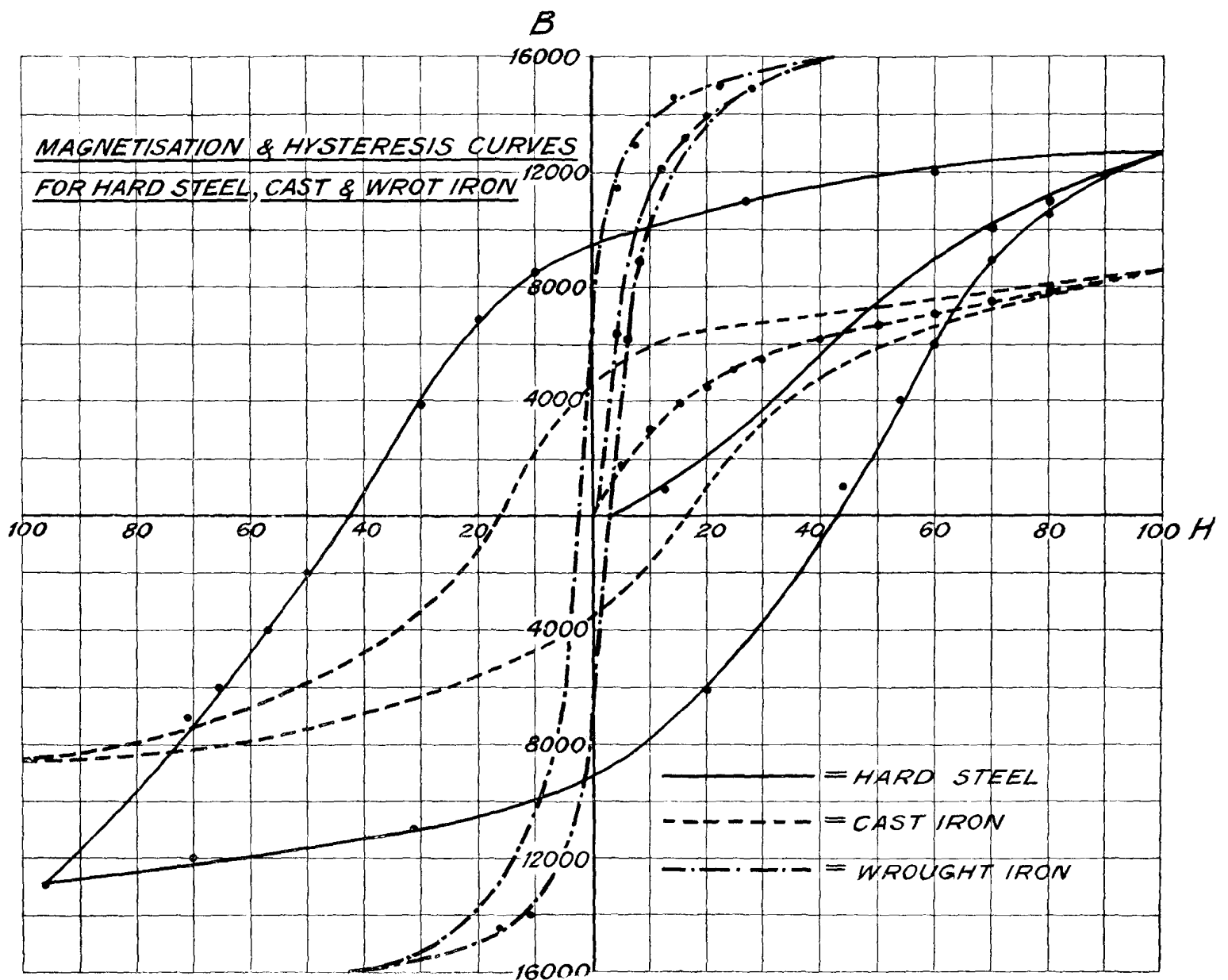


FIG. 2.

magnetism—a valuable property for permanent magnet work. There is good reason to believe that tempering is in some measure responsible for this peculiarity. As you are all well aware, when steel is being tempered it is heated to a bright red, allowed to cool till a certain colour (red, orange or straw colour) shows up on the surface of the metal, and then it is plunged into oil, hot or cold water, or mercury. The sudden cooling causes the surface of the metal to contract, so setting up severe internal pressures, which force the molecules in the mass into very intimate contact with each other. It is reasonable to suppose then that molecular friction is at its maximum, and that it will be difficult to move them out of position. That this is so is fully borne out by the B H curve.

It is interesting to note that very good magnets are made by submitting the hot metal to severe pressures in cooling, at the same time subjecting the metal to a powerful magnetising force.

**Cast Iron Curve.**—The metal shows fairly good magnetic characteristics. For ordinary magnet work, where weight and space occupied are not of first consideration, cast iron is very widely employed. Very clean castings can now be got and machining is cut down to a minimum. The metal is therefore very widely used for motor and dynamo field magnet yokes, etc.

Obviously, however, it would be folly to employ this material on alternating current apparatus on account of its high hysteresis loss, etc.

Very little, if any, cast iron is used on the magnetic circuits of telephone apparatus, always excepting, of course, the power machinery.

**Wrought Iron Curve.**—This curve indicates that in wrought iron we have a material showing all-round excellent magnetic qualities. It is very widely used in telephone work. From the core of the induction coil to the armature of the power generator every piece of iron required for magnetic purposes in the telephone exchange is wrought iron.

The curve shows us why this is so, and we note the following important features:—

- (1) Low magnetising forces produce good magnetic results.
- (2) Moderate forces give much higher magnetic results with wrought iron than with cast iron.
- (3) The hysteresis loss is low, as can be seen by the loop area being small.

(To be continued.)

# The National Telephone Journal.

"BY THE STAFF FOR THE STAFF."

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VOL. V.]

MARCH, 1911.

[No. 60.]

## A "TELEPHONE AUTHORITY."

AT a special meeting of the London Chamber of Commerce recently held, Mr. HERBERT LAWS WEBB read a paper (which we publish in this issue) proposing an entirely new solution of the telephone problem as regards its future administration and development. As is generally known the consummation of the agreement of 1905 which will place the whole telephonic service of the country under the control of the Post Office is rapidly approaching, although we have heard alternative suggestions mooted for dealing with the question by partial or complete municipalisation or by an extension of the National Company's license. The time, however, to the end of 1911 is short and several steps in the direction of absorption by the Post Office have already been taken.

The new solution which Mr. WEBB proposes is no less than the constitution of a telephone authority (on the lines of the Port of London Authority) which would assume control of the telephone systems not only of the Company but also of the Post Office and the two municipalities whose undertakings have survived competition.

The reading of the paper was marked by murmurs of assent and the criticisms upon it by members of the Chamber were all sympathetic. It is at least refreshing to find the largest Chamber of Commerce in the kingdom more interested in the future development of this all-important service than in the telephone rates of Norway and Switzerland, which seem to exercise the minds of many of the chambers and governing bodies to the exclusion of all other considerations.

"Let the telephone flourish!" is the sincere aspiration of those enthusiastic telephone men who constitute the bulk of our readers, and any scheme bearing on the development of the great industry in which their careers are bound up must naturally come in for

discussion in these columns. The project laid before the chamber of commerce is so far-reaching in its scope and so full of the most interesting possibilities that we cannot well avoid giving them some consideration.

In the first place, such an authority as that proposed, being of semi-commercial and semi-governmental constitution, would aim at combining the merits and avoiding the defects of both *régimes*, and would at least ensure that the telephone was not only self-supporting, but that it paid its way and contributed to the revenues of the State.

For this reason it would, in the second place, more easily command that free and liberal flow of capital which we have always maintained is vital to the development of the telephone industry than could an ordinary Government Department whose finance is circumscribed by the restrictions of the Treasury.

In the third place, an enormous belated expansion of the telephone in these islands, coming like a flood bursting its artificial dam, would mean unlimited possibilities of increased employment and advancement as the industry rapidly assumed its natural and legitimate dimensions.

The suggestion also has its advantages on the score of expediency, for it would ensure the great and indisputable advantage projected by present plans—that trunk wires and all exchange systems of every description would form a homogeneous whole under one control. Moreover, the vast and complicated labours of the two Inventory staffs now proceeding would in no wise be thrown away, for while it may be a matter of indifference to the National Telephone Company who its successor is to be, the purchase price of its plant will have in any case to be fixed.

## SOME REMARKS ON VOLUME V.

THE JOURNAL has now completed its fifth volume and with the April issue will enter on its sixth year. Whether that volume will run its normal course, and whether it will be succeeded by others, are matters which lie "on the knees of the gods." At all events, it has proved its usefulness by its success, and may be claimed, as the advertiser puts it, to "fill a long-felt want." Certainly the ever-increasing circle of subscribers at home, abroad and in the colonies bears witness to its value as a telephonic as well as a staff journal. We have endeavoured to leave no branch of the telephonic art untouched, ranging from articles on problems of transmission to practical questions of pole erection and underground construction, from complicated traffic studies to general remarks on exchange supervision, from the eternal rate question to light articles of the most varied description. We have kept close watch on telephonic politics and development at home and abroad, dealt with many questions affecting the education and advancement of the staff, and our correspondence columns (always open to the discussion of all problems relating to our work) have often yielded valuable opinions and criticism. At the same time we have not omitted to record the social doings of the staff, their progress in the service and their successes in examinations and in other connections.

We are glad to say that the field of our contributions continues as wide as ever. During the past year the principal articles (excluding editorial matter) were supplied by the following centres:—Head Office between twenty and thirty contributions; London

between fifteen and twenty; Glasgow and Bristol between five and ten; Sheffield, Gloucester, Edinburgh, Liverpool, Birmingham, Nottingham, Oldham, Hull, Bath, Margate, Leicester, Chester and Maidstone under five.

There is every indication that the sixth volume will not fall behind the others in interest or range of subject, and we rely on our readers to aid us, as they have in the past, in making the JOURNAL as complete and thorough a record of British telephony as possible.

### NOTICES.

Reproductions of the portraits of Messrs. C. C. Worte, C. W. Salmon and W. F. Taylor are now ready, and those of Messrs. J. Sinclair Terras and Alan Roberts are on order, price 6*d.* each. Portraits of nearly all the series of telephone men are in stock.

Binding cases for any volume of the JOURNAL are also obtainable, price 1*s.* 6*d.* each.

### HIC ET UBIQUE.

LIKE the law the telephone is long-armed. Unlike the law, happily it is not slow-footed but practically instantaneous. Two recent testimonies of its rapidity in overtaking the evil doer are the following. The first from a Wolverhampton subscriber:—

I have to thank you for your prompt attention to my telephone call from Graiseley at four o'clock on Saturday morning which enabled the police to get down to my house in time to arrest a man who was taking a particular delight in breaking my windows all round the house.

The second from Hull:—

I may add that, thanks to the telephone, we had a burg'ar caught here a little while ago. He had ransacked about five houses and attempted to get in ours, and the police were up in five minutes after we had rung up at three in the morning!"

BUT the "Slave of the Ring" also protects its mistress—if we may so style the operator—by swift and sudden intervention in orthodox *djinni* fashion, as a young man in Birmingham recently found to his cost. Using offensive language to an operator in the vain belief that he was protected by distance, and that his identity was safely hidden, he found himself kept in conversation by the operator while she telephoned for the police, and the result was a fine of 2*0s.* and costs.

THE German Telephone Rates Bill is referred back to the Budget Committee. This, says the *Zeitschrift für Schwachstrom-technik*, in the present Parliamentary position means that it certainly will not come up again in the Reichstag during the remaining days of the session. As new elections are expected, the present Bill would appear to be dead.

OUR Bolton correspondent sends us the following illustration of the local idea of "improving the shining hour":—

A few of the operating and electrical staff were invited to a small party. Whilst the customary musical and other entertainments were going on and gaiety was in the ascendant, one of the electrical staff was observed to be in earnest converse with the host. One subject only, it was assumed, could be so interesting—telephones. This was Friday evening. The upshot of the conversation was that a contract was signed on the Saturday. Sunday with its calm for Christians, telephone men and others, intervened, and Monday saw an additional subscriber.

### ANIMAL FOES OF TELEGRAPH AND TELEPHONE.

(Translated from an article "Der Telegraph und die Tierwelt" in the "Zeitschrift für Post und Telegraphie," by W. H. G.)

THE length of telegraph wires in the world now reaches more than 8,000,000 km., but in uncivilised countries this victory was not easily won, and great was the number of enemies who again and again disturbed, and still disturb, newly laid wires. Not only have uncivilised peoples destroyed in blind vandalism skilfully erected plant, but the animal world also has placed some heavy difficulties in the way of extending the telegraph, and is, even to-day, not

seldom the cause of bad disturbances. An obstinate enemy of the telegraph, above all, was the elephant. A French weekly journal, which devoted an article to these animals in this connection, related how the mighty pachyderms repeatedly tore the telegraph poles out of the earth with their trunks and caused general destruction. What instinct did the elephant follow in this? Was it hatred of the unaccustomed? "The last word on man will be spoken one day," so says an old Hindu writing, "but never the last word on the elephant." But almost worse were the disturbances caused to the first lines in India by the buffalo. With lowered, threatening head he charged against the poles, and those which did not yield to the first assault succumbed to the second.

In North America the cave-dwelling animals have occasioned engineers and electricians many troubles. Especially the armadillo, the wild hare and the skunk, which make their caves at the roots of trees, chose the telegraph poles for their burrowings, delved their subterranean passages and brought about in course of time the fall of the poles. The bears in Norway were at feud with the telegraph; the humming of the wires led them to believe that the poles were the headquarters of bees, and they pursued that enticing goal. Their longing for honey gave rise to fresh destruction. But the shaggy dwellers in the forest learned by their disappointment; the number of attacks on telegraph lines decreased more and more, and eventually the humming of the wires lost its attractive power for Bruin. In Africa and Asia telegraphic wires formed an acceptable gymnastic apparatus for the apes; consequently the wires became broken and deranged, and the routes had to be continually visited to make good the sins of the apes. Most useful of all, however, has this invention of man been to the birds; they find the wires a convenient resting place, as a glance on all sides will prove.

The woodpecker certainly believed at first from the humming of the wires that the telegraph poles must harbour inside a rich booty in insects. With his pointed beak he began to tap the pole, hammering deep holes in the wood often 7 or 8 centimetres wide, but in time he also learned the fruitlessness of his labours and gave them up; he had done enough damage. In America hundreds of poles had to be replaced because the woodpecker had so hammered them that they fell victims to the first storm.

In the insect world the birth of telegraphy was apparently hailed with joy. The wild bees chose the porcelain insulators for their nests, and industriously covered the shining porcelain with a crust of dust to prevent the sun's rays from burning through and then built their nests. Spiders show a special preference for telegraph wires, and often cover the wires with their webs for hundreds of kilometres. In Japan these webs attain such proportions that they deflect the current and hinder the messages. Special officers therefore go over appointed sections to clear away these webs—a work of Sisyphus, for a few days later the industrious beasts have reconstructed the destroyed fly traps and woven new ones.

Not only on land, in the depths of ocean has telegraphy its foes. Above all there is the teredo, which penetrates the cable and in the gutta-percha covering finds a welcome change from the monotony of wood nourishment. The sawfish often causes bad disturbances when in the depths of the sea he sometimes encounters the cable. The hindrance so annoys him that he attacks the cable with his mighty saw and disturbs the line. The submarine cables do not always follow the bottom of the sea, but often stretch from one submarine hilltop to another. This the whales utilise as a convenient means of disembarassing themselves of their troublesome parasites and rub against the cables until mussels, algae and snails are rubbed off. But these submarine toilets have dangers both for the whale and the cable. Sometimes the tail of the former is enfolded in the cable and he cannot free himself. His lot is then suffocation. In July, 1873, during works of repair, several such whales were found which had been caught in the cables as in a sling, and a similar phenomenon was observed in October, 1899, on the Brazilian coast. The cable ship *Viking* tested the cable, and eventually cut it through at the place where the current was arrested. Great was the astonishment when immediately thereupon, as if impelled by some mighty power, the body of a monstrous whale came to the surface of the water. In the interior of the great fish gases had formed which could not disperse and now sent up the enormous body like an air ball.





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## LONDON AND ITS ORGANISATION.

### TRAFFIC DEPARTMENT.

By J. STIRLING, *Metropolitan Chief Accountant*, AND  
 J. F. EDMONDS, *Metropolitan Traffic Manager*.

(Concluded from page 227.)

It would be difficult to over-estimate the beneficial results which have accrued to the service from the work of the observation office since its establishment five and a half years ago. The number of observations dealt with by the central office is about 3,900 per month, and as pointers to causes of weakness or slackness at any part of the system the records taken are invaluable. The general toning up of the service by reduction of irregularities, removal of obstacles to clean operating, and the maintenance of a good average answer and clear, is largely due to systematic observation work and the reliable data which it has furnished as to lines of enquiry and progress. The supervisory staff now appreciate the value of an impartial statement of the work carried out by those they control. At a few exchanges situated at a distance from the central office, and where it would not pay to provide direct junctions, the service is sampled regularly by means of portable observation sets. In addition to the information given on the standard forms, the

observation officer reports on any features of the service which seem to him to call for alteration or investigation, and his experience is naturally of the utmost value to the traffic manager. It is doubtful whether in the past sufficient use has been made of the observation officer's special experience. That experience comes into requisition more and more daily, and many suggestions and investigations have been made with regard to a number of subjects including such matters as the observation of "B" operators' work, the tone adopted by monitors in their dealings with subscribers, the special difficulties introduced in operating by private branch exchanges, the analysis of the "No reply" trouble, and the investigation of the reasons why operators do not repeat calls in the correct manner to subscribers. At the smaller exchanges the service is sampled by two service inspectors, who tabulate the results of calls made by the subscribers in their presence.

Another, albeit more recent factor in general service improvements, is the travelling supervisor. Some time before Head Office decided to appoint these officers throughout the country the system was at work on a small scale in London. The first experiment was made as the result of a discussion on the question of recording fee-paying calls at outlying exchanges. Some ten or a dozen exchanges were picked, and a specially selected supervisor was sent round with instructions to remain in each exchange for some days, and note all that transpired, not only as regards recording, but

everything affecting the service. Her trained and observant eye noted much that was unknown before, with the result that on the conclusion of her series of visits, four permanent appointments were made. Private branch exchanges engage practically the whole of the time of two of these officers, there being at present 245 operators employed by the Company to work the switchboards at subscribers' offices. In fact, when this special supervision of private branch exchanges is considered in conjunction with the various advantages which result from having trained operators at subscribers' offices, it is a question whether the large telephone users can properly appreciate the benefits to be derived from employing the Company's operators at their offices, otherwise this number would undoubtedly be greatly augmented. Amongst the many qualities required for this special supervision work, not the least is tact in dealing with the staff whose work is to be criticised: the aim of the supervisors must always be to lead rather than drive back into ways of rectitude those who have erred from the straight path of operating regulations. That they do this with both care and discretion the results have amply proved. One other feature of this work which must not be omitted is that it keeps the outlying exchanges in touch with the central office, and removes that feeling of isolation which is so harmful in its tendencies.

The London night service is under the care of the night manager and his assistants. At the small exchanges, where subscribers are few, there is, as a rule, a resident operator, who deals with all night calls. At the largest exchanges, however, a special male staff is employed, supplemented, in some cases, by relief operators drawn from the other departments of the service, and taking duty for not more than two hours per night in alternate weeks. The ordinary night hours vary, as at some of the largest exchanges it is advisable to keep the day staff on duty up to as late an hour as practicable. Each night operator is allowed one night off per week, and to afford the requisite relief, a proportion of the night staff have a scheduled rota of exchanges at which they take relief duty. For sick and special relief work a number of the night operators are allotted to a particular exchange at which to report on duty for instructions, and they are then dispatched to the point at which their services are required. Practically all the cord repairing and routine testing is done by the night staff. The busiest night exchanges are Holborn, to which many of the newspaper offices are connected, and Gerrard, at which the needs of the West End are provided for. The great difficulties of the night service work at large exchanges are that the bulk of the traffic is so slight for the length of time service is required; that it is difficult to arrange for continuous listening on order wires; and that a small traffic spread over a large switchboard has to be dealt with. The last named is, to a great extent, mitigated by the concentration of known night-users on special positions.

Call office success owes much to the fostering care of the Traffic Department. At many of the busy railway and tube stations the Company has its own attendants, who are under the watchful eye of the exchange manager. At Piccadilly tube station there are ten boxes controlled by two attendants. The call offices at the Stock Exchange, Law Courts and Houses of Parliament are similarly controlled. The attendants do not work more than 45 hours per week, and, as several of the boxes are kept open till a late hour in the evening, a carefully thought-out plan of relief is needed to ensure promptness and avoid surplus staff. The automatic boxes at ordinary call hours cause at times some worry to the exchange staff, but not to a great extent, particularly bearing in mind that many of the callers have had little experience of a telephone, and are therefore more likely to do the wrong thing than the right. There are now 3,027 public call offices in the Metropolitan area, and as the average calling rate is steadily rising, the provision of them is evidently appreciated.

Machiavelli's doctrine that "men will always be false to you unless compelled by necessity to be true" is one which, if it applies at all to modern business life, is surely applicable only to a small minority of malcontents, such as will always be found in every community. Most business houses trust their servants and believe in their desire to give of the best they have—ability, effort, forethought—to make the business a success. In that respect an acknowledgment is due to the exchange managers for the

diligence with which they have tended their exchanges and everything appertaining to them, so that the London service might be built up on a sound and durable basis. Their duties and responsibilities have grown with the years, but they have kept pace with the new developments. Exchange management will never become an exact science; wherever the whims, caprices, complaints and mistakes of men and women have got to be reckoned with, rules are of little avail. To control while preserving the respect and confidence of his staff; to gain the goodwill of his subscribers, while not hesitating to point out mistakes on their part; to maintain a service, complaints of which are at a minimum, while keeping in touch with those points of detail in organisation and administration which enable the machine to run smoothly, are some of the chief qualities expected in an exchange manager. The rapid growth of the private branch exchange system in the last few years has, by increasing the number of staff to be provided for and supervised outside the exchanges, and by rendering necessary alterations in method at the exchanges themselves, added a new and uncertain element to the work. It has also become a settled policy in London to encourage direct dealing between the exchange manager and his subscribers regarding complaints, even to personal interviews at the subscriber's office where that seems desirable; as far as possible, the central office does not interfere in such matters, and the result has been less correspondence and more frequent local settlements.



FIG 3.—LONDON WALL REST ROOM.

The selection of supervisors is rightly regarded as of considerable moment. On them the exchange manager must rely for maintaining a high standard of service; from their ranks have to be selected those who are to fill the important post of clerk-in-charge. (A photograph of the London clerks-in-charge at exchanges of over 500 direct lines is reproduced at the top of page 256.) No little care, therefore, is bestowed upon the appointments. The recommendation comes in the first place from the exchange manager, and he is strictly enjoined only to recommend those senior operators whose merit, keenness and general suitability, quite apart from length of service, are such as to warrant promotion. No appointment is made until the nominee has been seen by the assistant traffic manager, and a probationary period of three months, including a course of lectures at the school, and a visit to the observation office, is allowed so that the exchange manager concerned may report as to whether the appointment should be made permanent. A test of fitness, embracing knowledge of "A" and "B" operating, supervising and monitorial duties, possession of initiative and ability of clear expression in reports, etc., must also be passed. The qualifications seem somewhat stringent, but in reality are not so to any operator of intelligence and observation; they have certainly resulted in the pick of the operating staff securing, as is their right, the better and more responsible posts.

The welfare and contentment of their staff must be of the

greatest moment to all employers. The visiting matron provided by the Company does much by her tactful and sympathetic visits to the homes of sick operators, her assiduous care to prevent infection when an operator or any member of her family has contracted illness, and general desire to secure happy and comfortable surroundings for the staff, to foster that spirit of loyalty which is so desirable. Her certificate is accepted in place of a doctor's in cases of minor illnesses; she keeps the responsible officers in touch with their absent staff, and in many cases interests the parents of the girls in the work of the exchange. It is notable that, with so large a staff, there has never been an epidemic of infectious ailments at any London exchange, thanks largely to the care taken in disinfecting and cleansing the premises after any case has been notified. The bright and comfortable sitting and dining-rooms provided, those at the more modern exchanges being particularly deserving of praise, also tend to promote harmonious relations; a rest period spent in pleasant surroundings is necessarily more beneficial than if passed in an atmosphere of dreariness. (Fig. 3 shows the London Wall retiring-room.) The provision of meals on the premises is likewise a great boon, as nourishing food can be got in comfort and at a price which in outside establishments would only procure an insufficient supply of what would be less wholesome and satisfying. The catering is controlled by a committee elected by the girls themselves, all the kitchen staff and utensils being provided by the Company. (The



Gerrard Exchange Kitchen

FIG. 4.—GERRARD EXCHANGE KITCHEN.

Gerrard kitchen is shown on Fig. 4.) Previous articles in the JOURNAL have dealt so fully with the London catering arrangements that tempting as the subject is, it need not be dwelt upon. By means of the Provident Club, thrift and provision for a rainy day are rendered practicable; a small weekly payment entitles to an allowance in case of illness, and the fund is then distributed at the end of the year. The membership at present is 1,410—about 60 per cent. of those eligible. The traffic staff contribute generously to the Benevolent and Hospital Saturday Funds, and some of the exchanges assist various charitable objects in other ways, as witness the Bank Exchange annual series of whist drives on behalf of charities, and the Avenue's annual tea to the poor boys and girls of the East End. Such things add that human touch which brings people closer to each other in knowledge and sympathy than many years of ordinary business relationship would ever do.

Several of the exchanges have interesting associations connected with either the buildings or the sites. "Gerrard" is built on the site of the old Pelican Club; "North" has its inscribed plate recording that Michael Faraday worshipped there when it was a Sandimian Chapel; "Brixton" was once a Christadelphian meeting-place; and "Chigwell" (Fig. 6) is next door to the old inn

around which Dickens has thrown the glamour of his genius in the pages of *Barnaby Rudge*. It is abundantly evident that neither interest nor variety are lacking in our work and its associations.

More and more is the point of view of the subscriber to the telephone exchange changing. At one time the operator was to him a mere piece of machinery, so long as his calls were attended to promptly, and everything went right. When the reply was not so quick as he required, she became a person who occupied her time doing crochet-work or reading novels, an irritating misconception which we find accepted in more than one modern play, but that, of

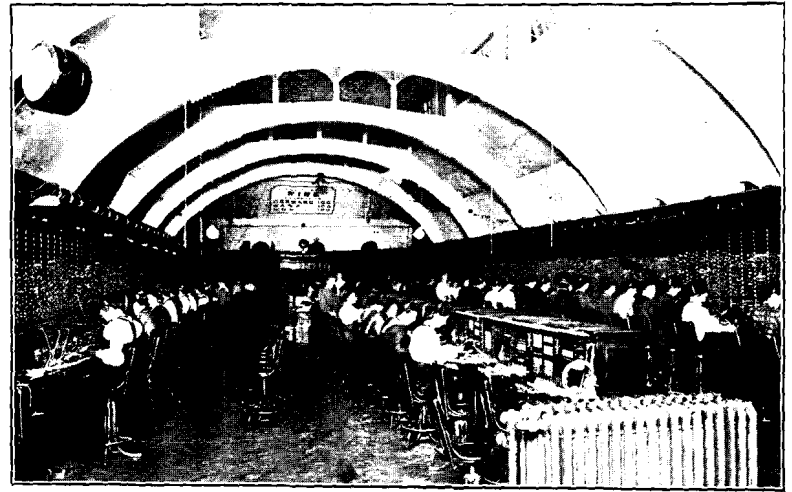


FIG. 5.—GERRARD EXCHANGE.

course, is almost to be expected, as no actor or playwright ever does seem to know how the telephone should be used—on the stage at least. At one time if a number was engaged, the operator, according to the caller, was merely saying so to annoy him, and could not possibly have found out in so short a time; if his instrument was out of order, it was the poor operator again declining to answer his call out of sheer malevolence and so on. To the average subscriber an exchange was a place where numerous



FIG. 6.—CHIGWELL EXCHANGE.

bells were constantly ringing, girls calling to each other in a loud voice, wires stretched all about the room, and a sort of general pandemonium reigning. A visit to the exchange soon dispels all these crude notions, and he realises that he is up against something bigger than he had ever dreamt of. The high pitch of organisation, the quietness with which the work is conducted, the rapidity with which calls can be dealt with and "engaged" tests obtained, the effective supervision, the high level of scientific and administrative

skill which have been reached, are to him amazing, and the impression thus made will have its reflex action in the subscriber's future attitude to his telephone service. Of course, there always will be the type of whom an exchange manager told a story recently: Having a grievance of some sort, the gentleman in question ended up by calling the operator a fool, to which she sweetly replied: "Shall I connect you to the clerk-in-charge?" "No," was the soft answer that came back, "She is a greater fool than you are." "I don't think so," courageously retorted the faithful but guileless operator. Perhaps if we cannot persuade the subscriber that he owes a duty to the Company quite as much as the Company owes one to him, we may in the near future be able to convince him that he owes a duty to himself, and that his business is bound to suffer if he does not see that the telephone requirements at his end—prompt attention, proper method of using the instruments and an adequate number of lines for his work, to mention only three—are carried out in a business-like manner.

One great difficulty in a large organisation always is to keep in touch with the staff, to see that proper instructions are given as to general policy and methods, and that such instructions are understood and carried out. Many decisions must necessarily be in writing, as they apply to all exchanges, are likely to be required for future reference, and authorise a departure from established practice. These are issued in the form of numbered circular letters, and are filed and indexed.

These instructions are supplemented by monthly meetings of exchange managers, at which questions of all kinds affecting the work are raised and discussed. These gatherings are not only of the utmost interest, but have been most useful in securing uniformity of working and the settlement of difficult and disputable matters. Each exchange manager again has regular meetings of his supervisors, at which any weakness in the exchange results is dealt with, and an effort made to find a remedy; new instructions are also talked over with a view to securing co-operation.

One thing is certain—finality in this or any other branch of the telephone business will never be reached. Traffic study and traffic work have been advanced to their proper status, and their exponents have obtained recognition of the claim to rank as the equals of other departments of telephone science. If future progress in all departments of telephone enterprise is to bear even a reasonable ratio to that of the past then the next generation will be witnesses to many marvellous achievements. Even then what rare old Izaak Walton said of angling will be true of telephone study and research: "Angling may be said to be so like the mathematiks that it can never be fully learnt; at least, not so fully but that there will still be more new experiments left for the trial of other men that succeed us."

NOTE.—In the first part of this article on page 225 the number of exchanges in the County of London was given in error as 13 instead of 21.

### THE BISHOP AND THE TELEPHONE.

[The Bishop of Stepney said that he found such things as telephones, taxicabs and private secretaries, instead of enabling business men to get through more work in a given time had really the opposite effect. They had enabled a man to crowd more work into a day and made life more strenuous, swifter and harder.—Daily Press.]

THE Bishop of a hustling world makes moan;  
Shuns (Shade of Penley!) Private Secretaries  
And Taxicabs; and to the Telephone  
Disfavour carries.

The miles and minutes saved, the toil one spares  
Of being to oneself amanuensis,  
Seem to his lordship hustle-weaving snares  
Whence come offences.

But we, enjoying all those spoils of age  
And fruits of time wherewith are stocked life's larder,  
Why need we use our priceless heritage  
To make life harder?

If telephones (and other things) save time,  
Might they not spare us from the toil diurnal  
More time to meditate on the Sublime  
And the Eternal?

W. H. GUNSTON.

### TELEPHONE WOMEN.

#### LXXXVI.—ANNIE CAMERON FERGUSON.

MISS FERGUSON entered the service of the Company at the old exchange, 90, George Street, Edinburgh, in February, 1895. A canopy indicator board was in use at that time, and the switch-room was in charge of Miss Johnson, now clerk-in-charge at Edinburgh Central. That switchboard was replaced shortly afterwards by an upright hand-restoring indicator board, which remained in use until early in 1903, when the exchange was closed and the subscribers transferred to the Edinburgh Central Exchange.

Miss Ferguson had some experience of the ring-through system on lamp signals, previous to the introduction of common battery



ANNIE CAMERON FERGUSON.

working. She was promoted to be Supervisor in December, 1905. Edinburgh Central was changed to common battery working in March, 1906, so that the subject of our sketch has had experience of various systems. She remained at Edinburgh Central until her promotion as Travelling Supervisor in October, 1908.

There are 23 sub-exchanges and five private branch exchanges which come under the supervision of the travelling supervisor, so that a large area is covered by Miss Ferguson in the course of her work.

Miss Ferguson's courtesy and tact have made her popular with all grades of the service.

#### LXXXVII.—LOUISA BISHOP.

LOUISA BISHOP entered the Company's service as an operator at Tunbridge Wells in March, 1897. The switchboard then consisted of two 50-line sections, to which four similar sections were subsequently added. In 1900 the system was altered to automatic call and clear, the switchroom being removed from the ground to the first floor. At that time there was very keen competition between the Company and the Corporation (whose system was

absorbed by the Company in November, 1902), and nowhere, apparently, was the competition more pronounced than in the switchroom. It is on record that subscribers having the two systems, would make test calls over both afterwards informing the operators of the result, and it is satisfactory to know the palm was invariably given to the Company's.

Miss Bishop was promoted to be Clerk-in-Charge in August, 1903. During her thirteen years of service, all spent at Tunbridge Wells, she has served with four district and four local managers. The number of subscribers to the Tunbridge Wells Exchange in



LOUISA BISHOP.

1897 was considerably under 100; it has grown to 982. In the same period the number of sub-exchanges has increased from two to twenty, with 774 subscribers and 44 junctions.

Miss Bishop's interest in the service is wholehearted, and in her constant endeavour to maintain the operating at the highest possible pitch of excellence, she considers the interest of the Company and subscribers alike.

Miss Bishop's recreative pursuits are general, and if there are any to which she gives special place they are reading, music and lawn tennis.

### INVENTORY OF PLANT.

The following additions have been made to previous lists:—

#### HEAD OFFICE.

Edwards, D. . . . .	late Chief Clerk . . . . .	Jersey.
Ewing, J. . . . .	Engineer . . . . .	Warrington.
Goodman, H. . . . .	Assistant Engineer . . . . .	Blackpool.
Mairs, J. . . . .	District Engineer and Electrician . . . . .	Aberdeen.
McHardy, R. . . . .	Inspector-in-Charge . . . . .	Berwick-on-Tweed.
Murray, J. K. . . . .	Assistant Engineer . . . . .	Glasgow.
Robson, F. . . . .	Chief Clerk . . . . .	Hull.
Williamson, R. . . . .	Local Manager . . . . .	Newport, Mon.

#### TRAVELLING STAFF.

Quartermain, J. . . . . Wireman . . . . . Reading.

The following names should be deleted from previous lists:—

Stallard, E. G. . . . .	Enumerator.
Barker, C. G. . . . .	Investigation Officer.

### CORRESPONDENCE.

#### "CLERKS IN LITERATURE."

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THERE are few words in the English dictionary that have as many meanings as the verb "to draw," but I suggest that the next lexicographer might, with great propriety, add this one "to quote Shakespeare or Dickens!"

In his admirable little article under the above heading in last month's issue of the JOURNAL, Mr. Gunston opened up a subject which, by this time, has no doubt appealed to and set a-thinking many of that vast body of men and women whose silent and useful work in the great commercial machinery of the world does not always meet with the recognition it deserves.

I do not propose to traverse any of Mr. Gunston's views, or to obtrude my own opinions on the social status of clerks, either in fiction or in real life. The question is too complex to be dealt with in a letter, and I will merely say this, that the public mind associates the generic and indiscriminate term "clerk" always with a man of routine and never with a thinker. Which we all know to be a colossal mistake.

But Mr. Gunston brought Dickens on the carpet and thereby, as I think he foresaw, courted criticism. The omission of a "t" in "Cratchit" was, of course, a printer's error, and, therefore, I pass it over. What I do desire is to put right what I consider a wrong done to one who was not only a great novelist, but a man of an extraordinarily broad, generous and sympathetic mind.

I do not believe that Dickens ever dreamt of casting a slur on any class of men, as a class, doing honest and useful work, no matter what their social position might be; and in this connection I might mention that in his books he runs up the whole gamut of the clerical world, from young Blight, the idle apologist of his idler master, Eugene Wrayburn, to Mr. Tite Barnacle, of the Circumlocution Office. I do not think that the many clerks he introduces into his books were intended to be types of a class, but types of men and character, and that their occupation was incidental. They are no more typical of clerks, as clerks, than Mr. Bounderby is typical of the self-made man, or Sampson Brass of the lawyer, or Pumblechook of the corn chandler, or Bradley Headstone of the schoolmaster, or Mr. Podsnap of the wealthy merchant, and a host of others.

Of Mr. Gunston's four examples, three were lawyers' clerks, two of whom were undeniably good men of business, particularly, perhaps, the "young man of the name of Guppy"; otherwise "Conversation" Kenge, his employer, would not have made him a present of his articles. Of Dick Swiveller, the impecunious ne'er-do-well, "Perpetual Grand" of the "Glorious Apollos" and champion of the little "Marchioness," it can only be said that he was no clerk, merely a needy borrower and consumer of huge quantities of beer. The pathetic figure of Scrooge's clerk, Bob Cratchit, whose weekly wage consisted of fifteen copies of his own name, was merely created to emphasise the monumental meanness of his employer.

And even in the higher walks Dickens casts no reflections on the abilities of the clerical characters he presents to us. The light and airy Tite Barnacle was merely the victim of red tape, while the Bank of England clerk who peeled and ate three Ribstone Pippins while Tony Weller signed his name may be cited as a model of unruffled and philosophic patience.

Uriah Heep and Smallweed are among the very few, if not the only, clerks who appear in Dickens' works in an unfavourable light, and even their capabilities cannot be impugned. For sheer incapacity I can only call to mind the young gentleman (name unknown) in the House of "Dombey & Son," who was under perpetual notice to leave on account of his lapses in arithmetic. But even he had his redeeming point, as when he burst forth into a passionate speech at a convivial meeting occasioned by a domestic calamity which had befallen the Head of the Firm.

But there are two who stand out as types of the best of their order—Wemmick, the go-between of Jaggers, the Old Bailey lawyer, and his criminal clients, the possessor of an aged parent in his freehold castle at Walworth; and, above all, old Tim Linkinwater, the confidential clerk of the philanthropic Cheeryble Bros. Like most of Dickens' characters, and like many of us, these two had their whimsical sides, but they were sound men of business, and had they been knights or bishops, instead of pawns in the game, who will say they would have been happier or more useful?

Head Office, Feb.

EUSTACE HARE.

### THE CALCULUS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THERE must be many members of the staff whose mathematical training was cut short on their entry into business-life before they had mastered the calculus. Some of these may have had a desire to continue their studies at home, and have found the difficulties of the calculus insurmountable. Let all such take heart, for a book has recently been published called *Calculus Made Easy* (Macmillan & Company), which will clear up most of the difficulties that beset the beginner. The prologue of this book is worth giving in its entirety; it runs as follows:—

Considering how many fools can calculate, it is surprising that it should be thought either a difficult or a tedious task for any other fool to learn how to master the same tricks.

Some calculus tricks are quite easy. Some are enormously difficult. The fools who write the text books of advanced mathematics—and they are mostly clever fools—seldom take the trouble to show you how easy the easy calculations are. On the contrary, they seem to desire to impress you with their tremendous cleverness by going about it in the most difficult way. Being myself a remarkably stupid fellow, I have had to unteach myself the difficulties, and now beg to present to my fellow-fools the parts that are not hard. Master these thoroughly and the rest will follow. What one fool can do another can.



A very clear general conception of the principles and application of the calculus follows this unique introduction. The obvious criticisms which will spring to the mouths of those who have had the advantage of orthodox instruction are best answered by the author's epilogue and apologue. I will leave critics to look these up themselves. The cost of the book is 2s. nett. A useful book to follow the one already referred to is *Barker's Graphical Calculus* (Longmans, Green & Company). Possibly after this the student may revert to the ordinary text books with some hope of grasping their intricacies.

Salisbury House, London, Feb. 13.

"EPSILON."

#### HOTEL WIRING.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

As one possessing some slight acquaintance with the wiring of large hotels and buildings, I found Mr. F. Barr's illustrated notes in the February JOURNAL relative to the plan adopted at the Sheffield Grand Hotel of considerable interest.

Presumably the building in question is not of recent construction, but, apart from this, although one frequently has to resort to the practice from motives of expediency, there is always a feeling at the back of my mind that the running of loose (mechanically) unprotected wires beneath flooring is not compatible with a sound wiring standard, particularly when, as in this case, the installation be one of some magnitude. One other count. If it is permissible to ignore possible danger to such circuits by other contractors at some future period (I am not sure it is), there is always the maintenance factor and the difficulty generally experienced—certainly in a London hotel—when it becomes necessary to upset the internal economy of such an establishment by pulling up corridor carpets to reach floor traps. Possibly this criticism is a little ungenerous, made as it is without knowledge of the building or local circumstances. Mr. Barr's scheme of main distribution, together with the wiring cost per station, exclusive of switchboard cabling cost, would be of value to many occasionally faced with the problem how best to wire a large hotel, if he would be kind enough to give them.

London, Feb. 3.

A. C. GREENING.

#### THE LAST STAFF DINNER.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I BEG leave to make the suggestion that on Dec. 30 next—the last secular day of the Company's license—some social gathering of the staff might well take place in London in celebration of a time of considerable interest to us all.

I think a dinner on that last Saturday evening would be generally welcome, as in many ways it might be made unique and might be specially arranged so as to afford a means of a semi-formal leave-taking between those who are taken and those who are left.

Leave-takings are not the most encouraging affairs in the world, especially when one bids adieu to those known over long years, and for whom, consciously or unconsciously, an affectionate regard has grown up; but this leave-taking would surely be possible under much more pleasant conditions than if it were left for official hours.

It would be interesting to see in your columns some representative opinions on this subject.

Perhaps it might be thought that a staff dinner in the spring or early summer and another in December of the same year would be too much to arrange; if this were so, might it not be worth while to defer our staff dinner until the "last day," which we would hope, however much we may regret the event, would be one of neither wrath nor mourning.

Feb. 14.

VILLEIN.

#### LONDON NOTES.

THE fourth annual Christmas treat was given by the staff of the Avenue Exchange to some of the poor children of Stepney on Jan. 21 at the Stepney Tabernacle. On this occasion 500 children assembled, and there could be no mistake about the success of the entertainment, the excellent tea, the gaily decorated tables, the varied assortment of cakes and other dainties, and the cinematograph show which followed, all being highly appreciated by the large company of small people. Not the least enjoyable part of the programme was the concert which concluded it, and which was provided by the children themselves; indeed, from the point of view of the helpers and visitors, it proved most interesting, the quick humour and cockney assurance of these juvenile comedians being quite amazing. We must congratulate Miss Forge (the "Avenue" Clerk-in-Charge) and her kindly staff, not only for finding the energy for this truly charitable undertaking, but on getting together the funds necessary to carry it out.

FOLLOWING the excellent example of "Avenue," the "London Wall" operators gave a tea and entertainment to 200 poor children at Lees Hall, Canning Town, E. The Mansfield House Settlement authorities selected the children, and the poverty of the neighbourhood was illustrated somewhat pathetically by the lack of boots and shoes on the feet of many of the small guests. There were numerous willing hands to assist in dispensing the tea and various good things which accompanied it, the enjoyment of the helpers being only second to that of those they served. The fact that in several cases the ample menu allowed for one or two tit-bits being stored in pockets for home consumption was not the least appreciated feature of the entertainment. Afterwards living marionettes, a magic lantern and a conjuror added their alluring performances to the afternoon's enjoyment, and the closing gift to each child of a toy, a new penny, an apple, an orange, and a bag of sweets was an ending such as they had not dreamed of. Miss Butcher (the Clerk-in-Charge) and her staff proved wonderful organisers, and one certainly hopes that the desire of the donors to make their treat to the children an annual one may be realised.

THE reports submitted to the Benevolent Society's annual meeting on Jan. 26 showed that during 1910 the need for the society had been more than justified, and much timely help given to members of the staff who had found themselves unfortunately in straightened circumstances. Mr. D. Stuart (Head Office), chairman of the committee, presided over the meeting. Mr. Clay, whose health did not permit of his being present, has again undertaken the president's duties, and a number of the chief officers have consented to become vice-presidents. The total membership at the end of 1910 was 2,828, being an increase of 128 for the year. One feature of the figures capable of improvement is the small proportion of the outside engineering staff who are members; the fact that the largest grant goes to and the smallest revenue comes from that department ought to lead to an increased membership. The amount disbursed by the society since its formation now exceeds £1,000. The Company's contribution for last year was £130 7s. 5d.

TWO of the City contract officers—Mr. G. Holder and Mr. W. Quash—have recently resigned, the former to take up a position in Australia, and the latter to accept a post in a shipbroker's office. Mr. Holder was the recipient of a safety razor and fountain pen from his colleagues, and Mr. Quash was presented with an umbrella. Good wishes accompany both to their new spheres.

ANOTHER of the "Bank" Exchange successful whist drives was held at "Ye Mecca," Ludgate Hill, on Jan. 25. The guests numbered 186. The organisers are to be congratulated that both socially and financially the results were admirable; the latter aspect is especially gratifying as the Benevolent Society's funds benefit to the extent of £5. The prizes were mostly given by friends, and were presented to the winners by Mr. Edmonds.

WHEN Mr. W. H. Elkington, a City contract officer, died a month or two ago, Mr. Bigland, the City contract agent, knowing that Mrs. Elkington's resources had been very much strained by her husband's illness, collected a sum of nearly £6 amongst sympathising members of the staff. This has been paid over to Mrs. Elkington in weekly instalments, and she has asked Mr. Bigland to convey her gratitude to the subscribers.

MR. B. S. COHEN, Chief of the Investigation Department, read a very instructive paper to a well-attended meeting of the London Telephone Society on Feb. 6. He touched on a number of important matters dealt with by his department. The various forms which have been designed in connection with the enormous task of standardising the Company's junction circuits, etc., were fully explained, the explanation being assisted by the aid of lantern slides. Apparatus for making transmission tests in and out of the laboratory was referred to, and a number of telephone freaks in the form of patent attachments for mouthpieces was shown. One providing for the accommodation of the speaker's nose as well as his mouth in the mouthpiece (an American invention) caused considerable amusement. The paper concluded with some particulars regarding loading problems. A brisk discussion followed which was limited by time and not speakers.

AT the monthly meeting of the Operators' Society, on Monday, Feb. 13, the varied programme attracted an audience of 234 members. Five papers were read, each being followed by a short discussion, and it will be seen from the titles given that the subjects covered a wide field. They were respectively, "Some Details of Operating," by Miss M. Clayton (Supervisor); "The Duties of a Senior Operator," by Miss E. Knowing (Operator); "The Value of Local Observations," by Miss A. G. Buckwell (Clerk-in-Charge); "The Importance of Tone and Manner," by Miss M. Bennett (Operator); and "Bartholomew House," by Mr. P. J. Mantle (Exchange Manager). The plan of replacing the usual one or two longer papers by several brief and "crisp" discussions was expected to encourage a larger number of debaters, but did not apparently have that effect, the speakers being fewer than usual. Many interesting points were, however, raised. The result of the "competition" evening, which was announced at intervals in quite the most approved "modern advertising" style on the screen, will be looked forward to with interest.

DURING February very enjoyable "socials" were held by the traffic staff of "London Wall" and "East." The former was at the Bishopsgate Institute; there was a gathering of over 200, who thoroughly enjoyed the programme of songs, recitations and dances provided for them. Miss Berry, the Senior Supervisor, assisted by a committee of operators, was responsible for the arrangements. The "East" staff had also an attendance of about 200 at Limehouse Town Hall, Mr. Tattersall being in the chair. A well-patronised buffet was provided, and there was an excellent programme of songs and recitations, relieved by games and dancing. The most successful event on the programme was the performance of a toy symphony orchestra under the charge of Miss Mott.

IN the semi-final of the Clay Challenge Cup, Head Office met South-East on Feb. 11, the result being a draw of four all. The re-play, as well as the match between Salisbury House and City, must be decided not later than Feb. 25, and the final must then be played by the last Saturday in March.

#### STAFF GATHERINGS AND SPORTS.

**Greenock.**—The annual dance of the staff was held in the Tontine Hotel, Greenock, on Jan. 27, at which 80 members of the staff and their friends were present, including Mr. A. Ramsay Lamb (District Manager) and Mrs. Lamb. Dancing was carried on till 2 a.m. Messrs. Bucklitsch and Lowe acted as M.C.'s.

The Post Office and National Telephone Company employees held a joint *conversazione* in the saloon of the Town Hall last month. Mr. J. MacIntyre, Postmaster, presided over a large attendance, and was supported by Messrs. J. L. Macdonald, chief Post Office Surveyor for the South of Scotland; D. Millar, late Greenock Postmaster; A. Ramsay Lamb, District Manager of the

National Telephone Company; Mrs. Lamb, Messrs. J. A. Swanson, A. Wilson, A. Bucklitsch, R. Whyte, J. Lennox, T. M'iver and J. Bulloch. After tea an excellent programme of songs was submitted by Misses Cathie, Brown and Mearns and Messrs. MacDougall, Pirrie and MacDonnell, Mr. L. T. Sharp acting as accompanist. At the conclusion of the musical programme dancing was engaged in. The arrangements for the *conversations* and dance were in the hands of a joint committee, with Mr. J. Lennox, of the Post Office Telegraph Department, as secretary.

**Bath.**—A social gathering, at which the majority of the centre staff were present and heartily enjoyed themselves, was held on Jan. 27. The "Hearts" prizes were won by Miss E. Allen, Miss I. A. Garlick and Mr. E. E. Lea. The details of the arrangements were carried out by Miss A. F. Weeks and Messrs. T. O. C. Parnell and W. A. Taylor.

**Edinburgh.**—The annual staff dance was held on Feb. 1 in Aitchison's Rooms, Queen Street, the company numbering upwards of a hundred. To the members of the committee great praise is due for the able manner in which the arrangements were carried out. Messrs. Bald and Tait performed the duties of M.C.'s.

**Cardiff.**—The members of the Cardiff Operators' Thrift Club held a social evening on Jan. 20 at the Queen's Café. Singing and whist were indulged in, and thanks are due to the Misses Brimble, Church, Clargo, Merritt and Thorn, and Mr. Mees for the musical part of the programme. The whist prizes, which were presented by Mrs. W. J. Marsh, were secured by the following:—Ladies: first, Miss Coates; second, Miss Baugh and Miss Church (prize divided); consolation prize, Miss H. van Riel. Gentlemen: first, Mr. Prickett; second, Mr. C. Osborne; consolation prize, Mr. Ryland. The main object of the gathering was to make a small presentation to Mr. W. J. Marsh (Traffic Manager), as a memento of the time spent by him as Exchange Manager of the Cardiff Exchange, and as a mark of the esteem in which he is held by the Cardiff operating staff. The presentation, which was made by Miss Spearing (Clerk-in-Charge), consisted of a pair of gold sleeve-links. The opportunity was also taken of presenting the secretary of the Thrift Club, Miss B. W. Williams, with a signet ring, as a token of appreciation of the work done by her during the last six years, in which she has acted as either secretary or auditor. The presentation was made by Mr. Marsh, who gave a short *resumé* of the good work done by the club during its existence, and thanked Miss Williams for the valuable services rendered by her. Mr. Ryland acted as M.C.

**Luton.**—A very enjoyable time was spent on the evening of Jan. 28, when about 60 members of the staff and friends met at the Franklin Restaurant, Luton, on the occasion of the annual social. A very interesting programme had been prepared, and included the special engagement of an elocutionist. A large number of musical items were given by members of the staff.

**Newport, Mon.**—The Newport staff held a social evening at the Beaufort Café on Jan. 26, when about 50 of the staff and friends were present. A very enjoyable evening was spent, the programme including various games and many interesting competitions, which were very keenly contested. In the absence of Mr. Williamson, Local Manager, who has been transferred to the Inventory (Headquarters) staff, Mrs. Williamson distributed the prizes. The committee consisted of Miss Van Riel (Clerk-in-Charge), Miss Turner, Mr. E. G. Payne, Mr. R. W. Richards and Mr. Turner. Mr. N. E. Davis acted as hon. secretary.

**Norwich.**—On Feb. 11 the Yarmouth staff and friends visited Norwich to try conclusions in a return football match with the Norwich staff at Eaton. The match was played under severe climatic conditions, the proceedings receiving the unsolicited assistance of rain, snow and blizzard in varied proportions. The result was in favour of Yarmouth, who, by four goals to three, regained possession of the Megohm Cup, captured by Norwich earlier in the season. A highly successful tea and musical evening ensued at the Criterion Restaurant, when the Megohm Cup was duly presented to Mr. Wilton, captain of the winning team. Reference was made by several speakers to the social value of these staff gatherings, and a wish expressed that the same staffs may arrange friendly cricket matches during the coming summer. During the evening the District Manager (Mr. O. W. Stevens) joined the party, and was accorded a vociferous reception.

**Dundee.**—The centre staff and friends held their annual dance on Jan. 20 in Gray's Rooms, Dundee. Under the guidance of Mr. A. G. Dundas, assisted by the committee, a company numbering about 40 couples participated, and the dance was thoroughly enjoyed by all present.

**Dover.**—The staff of the centre, with members of the Inventory staff and friends, held a very successful whist drive and dance at the Grand Hotel, Dover, on Feb. 3. The drive lasted from 8.30 to 11 o'clock. The ladies prize, a travelling clock, presented by Mr. C. F. Ashby, District Manager, was won by Miss G. Gregory, Correspondence Clerk of the district office, and Mr. G. Baker, Contract Officer, Folkestone, gained the gentlemen's prize, a pipe in case, presented by Mr. F. Duerth, Local Manager, Dover. Dancing was then indulged in till the early hours, whilst those not dancing found diversion in games and songs. The company dispersed about 1.30 a.m., having had a thoroughly enjoyable evening. The duties of M.C. were ably carried out by Mr. J. U. Wood.

**Hull.**—A very enjoyable evening was spent by the staff and friends, numbering 200, at a smoking concert, organised by the local members of the A.S.T.E., which was held at the Imperial Hotel on Jan. 27. An invitation was given to the new District Manager, Mr. J. W. Swithinbank, and this opportunity was taken to welcome him to the East Yorkshire district. Mr. Swithinbank was introduced by the Contract Manager (Mr. A. K. Murray) in a short speech, extending to him the same loyalty as was given to his predecessor, Mr. C. C. Wote; to which Mr. Swithinbank suitably replied. Items from the programme included songs by the Misses Annie Croft, Filby and Murray, Messrs. G. Gibb McLaughlin, G. R. Hill, A. K. Murray, J. Gait and C. Rudston; also violin solos by Mr. Harvey.

**Sheffield.**—A very successful whist drive and social gathering was held at the Baths Hall, on Feb. 3, over 160 members of the district and Inventory staffs with friends being present. Owing to the excellence of the programme

and the encores accorded to the various artists, it was only possible to play fourteen games at whist, for which five handsome prizes were given. The District Manager (Mr. R. C. Bennett) presided over the entertainment and also presented the prizes.

### NEWS OF THE STAFF.

Mr. J. RILEY, Local Manager, Barry, has been appointed Local Manager, Pontypridd, vice Mr. J. W. Price, deceased.

Mr. R. WILLIAMSON, Local Manager, Newport, has been transferred to Headquarters Inventory staff. Mr. G. FIELD, Exchange Inspector, Cardiff, has been appointed Acting Local Manager during Mr. Williamson's absence.

Inspector THOMAS S. HAUGHTON, Cork, has been transferred to Dublin in the same capacity. Before leaving he was presented by the Cork staff with a suit case.

Mr. W. A. FRAME, Traffic Manager, Greenock, on resigning from the Company's service to go abroad, was presented with a sum of money and a fountain pen.

Mr. L. G. ALLEN has been appointed Exchange Manager at Dublin Central Exchange.

Mr. PETER GILMOUR, Instrument Fitter, was, on the occasion of his leaving the service, presented with a kit bag and suit case. He sailed for Cape Town on Feb. 16 to fill a Government appointment as switchboard fitter.

Mr. S. A. HARDSTONE, of the Engineer-in-Chief's Department, has been awarded a Territorial Force efficiency medal, having completed twelve years in the Electrical Engineers' and London Wireless Telegraph Companies (K.E.).

Faultsman H. BINNS, Harrogate, has been transferred to South Shields as Chief Foreman.

Mr. S. G. TREGILLUS has been transferred from the position of Stores Clerk, Plymouth to be Local Office Clerk, Truro.

Mr. A. H. MANSFIELD has been transferred from the position of Local Office Clerk, Truro, to be Storekeeper, Plymouth.

Mr. F. R. W. WORDEN has been appointed Stores Clerk, Plymouth.

### METROPOLITAN STAFF CHANGES.

Mr. R. H. CHAFFIN, Wayleave Officer, Croydon, to be Call Office Collector, Salisbury House.

Miss A. M. B. HILTON, Operator, Hop, to be Clerk (Rentals Department), Salisbury House.

Mr. J. E. MARSHALL, Fitting Inspector, South, to be Chief Inspector, South.

Mr. F. LYNCH, City Fitting Department, to be Test Clerk, Holborn.

Mr. E. GREGSON, Inspector, Paddington, to be Test Clerk, Bank.

Mr. H. POUNTNEY, Test Clerk, Holborn, to be Exchange Manager's Assistant, Avenue.

Mr. R. W. WARE, Clerk in Superintendent's Office, to be Test Clerk, Paddington.

Mr. E. B. BOUCHER, Test Clerk, Bank, to be Exchange Manager's Assistant, London Wall. He was presented with a silver-mounted umbrella by former colleagues.

Mr. H. MORGAN, Contract Officer, Dalston, to be Chief Clerk, Contract Department, Dalston.

Mr. W. SEARLE, Foreman, Gerrard, promoted to be Acting Walking Foreman, East.

Mr. W. J. STROUD, Night Watchman Inspector, North, to be Test Clerk, North.

Mr. C. W. NAUGHTIN, Chief Inspector, Dalston, to be Chief Inspector, Gerrard.

### Traffic Department.

Miss MAUDE BLAKESLEY, sen., Supervisor-in-Charge, Croydon, promoted to be Clerk-in-Charge.

Miss ELLEN MOBLEY, Supervisor, London Wall, promoted to be Senior Supervisor-in-Charge, Palmers Green.

Miss MINNIE FRYERS, Operator, Bank, promoted to be Supervisor-in-Charge, Waltham Cross.

Miss ADA KNAPMAN, Clerk-in-Charge, North, transferred to Brixton.

Miss CELIA HOOPER, Clerk-in-Charge, Brixton, transferred to North.

Miss GERTRUDE RYDER, Supervisor-in-Charge, Palmers Green, transferred to London Wall as Supervisor.

Miss ETHEL BRASH, Supervisor, London Wall, transferred to East.

Miss HENRIETTA EVANS, Supervisor, East, transferred to London Wall.

### MARRIAGES.

Mr. A. LYNN, Chief Clerk, Cork, who has been transferred to the Head Office Inventory staff, was on the occasion of his approaching marriage, presented by the South of Ireland staff with a canteen of cutlery and week-end bag. Mr. Cowley, Superintendent for Ireland, made the presentation, in the absence of the District Manager.

Miss ISABELLA WILLSON, of the Great Yarmouth operating staff, has resigned from the Company's service to be married, and on leaving was presented with a handsome tea service and cheese dish by Mr. J. D. Pugh, local manager on behalf of the Great Yarmouth, Lowestoft and Gorleston staffs. Miss Willson was also the recipient of a china fruit bowl, an oak tea tray, and other presents from individual members of the operating staff.

Miss IVY STEELE, who has been in the Company's service at Harrogate since April, 1907, left on Dec. 24 to be married to Mr. A. WILLIAMS, who is himself a member of the staff at Harrogate. They were co-jointly presented with a pair of pictures and set of fire brasses by the Harrogate staff.

Mr. FRANK STEVENS, Sub-Engineer, Swansea, at present on the Inventory staff, was presented by the other members of "O" division, with a travelling trunk, on the occasion of his marriage to Miss MAY HAGLEY, formerly of the Company's service in Bristol.

At the close of the Bristol Operators Society meeting, Feb. 16, Mr. A. Perkins, on behalf of the operating staff, presented Misses Lucy Mary

SHELBOURNE and MARY ELFRIDA CAMERON, Operators, Bristol, with a leather hat box and cut-glass rose bowl respectively, as marks of esteem, on the occasion of their leaving the Company's service to be married. Miss Shelbourne is leaving England for Buenos Aires on Feb. 28, where she is to be married to Mr. A. H. KINGSCOTE, who was formerly sub-engineer with the Company at Bristol, and who left in October, 1909, to take up an appointment on the Engineer-in-Chief's staff of the United River Plate Telephone Company at Buenos Aires.

#### OBITUARY.

We regret to announce the death on Thursday, Feb. 9, of Mrs. COCKBURN, who acted as Operator and Caretaker at the Company's Gourcock Exchange. The deceased lady, who was the first operator when the exchange was opened in Gourcock during 1897, was very popular with the staff and subscribers, her obliging and courteous manner winning for her many friends. The funeral was private, and the staff sent a floral wreath.

### LOCAL TELEPHONE SOCIETIES.

**Bath.**—The fifth meeting was held on Feb. 1, Mr. W. C. Owen giving an extremely interesting paper entitled "Reminiscences," introducing a number of well-known names in the service in the course of describing his telephone experiences in various parts of the United Kingdom.

**Birmingham Operators.**—The fifth meeting of the session was held on Feb. 9, Mr. M. Bowes of the traffic office being in the chair. Seven competition papers on the following subjects were sent in by members:—"Scraps from the Monitors' Table," "Standard Expressions," "C.B. Order Wire Working," "Hints on 'A' Operating," "After Hours' Duties," "Exchange Messengers' Duties," and "Ambition." Some of the papers were sent in under a *nom de plume* and read by Mr. Abbott, Central Exchange Manager, others being read by the writers. The papers were of exceptional interest and merit. Messrs. Barr, Roberts and Jones of the Inventory staff kindly consented to act as judges of the papers and their decision will be published later.

**Bolton.**—A meeting on Jan. 17 was addressed by Mr. G. S. Wallace, Chief Electrician, Manchester, the subject being "Change-over from Magneto Working to C.B. Working." The various stages in the change-over at the City Exchange were dealt with by Mr. Wallace most thoroughly, and a subject of peculiar interest to the Bolton staff was made clear by means of excellent slides, curves and tabulated figures. A discussion followed the lecture.

On Feb. 16 Mr. T. A. Prout, Assistant Provincial Superintendent, gave a lecture on "Education, Method and Organisation." Mr. Prout made his subject fascinating by variety of illustration, verbal and graphic. Comparisons of telephone and railway organisation and other undertakings, together with brief analyses of the methods of the more prominent men associated with the undertakings, packed his lecture with interest. The evening ended with an excellent little concert by the members.

**Bournemouth.**—The third meeting was held on Jan. 19, when there was a good attendance of members to hear Mr. B. Clayton, Cost Clerk, Southampton, give his paper on "The Statistical Department." The paper was a most thoughtful and interesting one, and was discussed with much animation, the many enquiries addressed to the lecturer being answered satisfactorily. The chair was taken by Mr. L. Hunt, the Contract Agent.

The fourth meeting of the session was held on Feb. 8 before a very good attendance. The chairman, Mr. L. Hunt, was also supported by the District Manager, Mr. W. Howe, and the Acting Local Manager, Mr. W. G. Moore. The lecturer, Mr. H. O. Newman, of Head Office, gave a most interesting and lucid explanation on the process of boiling out joints. A discussion followed, in which Messrs. Young, Harris, Moore and others took part.

**Bristol.**—At the meeting held on Feb. 16, Mr. C. J. Williams, formerly of Bristol, but now Chief Clerk of Exeter, read a paper on "Engineering Records" before an attendance of 54 per cent. of the members. His paper described every record kept in the Engineers' Office, and being of a purely descriptive and not in any way of a controversial nature, it did not offer much opportunity for a lengthy discussion. The Engineer, Mr. E. L. Preston, presided.

**Bristol Operators.**—The third sessional meeting was held on Jan. 19 when a lecture was delivered by Mr. A. E. Coombs, Traffic Manager, Bristol, on "The Reason Why." Mr. Coombs emphasised the importance of understanding why certain things were done, and of not merely carrying out rules simply because they were rules, but of understanding the spirit as well as the letter. Amongst other things "The reasons why" of the operating statistics, weekly register readings, expressions, repetition of exchange names and numbers, society meetings, etc., were dealt with. Mr. Alfred Perkins (District Manager) presided.

The fifth sessional meeting was held at Bristol on Feb. 16, when Miss F. P. Nicholls, Clerk-in-Charge, Bristol, read a paper on "Divisional Working." Miss Nicholls outlined the importance of this phase of operating and commented on the improvements it had brought about, notably the increased sense of responsibility on the part of the supervising staff. The staff in the subsequent discussion corroborated Miss Nicholls' statement that the modern divisional arrangement was of great advantage and an improvement on anything yet introduced. Mr. A. Perkins (District Manager) presided.

**Cardiff.**—The fourth meeting was held on Jan. 26, Mr. S. F. Whetton being in the chair. There was a good number present. This night was set apart for competitive papers on "Office Work." The first prize was awarded to Mr. G. D. Bateman for a paper on "Directory Work"; second prize to Mr. H. N. Garland for a paper on "Wayleaves," and the third prize to Mr. G. R. Woodworth for a paper on "Cash." A lively discussion followed.

The fifth meeting of the session was held at Cardiff on Feb. 9, Mr. S. F. Whetton being in the chair. There was a good attendance. This was a competitive night open to instrument and line staff for papers on "Incidents in Connection with the Transfer." The first and second prizes were pooled and divided between Inspector E. Reid and Foreman E. Smith. An interesting discussion followed.

**Cardiff Operators.**—The third meeting of the session was held on Feb. 14,

and took the form of a competitive night. The chair was taken by Miss Spearing, Clerk-in-charge. Mr. Williamson, the chairman, has recently joined the Inventory staff, and was therefore unable to be present. Five papers were read by the following members:—Miss D. F. Lyons, "What Constitutes a Good Service"; Miss W. M. Baugh, "Telephone Mannerism"; Miss L. Evans, "Sub-Exchange Working"; Miss G. M. Hockey, "Junction Working"; and Miss G. H. Vaughan, "Local Knowledge." The papers were all of a very high standard, and it was clear that they had not been written without a considerable amount of thought. The vice-presidents, clerk-in-charge, and supervisors adjudicated, and awarded the first prize to Miss Lyons, second prize to Miss L. Evans, and third prize to Miss Vaughan. After a short discussion the meeting was brought to a close.

**Cheltenham.**—The third meeting of the session, postponed from Dec. 29<sup>th</sup> was held on Jan. 27, when Mr. A. R. Wran gave a paper on "Faults" and Mr. F. C. Henderson on "Primary Batteries."

**Cork.**—At the fourth meeting held on Jan. 26, Mr. W. Patterson read a paper on "The Rental Register and the Work it Involves." The paper was clear and to the point throughout; it was both instructive and interesting in a high degree and the blackboard was freely and effectively used to elucidate various points touched upon. At the close various remarks were passed by Messrs. Haughton, Lynn, Chamney, Hay and Roy.

**Corwall.**—A meeting was held at Truro on Dec. 22, when Mr. A. H. Mansfield read a paper entitled "The Centre." The reader illustrated his paper with lantern slides. Mr. G. Hooper, president, occupied the chair. There was 94.11 per cent. of the members present.

The third meeting was held at Truro on Jan. 11 two papers being read, one by Mr. E. Beare, Penzance, entitled "The Maintenance of Small Exchanges," and one by Mr. R. Harris on "Details in Line Work." The president again occupied the chair and 94 per cent. of members were present.

**Coventry.**—On Jan. 13 Miss Adams, of Birmingham, read a paper on "Telephone Progress from an Operating Standpoint." The paper was full of interest and created an excellent discussion which lasted over an hour. Fourteen members of the Inventory staff were present, and of these several took part in the discussion.

Mr. J. R. Milnes of the Engineer-in-Chief's Department gave a very interesting lantern lecture on "Power Plant" before the society on Feb. 13. Mr. Mewburn, the District Manager, was in the chair. The lecture was much appreciated, containing as it did a great deal of information which will be helpful to the members of the local staff, especially those who have charge of accumulators and motors.

**Dundee.**—At the meeting held on Jan. 25, a paper was read by Mr. John McEwan on "Switchboard Construction." The writer included much practical information, and gave an interesting description of a change-over from earth to metallic circuit.

The usual monthly meeting was held in the University College on Feb. 14, when Mr. Napier, of Head Office, gave a lecture on "Traffic." The lecture proved most interesting, and was greatly appreciated by an audience of record numbers. Mr. W. Brown, District Manager, presided, and expressed the thanks of the meeting to the lecturer.

**Edinburgh.**—The fourth meeting of the session was held on Feb. 6, when Mr. W. W. W. District Manager, delivered a lecture entitled "Post Office Trunk Switchboards." During his lecture he described the course of a trunk call from the time of its initiation until it was effected at the distant end; each step in the progress of the call being illustrated with lantern slides. He also showed the internal connections and multiple switchboards by means of a large number of slides. The lecture, which was greatly appreciated, was attended by a large number of the staff.

**Exeter.**—On Jan. 31 a paper was read by Mr. W. F. Wilson, entitled "Details of Line Work." The paper was particularly interesting to the outside staff, and was full of original points dealing with methods of construction. There was a good attendance.

**Gloucester.**—The fourth meeting of the session took place on Feb. 15, Mr. C. Elliott, District Manager, occupying the chair. An excellent paper was given by Mr. H. B. Yeo, Stroud, entitled "Telephone Instruments, their Construction and Working," which was ably explained by means of an instrument taken to pieces and by diagrams. There was a record attendance, and a number of guests, including Mr. Waite.

**Greenock.**—The fourth meeting of the session was held on Jan. 19. The subject was "The Telephone Business," and was illustrated by lantern slides. The slides dealt mainly with the technical side, and were explained by Mr. A. Wilson, Electrician. Mr. A. Ramsay Lamb occupied the chair.

The fifth meeting of the society was held on Feb. 2, and took the form of a whist drive. The prizes were kindly presented by Mr. and Mrs. A. Ramsay Lamb. Miss Kennedy won the first prize for ladies, and Mr. A. Wilson, Electrician, won the first prize for gentlemen.

**Hastings and Eastbourne.**—A meeting was held at Hastings on Jan. 23, when Mr. E. Brickett, of Hastings, gave a very interesting paper on "Electrical Instruments, and How to Use Them." Mr. T. J. Hickmore was in the chair.

The third meeting was held at Eastbourne on Jan. 30, when a very interesting paper on "Traffic" was read by Mr. F. J. Frost, Traffic Manager.

**Isle of Man.**—The tenth meeting was held on Feb. 3. The Chair was taken by the District Manager, who first explained some important points, held over from last meeting, on "Pot-heads," after which he introduced the lecturer, Mr. E. Cowley, Clerk, to read his paper on "The Measured Rate." The lecturer brought out most instructive points in the paper, and a good discussion took place. The Chairman impressed on those present the great importance of being well acquainted with all points of the measured rate, which was the coming rate.

The eleventh meeting was held on Feb. 17. The District Manager presided, and introduced Mr. J. King, Acting Gang Foreman, who gave a most interesting lecture on "Binding In, Terminating and Running Open Wires." The lecturer explained, by the aid of models and diagrams, the various systems, of making off,

binding in, and terminating, also some ingenious ways of getting wires over buildings, etc. Great interest was taken by all present in the many useful and interesting points so clearly brought out.

**Leeds.**—At the meeting held on Feb. 8 two papers were read, the first entitled "Some Types of Office Boys," by Mr. J. W. Walker, a junior member of the staff; and the second by Mr. T. W. Lawrence on "Operating," dealing mainly with the training of the operator, the public, and the staff. In the course of the paper it was stated that 71,233 valued calls were dealt with by the Central Exchange on a given day. The discussion on this paper was animated, being entered into by five ladies and ten gentlemen.

**Leeds Operators.**—A meeting of the operating staff of the Leeds central exchange took place on Feb. 1, when the Traffic Manager, Mr. J. H. Swain, gave an address on the past, present, and future service. A very animated and profitable discussion took place, and the meeting was thoroughly enjoyed, and it is suggested further meetings should take place.

**Liverpool and Birkenhead.**—At the third meeting, held on Jan. 26, Mr. O. G. Lee presiding, Mr. A. Ward read a paper on "Common Battery Maintenance." Written by one who has an intimate knowledge of C.B. exchanges, the paper was exceedingly interesting and instructive. The subject is one of increasing importance in Liverpool, and the general interest was fully confirmed by a lively discussion, participated in by a large number of members, concerning this wide and useful subject from many and diverse points of view.

**Liverpool and Birkenhead Operators.**—The fifth meeting was held on Feb. 14, Miss E. M. Jones presiding. Miss Briggs, of the Manchester Traffic Department, read a paper entitled "The Operating School." The paper was illustrated by lantern slides. An interesting and animated discussion followed the reading of the paper, terminating in Mr. Prout's proposing a vote of thanks and congratulating Miss Briggs on the excellence of her paper, and the very able manner in which she dealt with the various questions put to her. The society was pleased to welcome the Traffic Manager and Travelling Supervisor of Manchester, in addition to Miss Briggs. One or two musical items terminated a very successful meeting.

**Manchester.**—The fifth paper of the session was read on Jan. 20 by Mr. H. Elliott, Contract Manager, on "Development," the vice-president (Mr. G. F. Staite) presiding. Mr. Elliott explained the duties of an officer engaged on development studies, pointing out the great care which is necessary in his investigations, and gave comparisons of the development of telephone service in the United States and England, and expressed the opinion that in the near future the development in this country would be much greater than it had ever been in the past. The paper, which was very interesting, was followed by a good discussion.

**North-Eastern (London).**—A meeting was held on Jan. 30 at Dalston Exchange, the chairman being Mr. F. Morley-Ward, when a paper was read by Mr. G. J. Gawthorne on "Incandescent Lamps," in the course of which he gave a very interesting and instructive account of how the electric lamp was first evolved, the progress since made, the various metals used, the formation, and the methods employed to prepare them for use, and also some records and observations kept of lamps at Dalston Exchange.

**Nottingham.**—The third meeting was held on Jan. 27, Mr. H. Saywell occupying the chair. An interesting paper was read by Mr. G. F. Aker on "Sub-Exchange Construction and Maintenance," the subject being illustrated by slides. Subsequently a discussion took place, a good many of those present taking part. A prize awarded by Mr. C. H. Sibley was presented to Miss Brook for a paper on "Operating," read at the last meeting.

**Nottingham Factory.**—The fourth meeting of the session was held on Jan. 13, when the official reader, Mr. H. Wilcockson, read Mr. C. Hope's paper on "The Nature and Composition of Metals used in Telephony." The metals treated included copper, iron, German silver, zinc, platinum, nickel, cobalt, aluminium and magnesium. The making of spelter for brazing purposes was also touched on. A prize having been offered for the best question sent in calculated to elicit information of most value to the workshop staff, about three dozen questions had been submitted. These had been handed out to members of the Company's staff considered best qualified to write replies, and the questions, together with the replies, were read out at the meeting by the secretary, and proved both interesting and instructive.

On Feb. 10 the society was favoured with a visit from Mr. C. T. Peacock, of the Engineer-in-Chief's Department, Head Office, who gave an extremely valuable lecture, illustrated by slides and apparatus, on "Improvements in Telephonic Apparatus." The improvements dealt with were mainly those adopted by the Company during the last eighteen months, and their description was very much appreciated, as was evidenced by the excellent discussion which followed, Mr. Peacock's answers to the questions put to him being most instructive.

**Oldham.**—On Feb. 9 a paper was read by Mr. H. J. Corke, Local Manager, Ashton-under-Lyne, entitled "Operators and Operating." Sixteen members of the society were present, and also eighteen of the operating staff. In the absence of the president (Mr. J. Cleary), who is away on inventory work, the chair was taken by Mr. Pugh, District Manager. Mr. Corke dealt with his subject in a very interesting and able manner, and at the close of the lecture a discussion ensued, in which Miss Turner and Messrs. Pugh, Hart and Croasdale took part.

**Paisley.**—The third meeting of this society was held on Feb. 1, when a very interesting paper by Mr. W. A. Frame, entitled "Reflections," was read by Mr. A. W. Grant. The paper was thoroughly enjoyed by everyone present. There was a good turn-out of members.

**Plymouth.**—A paper was given on Jan. 25 by Mr. A. E. Ball, Chief Clerk, entitled "Office Organisation," which dealt with the essential qualities of a good clerk, his training, etc. The paper was followed by a useful discussion.

**Sheffield.**—The fourth meeting of this society was held on Jan. 18, the chair being taken by Mr. A. Broomhead. Papers were read by the following members of the local staff:—Messrs. Bowring, Cheetham, Christie, Skinner, Thyne, on "Works Orders, Defects or Improvements," representing the of the different departments. The matter of the papers had been well

thought out, many interesting points were raised and considerable discussion took place at the close of the meeting.

**Sheffield Operators.**—The fourth meeting of this society was held on Jan. 26, and took the form of a competitive night for the junior operators (operators having been four years and under in the Company's service). The chair was taken by the Traffic Manager (Mr. E. J. Johnson). Papers were read by eight of the junior members as follows:—"A Day of Eight O'clock Duty," by Miss G. Ardin. "The Working of a Sub-Exchange," by Miss W. Nield. "Some Difficulties in Operating," by Miss N. James. "The Work of a Test Operator," by Miss M. Sleath. "My Experience at a Sub-Exchange," by Miss P. Somerfield. "Two and a Half-Years' Experience at a Private Branch Exchange," by Miss C. Simmons. "Sub-Exchanges versus Central Exchange," by Miss N. Thornton. "Operating," by Miss Widdowson. The first prize, presented by the vice-president, was awarded to Miss N. James. The second prize, a case of tea spoons, presented by the supervisors, was awarded to Miss G. Ardin. The third prize, a serviette ring, presented by the Clerk-in-Charge, was awarded to Miss W. Nield. The prizes were presented by the Clerk-in-Charge (Miss L. Ibbotson).

The fifth meeting of the Sheffield Telephone and Operators' Telephone Societies were combined and held on Feb. 16, the chair being taken by the Traffic Manager (Mr. E. J. Johnson). A paper was read by Mr. W. Napier (Engineers-in-Chief's Department) on "Traffic." The subject was dealt with in an interesting and instructive manner, being illustrated by numerous interesting slides. Time did not admit of a lengthy discussion at the close of the meeting, but some interesting points were raised by the District Manager and the Exchange Manager, which were suitably replied to.

**Southampton Operators.**—The third meeting of the session was held on Jan. 26, when the following papers were given by operators:—Miss Scott on "P.B.X. Working." Miss L. Haynes on "P.B.X. Working." Miss Reid on "Use of Vibrators." Miss Davidge on "Operating Generally." Miss Turner on "Enquiries and Party Line Recording." Miss Morris on "Operating Difficulties." The whole of the papers were considerably above the average, and were keenly appreciated. Over 50 per cent. of the members entered into the debate, and prizes were given, one for the best paper with the most useful points, and one for the best show in debate, the prizes being carried off by Miss Morris and Miss Turner respectively. The chair was taken by Miss Hoare, the Clerk-in-Charge.

**Swansea Operators.**—The fifth sessional meeting was held on Feb. 8, Mr. W. J. Hodgetts (vice-president of the society) occupying the chair. An interesting and instructive lecture was given by Mr. A. G. Bristow (Traffic Manager), entitled "Sound Waves and their Application to Telephone Work." The fundamental principles of sound were demonstrated by means of some interesting practical experiments and illustrations of the waves produced when various vowels and words were expressed, were shown by means of lantern slides. The lecture was much appreciated by a good attendance of members.

**Swansea.**—The fifth sessional meeting took place on Feb. 15, Mr. W. E. Gauntlett (District Manager) occupying the chair, when Mr. A. G. Bristow (Traffic Manager) repeated his lecture on "Sound Waves."

**Sunderland and Shields.**—A meeting was held on Jan. 25, Mr. W. J. Douglass presiding. A paper on "Works Orders" was given by Messrs. Hall and Vernon, followed by a discussion in the undementioned took part: Messrs. W. J. Douglass, E. Spink, J. G. Dixon, R. Guthrie and J. Martin.

**Torquay.**—The sixth meeting was held on Jan. 30, when papers were read by the Misses Rowe and Harding on "Some Notes on Operating," which were exceedingly good. The chief point brought forward was the necessity of educating the subscriber. A good discussion followed the reading, and at the close of this Mr. P. Bovey read a paper entitled "Line Faults, their Cause and Remedy," which evoked great interest amongst the members of the line staff. An animated discussion followed on points raised.

**Western (Metropolitan).**—The fourth meeting of the session was held at Gerrard Exchange on Jan. 26 last, when a paper on "Combined Test and Fault Clerk's Duties," by Messrs. W. A. Stradling and F. C. Taylor was read. The paper gave a good description of the combined duties which had been in operation for some months past, and the advantages and disadvantages of the new system were clearly set out. An interesting discussion took place at the conclusion of the reading.

**Weymouth.**—The second meeting of the session, held on Dec. 15, was attended by 70 per cent. of the members in addition to a number of visitors. The Local Manager, Mr. Attwooll, gave a paper on "Line Work," illustrated by a series of lantern slides, Mr. Braithwaite, the Chief Inspector, taking the chair. The line staff was strongly represented, and contributed to an animated and interesting debate.

At the third meeting, which was held on Jan. 12, a paper on "Traffic" was given by Mr. S. O. Allen, the recently appointed Traffic Manager for Hants and Dorset, and as this was the first occasion on which Mr. Allen had given a paper to the Weymouth Society, his visit was much appreciated. Mr. Allen's paper was both interesting and topical, the speaker having given due regard to local conditions. The Chairman, Mr. Attwooll, after a vigorous discussion by the members, summed up in an instructive manner to an attendance of 82 per cent. of the total membership.

The fourth meeting of the society, held on Feb. 9, provided a thoroughly instructive evening, Mr. Braithwaite, the Chief Inspector, giving a paper on "Exchange Equipment," which was illustrated by a number of slides descriptive of central battery exchanges. As the lecturer has the advantage of a considerable experience in C.B. working, he handled his subject in an intelligent and comprehensive manner, his paper being in every sense educative. The Local Manager presided over an attendance of 93 per cent. of the total membership, this being the largest attendance of the session.

**Wolverhampton.**—On Feb. 3 a paper was given by Mr. W. Bentley on "Curve Plotting and the Slide Rule." Their advantages were very lucidly explained by the lecturer, and the paper was keenly followed by the audience present, numbering about 40. The chair was occupied by Mr. R. W. Lloyd.