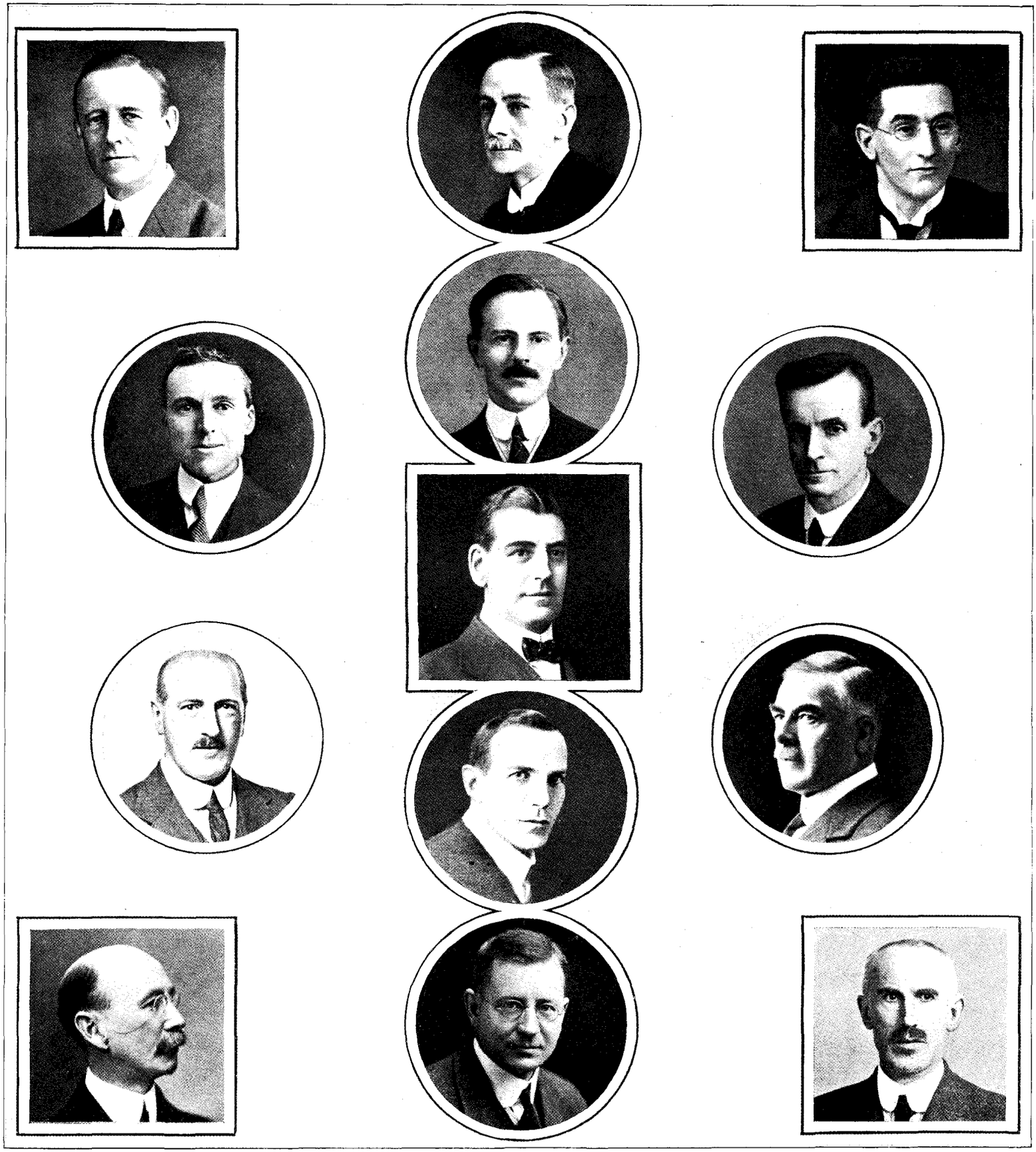

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(*Metropolitan Superintending Engineer*).

The Postmaster-General, the Assistant Postmaster-General, and the Principal Officers of the Telegraph and Telephone Service wish the readers of "The Telegraph & Telephone Journal" a Prosperous New Year.

Photograph of POSTMASTER-GENERAL, by Lewis, Croydon; of Sir E. MURRAY, by Lafayette; of Mr. DALZELL, by Elliott & Fry; of Sir HENRY BUNBURY, by Mullins, Ryde; of Mr. LEE, by Abernethy, Belfast; of Mr. VALENTINE, by Wil[illegible]; of Mr. STRANGE, by Hana, London.

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TELEGRAPH AND TELEPHONE MEN AND WOMEN.

XXIV.—

MISS A. C. CLARKE.

MISS ALICE CONSTANCE CLARKE, Supervisor, Telegraphs, Liverpool, was educated in Dublin and joined the Post Office service as a Sorting Clerk and Telegraphist at Liverpool. She had been an-Assistant Supervisor for some years, when, in 1917, her patriotic instincts and energetic temperament led to her joining the Queen Mary's Army Auxiliary Corps, with which she served in France from July, 1917, till September, 1919. Her devoted services led to many tributes from her superior officers and to the award of the Medal of the Order of the British Empire (Military Division).

Miss Clarke, who was promoted to her present rank in 1920, is well-known throughout the service as a member of the Executive and of the General Council of the Controlling Officers' Association, in which capacities she has proved to be a doughty champion of the claims of her sister officers in the service.

She is a woman of wide interests, but, in particular, she is attracted by the position of women in the economic life of this and other countries, and the movement for affording women greater opportunity and more scope in the service of the community could hardly have a more enthusiastic or more charming an advocate. She has a native brightness and optimism, a cheery outlook and a readiness of retort which never loses its kindliness.

NOTES ON TELEGRAPH PRACTICE.

BY G. T. ARCHIBALD.

(*Continued from page* 64.)

XII—Concerning Telegraph Apparatus used by the Post Office—Past and Present—Automatic Systems.

THE development of printing telegraph apparatus has been specially noteworthy since 1905. Up to as recently as twenty years ago hand signalling Morse was the characteristic type of telegraphy in use, and practically the only machines employed were Wheatstone automatic transmitters and receivers both of which were weight driven. This type of apparatus was used almost exclusively on news wires.

At one time it appeared likely that there might be a field for considerable development in this direction, but the laying down of underground cables which did not permit of high speeds except with more sensitive and costly apparatus, and the introduction of reperforating and printing machines put an end to ordinary Morse working on heavily loaded routes.

In 1873, as we have seen, the speed of the Wheatstone Morse Automatic system had been raised from eighty to two hundred words per minute, and within ten years of the transfer of the telegraph undertakings to the State one hundred and seventy-three such circuits were in operation.

In an admirable paper read before the Telegraph and Telephone Society of London in 1920 Mr. A. J. Stubbs, M.Inst.C.E., Assistant Engineer-in-Chief to the Post Office, gave some striking details concerning the gradual increase of speed of the Wheatstone automatic system. Mr. Stubbs told how the low Press tariff drove the Post Office to develop to the utmost this, the most economical method then known of disposing of Press telegrams. In 1890, by which time the speed had been increased to two hundred and fifty words per minute, the Engineer-in-Chief, Sir W. H. Preece, demanded a speed of from 400 to 500 words per minute, and it was with pride that Mr. Stubbs related how, within a few weeks, a Wheatstone transmitter was produced capable of being worked at the hitherto unheard of speed of 600 words per minute on aerial lines.

At this period the perforated tape or slip controlling the signals was generally prepared on " stick " perforators operated by means of three keys, one of them producing the perforations for signalling dots, one producing the perforations for signalling dashes and the third producing the space signal. These instruments were capable of perforating two and even three slips simultaneously, but the additional physical effort required of the operator in the production of more than one slip was considerable, rendering the work somewhat arduous. Pneumatic perforators designed to prepare from six to eight slips simultaneously were installed at some of the larger offices, but they were little used outside the Central Telegraph Office, London.

Expert operators work both types of perforators at speeds of from twenty-five to thirty-five words a minute: both are noisy in operation: the " stick " perforator keys requiring a fairly vigorous blow by means of an iron stick or tapper which is rubber tipped. The work is not usually given to women operators: during the recent War, however, women rendered excellent service in this direction, many becoming expert " punchers."

The need for a suitable keyboard perforator had long been felt when in 1898 Mr. F. G. Creed, who has since become famous in the telegraph world, invented a pneumatic keyboard perforating machine. It was tried by the British Post Office, but later gave way to the electrical keyboard perforator invented by Mr. John Gell, which did not require pneumatic pressure, and was, therefore, easier to instal and maintain. This was followed in 1914 by the Kleinschmidt electrical keyboard perforator which, like the Gell machine, continues to work well at a speed of upwards of 40 words per minute. The use of these machines has made it possible to employ women more regularly on Wheatstone automatic work.

The volume of Press traffic dealt with in the fifteen years before the war was so great, especially during the summer, that much difficulty was experienced in dealing with the vast quantity of Wheatstone Morse slip which had to be transcribed and retransmitted from the news distributing centres, i.e. London, Manchester, Liverpool Leeds, and a few other large offices. From six to eight transcribers were required to deal with the output of a single Wheatstone automatic circuit working at a high speed, and heavy delay could not always be avoided. Typewriters were introduced at a number of offices, and many operators were trained in the touch typing method with some success.

Meanwhile, Mr. Creed had not been idle, and in 1903 his now famous Morse Reperforator and Printer were tried at Manchester. The Reperforator at the receiving end prepares an exact facsimile of the perforated slip passed through the Wheatstone transmitter at the sending point, the received slip is then passed through the printer, which produces a printed slip which is, in turn, gummed on forms for delivery to the public and the Press. The latest model of reperforator and printer work efficiently at a speed of 150 words a minute.

Initially Creed apparatus was used only on a few news wires, and although the working speeds are considerably below that obtained under ordinary Wheatstone conditions the former system possesses many advantages, bearing in mind that underground lines, now in almost general use on main routes, impose a limit on the speed of transmission. The Creed reperforator slip is used for the further transmission of the items, whereas under ordinary Wheatstone conditions a fresh slip must be prepared at the transmitting office. Moreover the output of a single Creed installation can be disposed of by one gummer and checker, and the disappearance of Morse slip for transcription has proved of immense value in traffic organisation.

A duplex automatic system invented by another famous telegraph inventor, Mr. Donald Murray, was tried in 1901. A slip was prepared on a keyboard perforator and passed through a transmitter, the subsequent processes being similar to those employed in the Creed system, except that the telegrams were printed on forms instead of on paper tape. The five unit code—a code of uniform time value built up of five positive or negative impulses for each symbol—was used instead of the Morse code in this installation. The apparatus was first placed on the London-Edinburgh route, the best traffic record being the disposal of 1,727 telegrams in 7½ hours, an average of 230 per hour. From 1906 to 1910 it was operated on the London-Dublin route, and after a further trial of 4 years on the London-Leeds route it was finally abandoned in 1914.

The Buckingham automatic printing telegraph was tried between London and Glasgow in 1903. This system worked at a speed of upwards of 100 words a minute, slips being prepared by means of keyboard perforators. Ordinary Wheatstone transmitters were used for signalling purposes, but the varying length of the letters of the alphabet introduced complications in the keyboard perforators. The signals were received at the distant end on a printer of peculiar construction, and the telegrams were printed on forms cylindrical in shape which had to be inserted in the apparatus by hand for each message. The system was discarded for the reason that an error in the perforated slip necessitated re-perforation of the whole message. A staff of 14 operators was required when the system was working at about 125 words per minute.

The next, and the last duplex automatic system to be tried, was the Siemens-Halske—a German product. This was operated

between London and Liverpool, and worked very well at a duplex speed of about 160 words per minute. The five unit alphabet employed is designed to suit the German language and to reduce the alternations of current in passing from letter to letter. Perforated slip prepared on keyboard perforators is passed through a transmitter and the received signals bring into operation a local current through the brushes of the receiving distributor which move in phase with the brushes at the sending end. The selecting mechanism is controlled by five magnets, and the telegrams are printed on paper tape. The distinctive feature of this system is the provision of two sets of relays which alternately print and receive the incoming signals. Only one tape wheel printer is employed, and this operates at the surprisingly high speed of about 100 words per minute, printing direct on tape. The system also includes an arrangement whereby each keyboard perforator, by being joined to the receiving apparatus becomes a re-perforator, producing a perforated tape identical with that run through the transmitter at the sending end. As only one Siemens installation is used in this country the device is of no practical value. The apparatus was transferred to the London-Berlin route in 1922, and is still rendering useful service.

The trials of the Murray Automatic, the Buckingham, and the Siemens-Halske were conducted concurrently with the extension of the Creed Wheatstone system. Prior to 1907 Wheatstone working was used for ordinary traffic only during periods of line breakdown due to storms, etc., and occasionally in order to dispose of the heavy increased traffic during the summer pressure periods. The regulations governing spasmodic Wheatstone working were very strict owing to the difficulty of dealing with quantities of slip for transcription, and, as a general rule, this form of working was forbidden unless the transit time was likely to exceed thirty minutes, and even then the consent of the distant office had to be gained before perforation commenced.

The Creed system had proved most successful in connexion with Press traffic, and it is not surprising to find that in the absence of any other suitable system of machine telegraphy the British administration decided to test its merits on commercial circuits, i.e. circuits dealing with ordinary inland telegrams. The system was first tried at duplex on these circuits in 1907, the number of circuits so equipped rose to thirteen in 1910, and to twenty-four in 1913. It is recorded that as many as 284 telegrams were run in fifty-five minutes on a single channel, and that 2,808 telegrams were dealt with in eight hours on a circuit working between London and Edinburgh.

The Continuous Wheatstone Creed working on commercial circuits was not, however, a complete success, but its failure was not due in any way to defects in the apparatus. The lining up of traffic to be passed through a single transmitter caused undue delay during the peak pressure period, and difficulties in asking for and receiving corrections on routes where only one outward and one inward channel was provided proved to be a really serious disadvantage. It is doubtful whether this method of dealing with ordinary telegrams would have received a very extended trial but for the fact that the Telegraphists' Cramp Committee in their report issued in 1911 had recommended the Post Office to replace the Morse and other manual systems of telegraphy by keyboard systems to foster the efforts of inventors to produce high speed automatic apparatus.

In 1913 Mr. John Newlands, Controller of the Central Telegraph Office, London, expressed the opinion, in a paper read before the London Telephone and Telegraph Society, that there was a strictly limited field for Wheatstone working. Mr. Newlands pleaded for the development of the Baudot system, which, he said, would revolutionize the service if installed on all important routes. Early in 1914, however, it was decided to continue Wheatstone working on the circuits equipped with Creed apparatus until a Committee on High Speed Telegraph apparatus, then sitting under the chairmanship of Captain Cecil Norton, M.P., presented its report.

Unfortunately the great war prevented the completion of the High Speed Committee's, task but the report issued in Jan., 1916, was conclusive on two important points. The Committee found that the five unit code possessed many advantages over the Morse code for printing telegraph systems and that multiplex was superior to high speed automatic duplex working for ordinary traffic. The experience gained in the British telegraph service confirms this view, and the policy of the Post Office is to extend the use of multiplex systems wherever practicable and economical. High speed automatic (Wheatstone Creed) is now used only in emergencies on ordinary circuits; it is still, however, in daily use on news circuits.

Whether at some future time news traffic will be disposed of over multiplex or some similar system is a matter for speculation, but it seems quite certain that high speed duplex automatic systems will not again be employed as the standard method of dealing with ordinary telegrams.

(To be continued).

THE LONDON TELEPHONE AND TELEGRAPH SOCIETY.

"Fifty Years of Telephone Progress" was the title of a paper read before the above Society on Dec. 21 last by Mr. W. Day, M.I.E.E.

As a literary effort this paper was a model of careful preparation and condensation which, as one of the speakers afterwards said, was indeed a tribute to the condensatory powers of Mr. Day.

Mr. Valentine, the Chairman, at the opening of the debate introduced Col. Clay, formerly Metropolitan Superintendent of the National Telephone Co., who gave some racy stories of how telephone subscribers behaved in the good old days, when one irate customer brought his telephone to the offices of the company and dumping it down on the counter, shouted "Take your telephone, and when you've make it work let me have it." Those were the days when a notice such as the following was not unusual: "Subscribers in using the instrument will hear many voices, but after a while they will soon get to know which voice is the voice they want"!

It was Mr. Clay who, in one experimental long-distance talk, that between Liverpool and London, obtained actual audible transmission, not by means of the human voice but by making his dog bark into the transmitter!

Mr. Hart thought that Mr. Day should have separated his paper into two sections which he considered should have been "the progress made in transmission across space," and that made in the direction of "switching devices." He pleaded for a broader view of inventions and inventors, and thought that Mr. Day had unduly stressed the name of Bell, and remarked upon the omission of the microphone by Professor Hughes.

There was also a loss of perspective, said Mr. Hart, as regards the lecturer's views on underground cables versus overhead. There was no virtue in cables as against overhead lines. Cables were introduced because there was no space for overhead construction.

Mr. Shackleton defended other claims to the invention of the telephone, while Mr. Dive thought that Mr. Day would have done better had he rather drawn a comparison between what advance the telephones might have made with that which they had actually made. Had they developed as much as one would have expected in so many years? Mr. Dive did not answer the query, but he did admit as did others that the discussion on the case for or against this or the other claimant as the inventor of the telephone had left him more confused than ever on the point.

Major Lee stated that without wishing to disparage the value of history he personally generally ignored the past but looked forward into the future, nevertheless he had profited by Mr. Day's retrospective paper. On the other hand he felt bound to differ from the view that invention was always an individual function. Invention could be a collective matter, he continued, and cited the excellent team research work done here and in America as a proof of this statement.

Among the remaining speakers was Mr. Prout, still sprightly after four and more decades of telephone work, and now condemned, as he said, for his former telephone sins to work out during his closing official years a forecast of probable telephone development for the next quarter of a century.

One speaker made the unparalleled error of misnaming two of the preceding speakers when referring to their speeches. This would not have been mentioned in the ordinary way of a report but for one fact and that is the culprit was the writer!

J. J. T.

A DAY'S SAFARI WITH A TELEGRAPH INSPECTOR IN TANGANYIKA.

BY CHAS. H. POOK, TELEGRAPH INSPECTOR, DAR-ES-SALAAM, EAST AFRICA.

EVERYONE I know whose occupation causes them to be tied to an office for long stretches of time, on hearing the magic word Safari, invariably says "lucky devil!" and assumes a faraway look about him that shows that love of adventure—for in its broadest sense Safari always conveys that meaning—is by no means extinct in him. It probably opens up to him a vista of days on end away from the dull routine of office, and life among the evanescent glories of the "blue."

Having "had some," I often wonder how nice it would be to have a snug house with its assurance of safety, decently ordered meals and an office that gives sufficient shelter from sun and rain. All this is by the way—now for actuality.

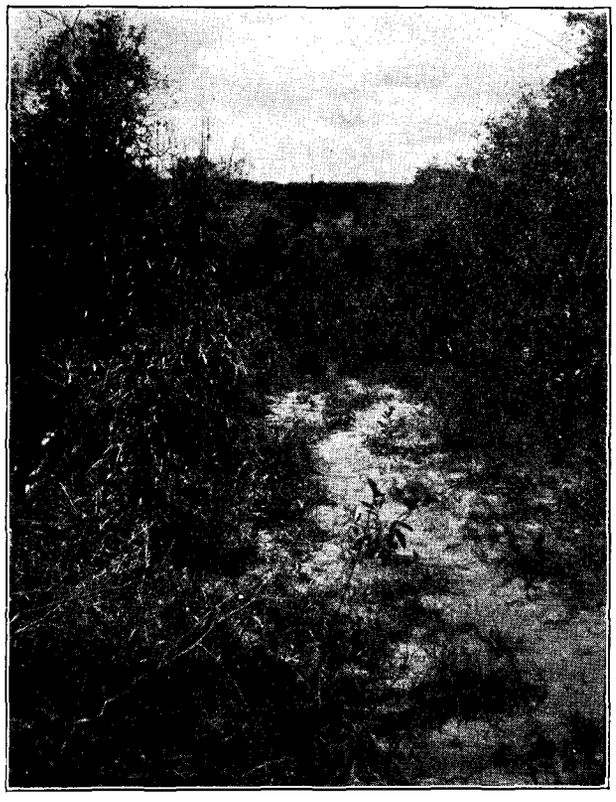
The day opens to me as most days do in this world, with that "nothing on earth" feeling. Somebody away in the distance says "Chai Bwana," and I semi-consciously sip Ideal Milk with a touch of Lipton's Best therein. Then one recognises such hazy objects as tent poles, safari kit, the first glimpse of the sun and porters arriving from devious directions.

A wash dispels most of the gloom, and, anyhow, the day has to be faced now, so one soon gets mixed up with tent, bed, and boxes in various stages of assembling and dissembling. At last everything is ready for a move, and the quarelling over the lightest load among the porters has been repressed by methods learnt from sergeant-majors in the days of yore.

A LITTLE DIVERSION THAT THE HOME SERVICE DOES NOT OFFER.

So we come to "Kazi," which means following that endless, monotonous line of telegraph poles that in some manner keep their end up against all comers and occasionally are the medium whereby people of means receive little buff envelopes and their portentous contents.

By now breakfast time has arrived—no wise East African thinks of breakfasting before 9 a.m.—and considerable thought is given to deciding whether to try the egg or the tinned kipper. Anyhow breakfast is soon over, aided by innumerable flies, and one now feels settled down to the rut, and the party start off once more. Towards midday, when one is looking gratefully at those cool, leafy glades that are occasionally passed, the trouble is discovered. What



A TELEGRAPH LINE IN TANGANYIKA. (PART OF OVERLAND ROUTE BETWEEN UGANDA AND CAPE TOWN.)

a mess! The elephants or giraffes must have been having a Ngoma hereabouts or perhaps "it just happened so." Everyone does the wrong thing and tells everybody else to bring something else—what a nation of foremen this country could produce!—until the voice of the sergeant-major is again heard, and somehow or other the telegraph line is made to look a little more respectable, despite the attempts of the workmen to turn all things the wrong way—even the ratchet-drums! Nevertheless, one must admire the way they handle the iron telegraph poles which under the sun's "kindly beams" are now scorching hot. So the little buff envelopes again begin to circulate, to somebody's joy—or sorrow, and I seek solace under a big branched tree with some *pre-determined refreshment.*

LINE BOYS (IN UNIFORM) AND WORKMEN. (*Taken at Temporary Store and Headquarters, Sadani.*)

Two o'clock! The sun is now more kindly, and a start has to be made for that distant village. Country undulating a little is passed, with an occasional stiff drop into a dry river bed. Just a further effort is required before the objective is gained, and that is by passing through a stretch of water nearly half a mile in length. This means being immersed knee deep and sometimes thigh deep in muddy water, plus discomfort and solid work. One wonders why the Germans put up a telegraph line through all this mud when there is such a lot of dry ground about. Still, let us put that down charitably to their immature knowledge of the East and the hundred and one difficulties that encompass the pioneer.

The village is eventually descried with a jaundiced eye, and after putting up the tent, the inevitable Jumbe arrives with the inevitable fowl and eggs; but I quickly decide to forego these luxuries—how I hate fowl and their by-products!—and dine a la Morton's Messes. A bath, followed by a stiff sundowner, and the world is again good to behold, probably an illustrated paper is perused, or more probably the "pictures are read"—and by the way, who on earth writes those illuminating little explanations under them? Dinner is disposed of in a summary fashion, and soon one seeks solace in that "six by two" wherein Tanganyikans spend a considerable part of their lives.

THE TELEPHONE DEVELOPMENT OF THE WORLD AT THE END OF 1924.

BY W. H. GUNSTON.

As in 1923, about a million and a-half telephones were added during 1924 to the total number in existence in the world. In the former year, however, nearly a million of this increase was provided by North America and only 440,000 by Europe: in the year under review 501,000 were added by Europe and about 840,000 by North America. Of Europe's increase 142,845 were yielded by Germany, 115,929 by Great Britain, 521,559 by France, and 22,147 by Belgium. This is the first time, so far as our records show, that the year's increase of telephones in Europe has exceeded 500,000.

The totals for the World, by Continents, are :—

	1923 Thousands).	1924 (Thousands).
Europe	6,341	6,842
Asia	781.5	863
Africa	136	153
North America	16,532	17,370
South America	345.5	362
Australasia	426	478
	24,562	26,068

In the subjoined tables the figures given are mainly obtained from official sources; a few cases, denoted by an asterisk, are estimates based on last or on an earlier year's figures.

Expressed in terms of telephones per 100 inhabitants the development of the chief telephone-using countries of the world is as follows :—

United States	15.3
Canada	12.3
Denmark	9.2
New Zealand...	8.5
Australia	6.9
Sweden	6.9
Norway	6.2
Switzerland	4.8
Germany	4
Netherlands	2.9
Great Britain*	2.9
Austria	2.4
Argentine Republic	1.9
Belgium	1.8
France...	1.6

*It will be seen from p. 83 that Great Britain's percentage is now 3.1.

The above list includes all countries with 100,000 telephones and upwards, and an average of 1 telephone and upwards per 100 of population.

TABLE A.—EUROPE.

Country.	No. of Telephones	Population (Thousands)	Inhabitants per telephone
Austria (135,839) ...	144,884	6,067	42
Belgium (114,797) ...	136,944	7,077	55
Bulgaria (7,283) ...	8,097	4,861	600
Czecho-Slovakia (103,606)	110,000*	13,588	123
Danzig (Free City of) (17,280)	17,234	356	20
Denmark (288,439) ...	303,754	3,283	10.8
Esthonia (8,611) ...	9,926	1,250	126
Finland (est.)... ...	80,000*	3,402	43
France (588,292) ...	642,851	39,209	61
Germany (2,242,332)	2,385,177	59,858	25
Great Britain (1,148,095)	1,275,524	44,150	34.6
Greece	5,000*	6,800	1,360
Hungary (74 679) ...	79,952	7,482	94
Iceland (est.) ...	2,500*	94	37
Ireland, Free State (20,762)	21,540	3,139	146
Italy (1,923)	142,603	38,500	264
Latvia (11,332) ...	15,804	2,000	126
Lithuania (6,029) ...	6,171	2,000	324
Luxemburg (6,656) ...	7,320	263.8	36
Netherlands (195,057)	204,676	7,029	34.4
Norway (163,000) ...	167,000	2,649	16
Poland (110,148) ...	124,000*	13,000	105
Portugal (18,000) ...	20,500	6,399	312
Russia (112,000) ...	131,613	136,000	1,033
Roumania (31,615) ...	34,580	17,000	492
Serbs, Croats and Slovenes, Kingdom of	27,457	11,600	422
Spain (est.)	110,000*	21,658	197
Sweden (402,389) ...	418,318	6,036	14.4
Switzerland (177,437)	186,297	3,888	21
Turkey (8,611) ...	9,801	2,000	232
Total, with allowance for Saar Region (13,000)	6,842,000	475,000	69

The figures in brackets are the totals for 1923.

It will be seen from table A that there was one telephone to every 69 inhabitants of Europe at the end of 1924. This figure, however, gives an altogether inadequate idea of the development of Northern and Western Europe. An area comprising Scandinavia, Germany, Austria, Switzerland, France, Holland, Belgium, Great Britain and Ireland and rather more than a third of the population of Europe contains 5,886,000 of its 6,842,000 telephones or one to every 30 inhabitants. If the rest of Europe were as well developed as this area, the Continent would possess some 15,500,000 telephones, instead of less than 7 million.

Austria.—(State system) showed an increase of 9,045 telephones, or 7% on last year. Vienna had 94,318, Graz 6,159, and Linz 4,334 telephones.

The small systems in the *Baltic States* all show considerable vigour. *Esthonia* has increased by 1,315 telephones or 15%, and *Latvia* by 4,472 or 39%. Reval (Tallinn) has 3,605 telephones, and Riga 9,073.

Belgium.—(State) increased its system by 22,147 telephones, or no less than 18%. Brussels had 47,528, Antwerp 19,572, and Liege 9,978 telephones.

Bulgaria.—(State) has increased by 814 or 10%.

Denmark.—This highly developed country increased its telephone system by 5.5%. The principal administrations are the Copenhagen Telephone Company with 162,064 telephones, the Jutland Company with 91,085, the Funen Communal system with 21,455 and the State system with 10,869.

Copenhagen and suburbs had 125,307 telephones.

The figures for *Finland* and *Czecho-Slovakia* were obtained from an American source. There are State systems in both countries,

but the service in the three chief towns in Finland is in the hands of private companies.

France.—(State) showed an increase of 54,599 telephones or 9% on the previous year. Paris had 227,968 telephones, Marseilles 16,339, Lyons 14,960 and Bordeaux 10,191.

Germany.—(State) showed an increase of 142,845 or 6.5%. Greater Berlin had 392,172 telephones. Hamburg 127,783, Munich 57,946, Leipzig 53,435, Cologne 52,460, Frankfurt (Main) 48,749, and Dresden 46,270. Seventeen other towns had from 12,000 to 34,000 telephones each.

Great Britain.—Of the 1,275,524 telephones in Great Britain and Northern Ireland, 1,244,457 were connected with the Post Office system, 14,426 with the Hull Corporation system, and about 5,000 with the Guernsey and Jersey systems. 11,500 private stations which enjoy exchange service are included in the total for the first time. Great Britain's total increased by 115,929 (without including the private lines referred to) or 10%. There were 439,223 stations in the London telephone area, 58,756 in that of Manchester, 47,760 in Glasgow, 45,571 in Liverpool, 36,473 in Birmingham, and 19,350 in Edinburgh. Nine other towns had upwards of 11,000 telephones.

Hungary.—(State) the total increased by 5,273 or 7%. Budapest had 32,055 telephones, and Debreczen, Pecs and Szeged each over 1,000.

Ireland.—The Free State system has increased by 4%. The largest city systems are Dublin with 13,297 telephones and Cork with 2,293.

Italy.—No later information than that for 1923 is available. The local system has been handed over by the State to private companies.

Netherlands.—The Amsterdam (39,019), Rotterdam (30,693) and Hague (27,430) systems are Municipal. The State system chiefly prevails elsewhere, its largest exchanges being Harlem with 6,132 and Utrecht with 5,981 telephones.

Norway.—There were 78,259 State telephones at the end of June, 1924, and 68,557 private companies' telephones at the end of 1923. Together with private lines having connexion with the State trunk system, the total for the end of 1924 may be put at 167,000 stations. 36,908 of these were in Oslo (State), and 8,736 in Bergen (private).

Poland.—The figure given has been estimated from the official total for 1923. About 50,000 telephones are connected with the Company operating in Warsaw and the large cities; the rest are on the State system.

Portugal.—The Lisbon (13,185 telephones) and Oporto (4,172) systems belong to the Anglo-Portuguese Telephone Company. About 3,000 lines are worked by the State.

Roumania.—(State) increased its total by 2,965 or 9%. Bucarest had 10,317 subscribers.

Russia.—The number of subscribers' telephones under the Soviet regime is 131,613, without counting extensions, which would bring the total number of telephones up to at least 145,000. Probably 12,000 or 13,000 of these are in Siberia, Turkestan, &c., leaving the total for Europe at about 132,000. Moscow had 29,703 direct lines, Leningrad 20,942, Kiev 3481, Baku 3,069, Rostov 2,451, and Kharkov 2,134.

Spain.—The statistics given are based on those for 1922, the latest available. The Spanish telephone system is now in the hands of a private company.

Sweden.—(State) increased its total by 15,929 or 4%. Stockholm, the best developed city system in Europe, had 102,829 telephones, Gothenburg 27,963 and Malmö 14,291.

Switzerland.—8,860 telephones were added in 1924, an increase of 5%. Zurich had 24,719 telephones, Geneva 14,805, Basle 14,025, and Berne 12,481.

TABLE B.—ASIA.

	Telephones.
Ceylon	5,435
China (est.)	101,000*
Hong Kong	8,804
French-Indo-China	2,500*
Japan	573,144
Chosen, Quantung, Formosa 1923	45,000*
India	42,170
Iraq	731
Netherlands Indies	39,630
Palestine	1,760
Persia	2,445
Philippine Islands	15,000*
Siam	1,575
Singapore	4,612
Straits Settlements	1,859
Federated Malay States	3,658
Siberia, Khiva, Bokhara	13,000*
Total	863,000

Table B gives a summary of the telephonic development of Asia. Two thirds of telephones are in *Japan* where the system is worked by the State. There were 119,885 telephones in Tokyo, 76,426 in Osaka, 22,156 in Kobe, 20,890 in Kyoto, 18,617 in Nagoya and 13,421 in Yokohama.

India.—At March, 1925, 25,222 telephones were connected with the Companies' systems, and 14,663 with the Government system. Calcutta had 10,710 stations and Bombay 9,906.

Dutch Indies.—2,940 of the telephones belong to a private company. The rest are on the Government system. Batavia had 8,042 stations, and Soerabaja 6,724.

Iraq (Government System).—There are 434 telephones in Bagdad.

The *Persian* system is worked by a private company, which has 1,316 telephones in Teheran, 232 in Isfahan, and 217 in Shiraz.

Siberia, Bokhara, Khiva &c.—Vide notes on Russia in Europe.

The Phillipine Islands, the *Singapore* and *Hong Kong* systems are private ones, the remaining Asiatic systems being State-owned.

TABLE C.—AFRICA.

	Telephones.
Algeria	21,582
Egypt	33,009
Tunis (est.)	6,500
Gold Coast...	464
Madagascar	750
Mauritius	1,203
Morocco (est.)	5,000
Nigeria	642
Portuguese Guinea (est.)... ...	6,000
Union of South Africa	73,825
Southern Rhodesia	1,847
South-West Africa	916
Kenya and Uganda	1,391
Total ...	153,000

The three chief systems are those of South Africa, Egypt and Algeria.

Egypt.—At March, 1925, 23,815 telephones were connected with a private company's system, and 9,015 with the State system. Cairo had 13,480 telephones, and Alexandria 9,533.

Algeria.—This is a part of the French Government's telephone system. Algiers had 6,533 telephones and Oran 3,228.

South Africa.—This is a Government system, except that the telephones in Durban are operated by the municipality. Johannesburg had 16,373 telephones, and Capetown 12,054.

(*To be Continued.*)

TELEGRAPHIC MEMORABILIA.

A HAPPY NEW YEAR! This to all my readers and to all those whom my readers love and know. My sincerest thanks also to these same readers who with a toleration the most kindly and generous have borne with me month after month for considerably over a decade without sign of ennui and with none but the most charitable criticism. This, my hearty and sincerest greeting, is made with the full knowledge, viewed at some angles, with something more than a tinge of regret, that officially, 1926 is my dying year and 1927 should see other initials at the foot of this column.

The Annual Report of the Pacific Cable Board for the year ending 1925 is an engaging document, and the following are amongst some of the most interesting items :—

"The forthcoming duplication of the cables between Vancouver Island and Fiji will involve expenditure of approximately £2,400,000, and the work will not be completed until the end of September, 1926. It is expected that during the period the reserve and renewal fund will be sufficiently strengthened to meet the cost of duplication in full. The effect of the reconstruction of salary scales has been to increase the liabilities of the pension fund, and the net sum provided to cover the increased liabilities was £6,600.

The depots, instruments, and plant generally have been maintained in a high state of efficiency. A new tri-core shore end was inserted by the *Iris* at Suva on the Fanning Island section in November, 1924. This completed the provision of tri-core shore ends on both sides of each of the long cables.

The Board was occupied throughout the year under review in giving consideration to the duplication of its system in the Pacific, and contracts have been placed (*a*) with the Telegraph Construction and Maintenance Co., Ltd., for the Vancouver Island-Fanning Island section; (*b*) with Messrs. Siemens Bros. & Co., Ltd., for the Fanning Island-Fiji section. The contractors have undertaken to complete the laying of these cables by September 30, 1926. The new cables will be continuously loaded with a metallic alloy of high permeability, and their guaranteed traffic transit capacity is more than twice as much as the capacity of the existing cables, and it is expected that in practice the guaranteed capacity will be largely exceeded. The total cost of the cables laid in 1923 (*a*) Suva-Auckland (direct) and (*b*) Southport-Sydney including equipment and engineers' fees, amounted to £337,940.

The total expenditure on the wireless investigations at Vancouver Island and Fiji (referred to in the report for 1922-23) amounted to £7,155, and the investigations established that the reception possibilities in the localities referred to were satisfactory, but in view of the cost of running wireless stations, as compared with the extra cost of working duplicate cables, and of the difficulty of securing secrecy and the certainty of continuous communication, it was ultimately decided to complete the duplication of the cables.

The landlines leased by the Board from the Canadian Pacific Railway Co. worked well, and the service on the landline which is allocated by the Australian Commonwealth Government for the exclusive use of the Board was generally satisfactory. The laying of the cables in the British West Indies and British Guiana was completed in July, 1924, and the last of the wireless stations was handed over by the contractors in February, 1925. Owing to the wireless stations not being completed, it was necessary to postpone the opening of the system until December 1st, by which time arrangements had been made for telegraphic communication with all the islands."

The developments of wireless on ocean travelling vessels is well illustrated by the following particulars of some recent contracts :—Six vessels owned by the Companhia Nacional de Navegacao Costeira, of Rio de Janeiro, are to be equipped by the Marconi International Marine Communication Co., Ltd., with wireless installations. The equipment for each ship will comprise a 1½-kw. quenched-spark transmitter, a 1½-kw. continuous-wave valve transmitter, valve receivers for spark and continuous-wave reception, a direction finder, and a broadcast receiver of the marine V4 type designed especially for ships. Loud-speakers operated by the broadcast receiver are to be installed in the music and smoking rooms of each ship. The receiving apparatus includes a four-electrode valve amplifier, and covers the wavelengths of all the transmitting stations in commercial use. The direction-finding installations will use the new fixed-frame aerial, which obviates the use of posts or jumper stays, and effects a great saving both in space occupied and in cost. In addition to the five broadcast receivers mentioned above, the Companhia Nacional de Navegacao Costeira has purchased from the Marconi International Marine Communication Co., Ltd., twelve more such sets for installation on other ships of its fleet. Orders have also been received from Messrs. Elders and Fyffes, Ltd., for six new vessels to be installed with Marconi 1½-kw. installations and fixed-frame direction-finders.

House telephones, which can also be used for outside calls, will take the place of the old-fashioned push bell in the new hotel which is being erected on the steel skeleton which has stood for ten years in Piccadilly, London. Arrangements have been made for the installation of four hundred telephones. The occupant of any room will be able to call up, on one instrument, any department in the hotel, or any number in the directory; he will be able to talk to his next room neighbour, or to the North of Scotland. Inside calls, of course, will not be charged for.

The cable steamers round the coast of this country appear to have had a full program these last three months. Quite recently the "Alert," the "Monarch," and the "Norderney," the "Faraday" and the "Poseidon," the latter not originally built for cable repairing but apparently successfully adapted to shallow-water repairs—could all have been seen during a trip up the English Channel into the North Sea.

Since last issue three of our old and respected pensioners have honoured the C.T.O. with a joint visit, namely Messrs. West, Hickman and Charlie Keen, all looking remarkably well on the "dole"!

Within a few days of this welcome visit Mr. Moody, formerly of the Cable Room, delighted a number of his old colleagues with a hearty hand-grip, and a long chat over old times. News has also been received of Messrs. Didden, Mathias, Neasmith, and Enness, all of the same department.

The Panatrope! Do you know what the panatrope is? Well the panatrope, according to Reuter's Trade Service New York, is a new musical producing instrument which operates on a wave of light, and synchronises electrical reproduction with electrical recording of sound. The system had its first presentation at the Eolian Hall in November last, and the instrument has been developed by the Radio Corporation of America, the General Electric and other kindred companies.

The Electrical Review records that the claim that it is possible to broadcast pictures in the same way as music is broadcast was put forward by Mr. Thorpe Baker during a recent lecture before the Royal Photographic Society. In the demonstration the resulting picture was similar to those which appear in newspapers, and the time taken for the transmission was three and a half minutes.

Mr. Thorne Baker is reported to have said that the receiving instrument which he had designed could be operated by any intelligent boy or girl and could be used by anyone possessing a valve receiving set. The cost of the sensitised paper for each picture should not exceed a penny, and by the method which he had demonstrated it would be possible to broadcast pictures of people or of events.

From the report of the Annual Meeting of the Western Telegraph Co., Ltd. held on November 26th last, under the championship of Sir John Denison-Pender, G.B.E., the following items are accepted as of particular interest to telegraph readers :—

In moving the adoption of the report the chairman said that the receipts, which had had a downward tendency since 1920, had increased, in spite of the low value of the Brazilian milreis, which had, however, recently improved. The general reserve had been debited with the cost of a very important renewal of cable, some 550 miles, at a cost of £131,278, replacing the last remaining portion of the original cable laid in 1874 between St. Vincent and Pernambuco. The new cable ships, the cost of which had been debited against the maintenance ships' fund, had been thoroughly tested on repairs and found satisfactory. The negotiations for a wire between Paris and London had made little headway, but it was hoped that the French would admit the justice of their application. The Italian cable to South America had been opened for traffic, but it was too early to say what the effect of that competition would be. South America was undoubtedly a great field for development, and the company had a well-equipped and efficient system which was giving satisfaction to its clients. So far, the Argentine radio station had had no effect upon the company, being engaged upon the cheaper class of traffic.

"PARIS."—Under this heading in our December issue was unfortunately published a somewhat misleading paragraph regarding matters connected with the late International Telegraph Conference held in the French capital. The writer accepts the full responsibility for its publication and tenders due apologies to the administrations which may have been inconvenienced. The blunder was in part due to the Christmas pressure, and although the error was discovered before copies were printed, the proofs had been passed and the make-up was actually on the machines.

The revised information is now given and should have read as follows :—

The plenary meeting of the International Telegraph Conference here adopted, on Oct. 24, the increases in telegraph charges recommended by its Tariffs Committee. While the maximum terminal and transit rates chargeable are thus increased to keep pace with the increased working costs, no country is obliged to raise its rates. Great Britain has come to an arrangement with all European countries that there shall be no increase in the rates to and from Great Britain, except in traffic with Italy, Switzerland, and certain other smaller countries, and in the case of these countries it is not certain that in every instance the increases will fall entirely on the public. The foregoing only refers to Intra-European traffic. As regards extra-European traffic, an increase in the maximum terminal charges at the European end is authorised, but the rates payable by the public will not be increased, the increases, if imposed by the Governments, being absorbed by the cable companies. The Intra-European increases will come into force on April 1, 1926.

A plenary meeting of the International Telegraph Conference on Oct. 21 also decided to make no changes at present in code language, but appointed a committee to report on the subject by next October. This means that the present rules as regards code cipher will remain in force until the next International Telegraph Conference is held."

The Bell Company of the United States are said to require no less than 200,000 telegraph and telephone poles per annum either for the construction of new lines or for replacing those in a bad condition. The company has no less than seven yards where the injection of these poles with creosote by a special process is carried on, and which, if the yards are working at full pressure can turn out as many as 139,000 fully preserved poles per annum.

Though not a telegraphic item most of our craft take a keen interest in electrical developments all over the world, and some few particulars of the feat of the new oil-electric railway engine, *i.e.* internal combustion oil engine *cum* electrical generator locomotive will arrest attention. This engine crossed Canada from Montreal to Vancouver in 67 hours, achieved two world's "records," one for the fastest run for such a distance (2,937 miles), and the other for the longest non-stop run ever made. The car left Montreal 16 hours after the Canadian National Railway fast "Continental Limited," passed it at Winnipeg, and arrived in Vancouver 22 hours ahead of it, the steepest grades of the Rockies being climbed at an average speed of 40 m.p.h. From the time the car left Montreal until it reached Vancouver the engine never stopped running.

The best wishes of the Cable Room staff to their war-time and much respected colleague follow Miss Slater upon her enforced retirement from the telegraph service. That she may have a pleasant and safe voyage and renewed health and strength as a result of her journey to Adelaide and her stay 'down under' is the devout desire of all those with whom she has been associated in the London office for years, be they few or many.

Congratulations and reciprocal wishes to the "F" division of the C.T.O. upon their Xmas and New Year's card, the design of which is distinctly unique. Congratulations also to the clever artist, Mr. A. H. Johnson, who has so skilfully, so humorously, and yet so daintly depicted the "re-building" woes of the interior of G.P.O. West. The picture is a series of many thumb-nail sketches all in humorous vein of the life of C.T.O. telegraphists *and* the supervision thereof, under and between scaffolding, ladders, beams, bricks and girders, and is well worthy of re-production.

AUSTRIA.—The Government telegraph service recently introduced a system of "lightning messages" which are accepted for specially rapid transmission to any part of the country, also to Germany and Poland, at a charge nine times that of the ordinary rate. Another innovation is a reduced charge for telegrams containing over 60 words for transmission between stations provided with Hughes apparatus. On messages containing between 60 and 100 words a reduction of 20 per cent. on the ordinary rate is allowed; between 100 and 150 words, 30%; between 150 and 200, 40%; and over 200 words, 50%.

BRUSSELS.—The Co-ordination Committee of the Council of the International Radio-phony Union, assisted by engineers, will meet in Brussels on December 14, when several plans for stabilising the European wave-length situation will be discussed. The scheme drawn up at the last conference of experts, while excellent in theory, has proved entirely unsatisfactory in practice. At present one of the worst culprits is Toulouse, which on one occasion recently was found to have changed its wave-length six times in 24 hours, so says the *Daily Mail*.

CANADA.—The number of amateur wireless receiving licences issued for the nine months of the current year ended Sept. 30, says Reuter's Ottawa agent, showed an increase of 7,823 over the previous year, making a total in use of 64,682. Ontario issued half the licences with a total of 32,833. The cost of each licence is one dollar per annum.

A "University of the Air" is to be established by the Manitoba Agricultural College, *in conjunction with the Manitoba telephone* system broadcasting station at Winnipeg. According to Prof. Clark Hopper, a series of diploma courses will be instituted by the college, all instruction being given by wireless. Examinations will also be conducted by radio, and students who are successful will be given diplomas.

CEYLON.—According to *The Times* experiments have been in progress since the end of September at the wireless station at Colombo, where new continuous-wave plant is in use, to ascertain whether it is possible to establish regular direct wireless communication on a commercial basis between Colombo and Perth, in Western Australia. Communication has been readily established, and the object of the experiments is to discover whether it can be maintained at all hours of the day and night and under all conditions. The new plant will be used also for broadcasting purposes on an 800-metre wave-length.

CHINA.—The Shansi authorities are constructing a wireless station at Hou Hsiao Ho Taiyuan, Shansi provincial capital. A number of experts and skilled mechanics have been engaged from Peking to carry out the work.

GERMANY.—Frankfurt is erecting a new high-power broadcasting station which will be ready in February. This 10-kw. station will be a considerable improvement on the present station, which is accommodated in the Post Office buildings. Frankfurt has at present 65,000 listeners, and arrangements were recently made to put crystal users in touch with foreign stations, which scheme has given much satisfaction.

The London *Evening News* states that police regulations issued for Berlin and Potsdam concerning the erection of roof aerials seem likely to handicap the development of broadcasting there. Police permission must be obtained before a roof aerial may be mounted. The request must be made in writing, together with a plan and description in duplicate, giving all details of the proposed construction: its distance from other buildings and properties, and from high- or low-power cables. On demand, proof of the firmness of the material and construction must be given. Within three days after completion, the police must be informed in writing, and asked to test the construction. The aerial must not be used until the final permit is issued, and it must be constructed of copper, bronze, or aluminium of a certain tensility, and must pass a certain temperature test. For the puzzlement of the unlearned, mathematical formulæ are added.

Early in 1924, said *The Electrical Review* in a recent issue, the Berlin Tramway Co. in conjunction with the telegraph authorities, carried out experiments concerning the causes of interference with broadcast radio reception, and came to the conclusion, according to *E.T.Z.*, that the chief cause of the trouble was the interruption of the small lighting current used in the tramcars. The motors themselves are also audible, but not to any objectionable extent if they are in good working order. The safest cure for the trouble, failing a complete reconstruction of the collecting gear, was found to be an increase in the lighting current from the existing value of 0.6 amperes to something like 2½ amperes. Following the publication of these results, further experiments were carried out in Halle, and it was there found that a further aid was the connection of condensers of considerable capacity between the collecting gear and earth, *i.e.*, in parallel with the lamps. When tried in Berlin the same good results were found when condensers of some 30 micro-farads capacity were employed. Experiments were next made in a number of other towns in which the tramways employ bow collectors of aluminium instead of the roller (trolley) collectors used in Berlin. In all these cases it was found that the condensers, instead of curing the trouble, produced hardly any effect at all. Inquiries made in other towns, such as Frankfort (on Main), in which the tramcars employ bow collectors fitted with carbon contact surfaces, showed that no interference with wireless reception occurs there, and this result was confirmed in Berlin and in Halle by the behaviour of experimental cars fitted with such carbon collectors. It would seem, therefore, that the best all-round cure for tramway interference would be to fit all cars with carbon collectors, an arrangement which should also meet with the approval of the tramway authorities themselves, as it would tend to reduce the wear on the overhead trolley lines. In the meantime the telegraph authorities are carrying out further experiments with a special car arranged to work with collectors made of various materials.

It is reported that three of the new 400-ft. masts of the Norddeich radio-telegraph station, which is controlled by the German Government, were blown down in a gale early last month.

HUNGARY.—Possession of wireless receiving sets in Hungary has now been legalised, and regulations governing their use have been issued, says *The Times*.

ICELAND.—(See Shetland).

INDIA.—The London *Times* says that last summer it was announced that applications for permits to establish a broadcasting company for India, together with applications for a separate company for Burma, would be received up to August 31 by the Director-General of Posts and Telegraphs, Wireless Branch. At the request of interested parties the last day for tendering was postponed to Dec. 7. There is no reason to believe that tendering was confined to interests associated with the Indian Radio Telegraph Co., Ltd., which some time ago took over the Marconi interests in India. The receiving *licence is to cost not Rs. 15 per annum, as at first suggested, but Rs.10.* Consequently the percentage payable to the broadcasting company has been raised to 15%. Various suggestions have been made as to meeting the claim of the promoters that they should be permitted to create a second source of revenue in addition to the percentage, and it is now announced that applications will be considered which provide for the payment to the company, by importers, *of a royalty on imported wireless apparatus. The duty on such apparatus* was fixed some time ago at 2½%, as compared with a general import rate of 15%. Another question as to which negotiations have been taking place is the extent to which the broadcasting programme may be utilised for the publication of Government announcements and *communiques*. Mr. McCarthy Jones has been selected to be the general manager of the Indian Radio Telegraph Co., Ltd., and is proceeding to India to take up his duties.

ITALY.—The new broadcasting station at Milan was inaugurated on Dec. 9; it will work on a wave length of 320 metres for the time being.

The *Morning Post* draws attention to modifications recently introduced in the law controlling radio in Italy. Owners of receiving sets may pay the annual fee for the licence in monthly instalments of 8 lire (about 1*s.* 4*d.*), and where sets are installed in public places, or for purposes of gain, special contracts will have to be made with the broadcasting companies. Manufacturers of receiving apparatus must obtain from the Ministry of Communications a special permit, which costs 500 lire annually.

Radio material is to be taxed; for example, the tax on every valve will amount to 6 lire, on every crystal set 12 lire, on every loud-speaker 24 lire, and on every receiving set having one or more valves 36 lire, in addition to the tax on the parts already mentioned, the amounts being added to the buyer's invoice at the time of the purchase. 10% of the taxation receipts go to the State, and 90% to the broadcasting company. Those who do not comply with the law are, in addition to the penalties laid down in the Penal Code, liable to fines of from 1,000 to 2,000 lire for all violations committed by manufacturers, merchants, and shopkeepers, and 200 lire where receiving sets are kept without a licence.

JUGO-SLAVIA.—When the new State (the Kingdom of the Serbs, Croats, and Slovenes) was created, its telephone and telegraph lines were in complete disorder, and the entire pre-war system in Serbia had been destroyed. Consequently, the Jugo-Slavian Ministry of Posts and Telegraphs had to practically rebuild the systems. The services now rendered are adequate, and not only are all centres of the country connected by wire, but Belgrade and Zagreb have direct lines to the capitals of all the neighbouring countries, except Italy, this line extending only to Trieste. At the end of 1924, according to *Commerce Reports*, there were 14,605 kilometres of telephone lines with 27,457 subscribers, and 20,039 kilometres of telegraph lines. Since 1921 new telephone lines have been put in service between Belgrade and a number of cities, and it is said that 27 telephone and telegraph lines are now under construction.

LONDON.—The *Radio Times* considers that it is undesirable that listeners should hold hopes of an improvement which has no possibility of being fulfilled for some time to come. Rather they should know definitely that the existing state of affairs must unfortunately continue during the present winter. No scheme satisfactory to all who must participate in it has been yet devised by which room can be found for 150 broadcasting stations in a wave-band which can only properly accommodate 100 stations. New proposals are being drafted, but they cannot be put into immediate operation. For the time being, therefore, no general alteration will be made in the wave-lengths of European broadcasting stations. Jamming between one station and another must get worse before it can become better.

The *Financial Times* remarks that for wireless communication with aircraft a limited wave-length band in the beighbourhood of 900 metres has been allotted, and while this has sufficed in the past, it is now in danger of being very overcrowded. When, this journal continues, it is considered that the average number of machines arriving at, or departing from, the London terminal aerodrome daily is about 70, and that there are frequently five or more machines within the British control area simultaneously, it is not difficult to understand that interference between machines and ground stations frequently occurs. The problem will be rendered the more acute when, as will possibly take place in the future, facilities are afforded to airway passengers to send private messages in a similar manner to that in vogue on board ship. As a partial solution, a scheme will be tried shortly in which the larger machines will carry an operator who will transmit and receive all his messages *by telegraphy instead of telephony*. Another aid is being sought in the use of shorter wave-lengths.

PACIFIC.—The contracts for the new Pacific cables were placed many weeks ago. The section between Bamfield and Fanning Island, which is 3,458 miles in length and is the longest cable in the world, is being made by the Telegraph Construction and Maintenance Co., of Greenwich, while the section between Fanning Island and Suva (Fiji) is in the hands of Messrs. Siemens Bros. of Woolwich.

PARAGUAY.—*Commerce Reports* states that interest in radio broadcasting is increasing, and the Ministry of War and Marine has apparently decided to purchase equipment, although the decree authorising this action has not yet been signed. The organisation of a broadcasting company, which the municipality of Asuncion has been asked to subsidise, has also been proposed.

SHETLAND.—It is announced by the *Financial News* that the Great Northern Telegraph Co.'s concession for a cable from the Shetland Islands to the Faroe Islands and Iceland has been renewed, subject to the approval of the Icelandic Alting.

SOUTH AFRICA.—Mr. Thomas Boydell, Union Minister of Posts and Telegraphs, recently stated that since the present Government took office in June, 1924, nearly 10,000 miles have been added to the country's telegraph and telephone facilities, which fact ought to impress upon British manufacturers the importance of the Government business likely to be on offer shortly in this connection. Official purchases of telephone and telegraph equipment in 1925 reached a higher figure than the £265,685 recorded in 1924, which was in its turn an advance on the £122,201 registered in 1923, and an effort is being made to add 3,000 miles to the farm telephone service before the end of the financial year in March. In 1924 British firms handled contracts to the value of £205,314 out of a total of £265,685, but both Swedish and German efforts to participate to a greater extent than formerly are very evident. There would appear to be little danger of Britain losing considerable ground, however, says the *Gazette*.

SPAIN.—Reuter's Agency, Madrid, informs us that the fresh distribution of wave-lengths among the Madrid wireless companies in order to avoid complaints of mutual interference is again being considered. The monopoly project cherished by different emitting companies at Madrid and in the provinces seemed a little while ago to have been dropped; the scheme has now been revived, but is meeting with strong opposition.

SWEDEN.—The Government and private broadcasting stations in Sweden are all now being connected together to the main station in Stockholm, *via* underground or aerial wires. At Stockholm there are amplifiers on each main route, and there are intermediate amplifiers at Ange and Norrköping. To prevent the stations nearest Stockholm taking too much of the power from the lines to the detriment of the stations further away, adjustable resistances are inserted in the feed to each station just before the local amplifiers in the station. The line between Stockholm and Boden is 1,000 kilometres long, in which at present one amplifier suffices, but additional ones will be required when the station at Umea and other projected stations are added. Some 40,000 licences were issued in 1924; 110,000 were issued up to Sept. 30, 1925.

SWITZERLAND.—SECRET BROADCASTING.—By order of the Swiss Federal Post and Telegraph Department, says *The Times*, the Geneva police have recently seized the wireless receiving set of a Geneva individual who had failed to register his set and to pay the yearly 10-fr. tax. According to the Swiss regulations, which compel amateurs to register their sets and to pay a tax, and which forbid them to write down what they hear, a fine may be imposed up to 1,000-fr. The Swiss police have also seized ten secret broadcasting posts set up by a secret association of young men for corresponding between themselves in Switzerland and with foreign countries.

UNITED STATES.—The *Daily Mail* reports that the new high-power station at Round Brook, New Jersey, which will shortly be operating on a power of 50 kw., carried out experiments on part power (35 kw.) during the night of Nov. 25-26. The wave-length was 455 metres and the call sign W J Zee. America is preparing for international broadcasting by building at Belfast, Maine, a receiving station, a novel feature of which will be a short-wave wireless link with the high-power station. Belfast, Maine, will thus pick up the Daventry programmes and relay them on a short wave to New Jersey, which station will broadcast the programmes all over the United States.

Following several fatal accidents in New England, says the *Electrical World*, due to the improper erection and construction of radio aerials, the Worcester (Mass.) Electric Light Co. has offered to make a free inspection of outside strung wires upon request of the owners. About fifty aerials have been inspected in one month from the standpoint of eliminating the hazards of too close proximity to primary and street-lighting circuits, attachment to company poles, and dangerous relationship to other wiring. The Hartford (Conn.) Electric Light Co. has announced to its employees that to encourage constant watchfulness against aerials attached to the company's poles, or erected over any of its wires, the company will pay after verification $5 to any employee reporting such an installation.

The receipts of the United States wireless industry for 1925 are expected to exceed $500,000,000 (£100,000,000), which would be an advance of $200,000,000 over last year's figures. The increase within five years from the $6,000,000 (£1,200,000) of 1920 marks a "record" expansion for any American business. The London *Times* says that the manufacturers estimate that in 1925 they will have sold 3,000,000 wireless sets and 20,000,000 valves, as well as $150,000,000 (£30,000,000) worth of parts and accessories for home-made sets and replacements. According to Major H. H. Frost, president of the Radio Manufacturers' Association, the industry now employs about 300,000 persons in 1,200 factories and 40,000 workshops. Out of 584 existing broadcasting stations, 108 are operated by educational institutions, 47 by churches, and 39 by newspapers.

The sincerest sympathy will have been felt by all our readers for Captain Eckersley in the unfortunate fire which not only deprived the energetic engineer of the B.B.C. of much valuable plant, but of the results of much trouble, thought, careful study and calculation.

The recent December storms which swept across Europe took full toll of both telegraph and telephone communications, and one wonders how much in cash has actually been saved by the delay in adopting a serviceable underground system for these two prominent means of international communication.

Admitted that underground lines as planned to-day—pre-eminently for telephones—and if possible for telegraphs so it would appear, and which also add to the difficulties of the telegraph services by restricting speeds of the latter and by introducing detrimental electrical factors, nevertheless stability is so great a desideratum that one rather feels inclined to accept a modern application of an old proverb and admit that "half-speed is better than no line."

Reading.—"The works of the great poets have never yet been read by mankind, for only great poets can *read* them. They have only been read as the multitude read the stars, at most astrologically, not astronomically."—*Thoreau.* J. J. T.

CORRESPONDENCE.

DUPLEX TELEGRAPHY.

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

Mr. Archibald's reference in his interesting "Notes on Telegraph Practice," to the purchase by the Post Office in 1879 of Stearns' duplex patents leads me to enquire whether any reader of the *Journal* could inform me as to the date on which practical duplex working was first carried out in this country. Mr. A. J. Stubbs, in his paper on "Fifty years of State Telegraphs," published in these pages in December, 1920, stated that the Post Office took the system up in 1879. It seems probable, however, that duplex working was established prior to that date. The late Mr. Frederick Cox, Superintendent of Telegraphs at Brighton, 1878-1897, and a keen student of all matters relating to the Telegraphs, in a communication written in 1880 to a well-known local historian, stated that duplex telegraphy was introduced between London and Brighton in 1873, and a private letter in the writer's possession written by Professor Stearns from Eastbourne on Dec. 16, 1873, indicates that the latter gentleman had been in Brighton some time previously in connexion with his system and was returning hither. There is evidence, too, that the London-Brighton circuit known as "TS 251" was worked duplex in 1874.

Another matter which may be of interest to students of telegraph history is the fact that the "Hughes" system was working between London and Brighton in the early seventies, but was abandoned on Aug. 31, 1873. Whether the introduction of duplex working had any bearing on the decision to discard the "Hughes" or not remains to be seen, but further investigations which are being made by the writer may decide the point.—Yours truly,

Telegraphs, Brighton. JOHN SKINNER.

The
Telegraph and Telephone Journal.

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Managing Editor - - - W. H. GUNSTON.

NOTICES.

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

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RUGBY.

RUGBY has made a sudden appeal to the Englishman's imagination. It has made other appeals in the past and not without success. Tom Brown in fiction (or half-fiction); Arnold in life; football in sport—of these is the fame of Rugby. To-day it makes another appeal. Twelve huge masts on the ridge just outside Rugby are dominating the world in a way which is difficult to realize. We have read descriptions of those masts; they are so many times higher than the cross on St. Paul's; they are built on a large ball-and-socket so that they can sway in the wind; they have their electric lifts so that repairs can be made speedily; they include a territory of more or less a thousand acres; they use an immensity of electric current in order that the ether may suitably and effectively be set in motion. All this is of the realm of the technician, and the hungry imagination asks for more. It asks questions as to moral and social value. It wonders to what real use such a vast enterprise can be put. Even thus early in the experimental stage one can see that certain skilled tappings of a sensitive apparatus in London can control and direct the motions of etheric waves from Rugby and that these motions become intelligible signs all over the world. That last phrase "all over the world" is used, in this connexion, with a literalness which is rare indeed. What seems to have been proved is that simultaneous transmission and reception (or at least as near to simultaneous as human faculties are capable of estimating) is now possible from London to every dominion. We may leave aside the suggestions that telephone speech may be possible by the same means. All that we need concern ourselves about at the moment is the possibility of simultaneous transmission, all over land and sea, of intelligible communications.

At this point our dreams may begin. It may be well to compare the beginnings with other beginnings of dreams. Claude Chappe presented his semaphore to the National Assembly in 1792, but it was Napoleon years afterwards who conjectured its utility. He saw its value in a military sense, and the history of telegraphy bears the impress of Napoleon's shrewd foresight. The nineteenth century used the telegraph for what we may call individual messages, and no other use of it seemed to be possible. It is true there is a sense of corporateness in what we may call "press" telegrams. They are gathered by agencies and distributed to various journals and these journals, in turn, distribute them to the world at large. But no one can say that this use of the telegraph is at all commensurate with the public needs. If any issue of a continental newspaper is examined for "news" from England it will be seen that the whole is comprised in a few lines. For the definition of "news" seems to limit it to an event of a particular type—a murder or a catastrophe. Anything in the way of a strike attracts notice; a vast wage settlement is treated with disdain. There is a curious spirit in international news which seems to revel in *schadenfreude*. It hates to rejoice with them that rejoice. It wants to look at events with that curious objectivity which enables one to look out from a window at others in the soaking rain and to feel a subtle satisfaction in so doing.

So the question may be raised whether, among the many uses to which Rugby can be put, there will be a broadening and a deepening of news services, and especially in the Imperial aspect. After all there must be movements of mind, or of art, or of political endeavour, or of industrial achievement which are of value—and of interest—outside the bounds of the country concerned. In the earliest days of telegraphy, fifty years ago, an enterprising American journal had a full telegraph report from London of new plays and new books. To-day the focus is a little different. It rests on piquant happenings to persons, the divorce of an actor or a robbery of an author's jewels—this latter being, of course, a fanciful instance. It seems odd to say so but we are a long way from using international communications for the enlightenment of the world. The telegraph wires go on gaily with their daily work when a cloud of ignorance has fallen over the world as regards the life in a particular country. It is significant that it is at this time that the International Telegraph Conference has legislated for telegrams at the reduced press rates by day as well as by night. It has chosen the occasion happily. So we can see all sorts of vistas opening up. Rugby makes a real appeal to the imagination.

1925.

THE year which has just passed was marked by another substantial increase in the number of telephones in this country. The total at the end of 1925, as nearly as can be estimated at the

time of writing, was 1,357,500, an increase of 113,900 for the year. This includes stations on the Post Office system only; but if we add the telephones connected with the Hull, Guernsey and Jersey systems, and 11,500 lines connected with private branch exchanges in the ownership of railway and other companies, the total for Great Britain and Northern Ireland may be put at 1,388,000 or 3.1 telephones for every 100 inhabitants. The London telephone system has increased from 439,223 to about 476,500 telephones. The number of new exchanges opened during the year was 195 and of new call offices 1,400. Whilst automatic telephony is making steady progress, the number of new exchanges actually connected to machine-switching during the year is nothing compared with the number of exchanges where the work is nearing completion, where installations of considerable magnitude are well in hand. Automatic exchanges were opened during 1925 at Kirkcaldy, Torquay and Paignton, and at Chapeltown, Headingley, Roundhay and Stanningley (Leeds area) and Cwmbran and Risca (Newport area), and these will be followed early in the new year by exchanges at Shrewsbury, Ipswich, Gosport and Hayling Island. This year is expected to see the completion of the extensive schemes in progress at Edinburgh, Sheffield, Coventry, Gloucester, Oxford, Harrogate, Halifax, West Hartlepool, Cheltenham, Chesterfield and other centres, so that 1926 will shew a very material addition to the number of subscribers served by the automatic system. In addition, solid progress has been made with the gigantic undertaking of converting the complex London system to automatic working. During 1925 the work of installation was actually put in hand at the Holborn, Bishopsgate and Tandem Junction exchanges, and although these will not be opened in 1926, that year will also see a start made with the installation of automatic apparatus at a number of other new London exchanges.

In the year under review continuous progress has been made in the work of placing the main trunk lines underground. Some additions have been made to the Anglo-Continental system, four additional circuits between London and Holland being brought into use and three between London and Paris. The coming year should see the projected Anglo-German service become a fact, and also the provision of a new cable between Great Britain and France.

As regards the Telegraph service, the best that can be said is that substantial progress has been made during the year in the improvement of plant and procedure. The decline in traffic, which set in six years ago, unfortunately continues, but there is a modicum of comfort in the fact that the decrease this year as compared with last year is slight. As we said a year ago there can be little reaction in the state of telegraph traffic until the trade of the country revives, and unfortunately that much desired improvement is long in coming.

In wireless there have been very considerable developments. The Post Office Rugby high power station has been completed and the work on several Beam stations has progressed rapidly. Short wave transmission of Press to Canada has been instituted, and has continued regularly night after night for some months past. A committee has been appointed under the chairmanship of Lord Crawford and Balcarres to consider the future of broadcasting after the termination of the British Broadcasting Company's licence at the end of 1926. The number of licensed listeners now approaches two millions, which was regarded in the early days as the saturation point, and there seems small sign of a falling off in wireless enthusiasts. The 25 kw. station at Daventry was opened on July 27 by the Broadcasting Company, thus affording facilities for "crystal reception" to large parts of the country where previously satisfactory reception demanded the use of expensive valve receiving apparatus. The law as to licences, which was passed before broadcasting was ever dreamt of, has been amended to exclude the elements of doubt which had been expressed as regards the application of the 1904 Act to receiving apparatus, and armed with the power of the Explanation Act of 1925 the P.M.G. has been able to check the growth of unlicensed stations by proving that it is cheaper to pay the nominal licensing fee of 10s. than to endeavour to get the wireless programmes for nothing.

We have touched but briefly on the varied activities of the Telegraph and Telephone Departments of the Post Office during the past year. To treat more exhaustively and in detail of the useful and interesting achievements of the Administration during that period would make too much demand on our space. Moreover several of the features referred to have been described in these columns when they were news and others will be dealt with more fully later. Enough perhaps has been said to give the reader an idea of the constant progress and development which is taken place in these services.

HIC ET UBIQUE.

"IN our calmer moments," says the *Daily Telegraph*, "we all respect the telephone operator. Whatever we may have suffered, we know that she has the worst of it. The telephone, of man's life but a part, is her whole existence. She has to deal all day long with the sort of people who ring us up and who answer when we ring anyone up. She must be a person of great physical, mental, and moral strength, or she would not long survive. Without surprise we hear that the Post Office finds it difficult to get enough of her. Only one in six, speaking roughly, of the girls who want to be telephone operators please the Postmaster-General. . . . Of the rejected, some stuttered and some lisped, for such is human nature that damsels with these failings consider themselves perfectly fit to operate telephones. Others had a slovenly habit of speech, slurring words, and dropping final consonants. Some could not hear, some could not see, and some could not spell; some suffered from an 'undesirable accent.' . . . But the ploughing of five candidates in six suggests that the schools should pay more attention to the art of speech. For it must be remembered that if five girls out of six speak too badly to be telephone operators, just as many are unfit to be telephone users. We wish that the Postmaster-General could see his way to make the passing of an adequate examination compulsory for subscribers."

The moral is pointed very nicely. When on the dangerous ground of "education of subscribers" it would be unbecoming in us to put the case so strongly as this.

The European Manager of the *Christian Science Monitor* has been good enough to send us a marked copy of that paper containing an interesting account of the extension classes arranged in Minneapolis for the messenger boys of the Western Union Telegraph Co. What interested us still more, however, was a letter in another column from a Boston "office manager" on the subject of telephone rates in which he makes the following complaint.

Three jobs were to be done in the office. A telephone man came to do the first job, and while he was there he was asked if he had the order and if he could detach an extra attachment on one of the instruments.

He said that he did not have any such order and that he could not do it, although it was but a three-minute job. He was asked if he could or would call up his department chief and get the order or permission to do the job, but he said he could not and would not. That was a job for someone else.

Several days later a very efficient and hustling young man came in and briskly asked about the attachment that was to be taken off. He was shown, and in a couple of minutes, with the help of a screw driver, the job was done.

Asked if he was going to do the third job, he said no, that was for another man. Asked if he had any other job on hand, he said not until he got back to the office and was assigned to one.

The third job is not yet done, but probably will be as soon as the rush is over.

Let's see! Wasn't it Sisyphus who used to keep pushing up a hill a rock which kept rolling down again?

We of course know nothing of the Telephone Company's version of this story—one rarely does—but the letter has a strong family resemblance to some which have in the past appeared in the British press.

According to a report on the Trade and Industry of Syria issued by the Department of Overseas Trade, a recent attempt was made, without success, to obtain tenders for a telephone service in Syria and the Lebanon. It is believed that the postal authorities may decide to take over from the army the existing service and try to work it themselves.

We learn also that a concession has been granted to the municipality of Smyrna for the operation of a telephone service, making provision for 2,000 subscribers, the city installation to be working within 15 months after the necessary capital is procured.

With public telephones working in Syria and Turkey-in-Asia, two more of the lacunæ in Asia's telephone system will be filled up.

Extract from a cablegram reclamation enquiry which readers may not know are carried out by all parties in the French language:

> "Le facteur, au quel ledit message a été confié, est un "homme très sérieux qui ne peut être soupçonné de "négligence dans l'accomplissement de ses functions."

Some testimonial!

The Annual Prize Distribution and Student's Conversazione of the Northampton Polytechnic Institute was held on Dec. 2. Lord Montagu of Beaulieu, K.C.I.E., distributed the prizes and certificates and gave an address.

The Conversazione was continued on the following Saturday, when the building was, as in previous years, thrown open to the whole of the members and students and their friends.

FIFTY YEARS' TELEPHONE PROGRESS.*

BY W. DAY, M.I.E.E.

THE question of progress has long fascinated thoughtful minds. The word itself is in common use yet it stands for many diverse conceptions. It may, for example, mean growth in ideals of human society, or in talent and strength of mind, or in wealth of human nature, or in material gains. The assumption that causes are constantly at work tending to raise the standard of civilisation, and to spread its successive achievements over an ever increasing area, is the motive power behind much of the thought and activity of the day. But this optimism is challenged by those who point out that from vast tracts and periods of time the idea of progress has been entirely absent. At any rate one chief mark of our era has been the evolution of science and the inventions thereby made possible. And surely we may regard the art of communication as the spearhead, pointed by speech transmission, of modern inventive developments.

Indeed the extension of the range of speech and the growth of intercommunication facilities for conversational purposes must be placed in the very forefront of those material agencies which have hardly yet begun to affect those great changes in human destiny which we must hope it is in their nature and their futurity to accomplish. In passing, it is worth while reminding ourselves that progress is no automatom: it is not spontaneous. Every sign of progress—and this as true of our day as of any preceding time—has been created by individual constructive thought and labour. Men cannot invent collectively. Progress in the sphere of scientific endeavour although conditioned by many circumstances depends supremely upon the scope and play allowed originating genius. This faculty most certainly marked Alexander Graham Bell, who fifty years ago demonstrated practically the possibility of transmitting along a wire by means of electricity musical sounds possessing not only pitch, but also timbre or quality, and, as a result, conceived the notion that speech by this method was possible. It is interesting to recall the circumstances in which this idea was born and developed. Bell, a professor of acoustics, possessed an intimate knowledge of all the varied aspects of his particular subject as well as a student's information concerning electricity. He believed that if accoustical resonance could be linked with the propagation of electrical currents, then it should be possible, not only to transmit musical sounds, but also to send simultaneously two or more morse code messages along a single conductor. Says Bell, "I imagined to myself a series of tuning forks of different pitches arranged to vibrate automatically, each fork interrupting at every vibration a battery current. The thought occurred why should not the depression of a key direct the interrupted current from any one of these forks through a wire to a series of electro-magnets operating the strings of a musical instrument at some distant place. It struck me," he goes on, "that in a similar manner the duration of such a musical note might represent the dot or dash of the morse code, each receiving operator listening for signals of a certain definite pitch and ignoring others. In this way could be accomplished the simultaneous transmission of a number of telegraph messages along a single wire—the number being limited only by the delicacy of the listener's ear."

After much experimenting, Bell found it impossible to transmit simultaneously the number of musical tones that theory indicated to be possible. The difficulty was due to the nature of the current employed, viz. a rapidly interrupted battery current during key depression. Bell thought that the trouble might be overcome by transmitting undulatory currents, but at first he was doubtful as to the possibility of generating currents of sufficient strength to make the idea practicable, as his apparatus consisted merely of a vibrating armature in front of an electro-magnet. But this misgiving was soon dispelled.

In June, 1875, Bell and his assistant Watson, were endeavouring to send simultaneously a number of telegraph messages along a single wire when the armature of Watson's receiver stuck to the poles of its magnet. Bell asked Watson to pluck the armature, and was startled to hear in his own instrument a tone not only of similar pitch, but also of similar timbre or quality to that produced by the instrument in use by Watson. This proved for Bell that magneto electric currents of useful strength could be produced, and, since he knew that speech is only sound with frequently changing pitch and timbre, it also gave rise to his conviction that transmission of speech by such an agency was a sure possibility. Thus an accident, which might well have been regarded merely as one of a number of obstacles in the way to a definite goal, was to Bell the source of an inspiration of tremendous potentiality in virtue of which he belongs to that far shining company of pioneers who have led mankind into new paths of scientific endeavour.

Bell had hitherto been attempting to increase the carrying capacity of a telegraph wire by using different frequencies in order to transmit a number of messages simultaneously: a problem still confronting telegraph engineers, and one which may yet be solved practically by the aid of the valve. But henceforth his energies were to be concentrated on the telephone.

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* Paper read before the London Telephone and Telegraph Society.

In March, 1876, Bell was granted a patent for his invention. The specification covered the electrical transmission of speech by undulatory currents no matter how produced. Two aspects of this patent are worthy of emphasis. First the comprehensive nature of Bell's proposal, and second, that the specification embodied a mental conception rather than a record of convincing demonstration. In other words, Bell stated clearly the essentials of telephone transmission, yet only indicated in a general way the means whereby they were to be applied in practice. It is indeed a far cry from Bell's invention to the telephone industry of to-day, with its world-wide ramifications and its great national and international organisations. Such a tremendous development has demanded an infinite diversity of effort, and the design of this paper is to consider in a short and direct way some at least of the more important of those outstanding inventions which have made possible the many advancements in the telephone art. Shortly after the historic experiments already mentioned there passed between Bell and his assistant Watson the first telephone message ever transmitted by means of electric currents. The apparatus used consisted of a cone to enable sound vibrations to impinge upon a stretched membrane to the centre of which was attached the armature of an electro magnet. The movement of the armature followed the vibrations of the membrane, and resulted in undulatory currents in the electro-magnetic coils which were connected to similar apparatus at the distant end via a metallic circuit. In passing through the electro-magnet at the receiving end the undulatory currents caused its armature to copy the movements of the armature of the sending station, and the original sounds were thereby reproduced.

A little later Lord Kelvin declared that Bell's invention was the most wonderful thing he had seen in America, thereby hallmarking Bell's great accomplishment. Henceforth, the problems centred round the production of commercial instruments and their application to the social and business activities of the community. One of the first steps in this development—the ultimate magnitude and character of which no man could foresee—consisted in substituting the membrane with its associated armature and electro-magnet by a combination consisting of a metallic diaphragm, and a permanent magnet with coils of wire wound round its pole pieces: the instrument serving both as transmitter and receiver. By this time Bell was receiving numerous suggestions from scientific workers, and the telephone instrument as a receiver soon assumed more or less the characteristics and form familiar to every user. But Bell's telephone had serious limitations when used as a transmitter, since the energy of the voice was used to produce the effects at the distant end, and these were of necessity weaker than the originating sounds. In 1877 Edison entered the field of telephonic endeavour and made possible a great increase in the range of telephone speech by his invention of the carbon *transmitter used in association with an induction coil.*

In the Edison transmitter the voice merely directs the movement of the diaphragm—a battery furnishing the energy used at the distant end. The movement of the diaphragm results in a corresponding variation of transmitter resistance, and, consequently, in the currents passing through the receiver at the distant end. But the resistance of the line marked the variations in transmitter resistance, and so Edison introduced the practice of using an induction coil to separate the transmitter circuit from that of the line.

The carbon transmitter, with many notable modifications leading up to the well-known solid back transmitter, together with the induction coil, remain standard practice. Edison's combination was indeed a vital contribution to telephone research. Transmitters and receivers were now in existence which could be used over what were then considered comparatively long lines. This success necessitated the development of means whereby subscribers could send a calling signal over similar distances. The earliest attempt to solve this problem consisted of devices by which the telephone itself could be used. These were soon superseded by an invention of Watson's—Bell's co-worker—in which use was made of a machine capable of sending alternating currents and actuating a magnetic bell at the distant end. The worth of this particular achievement will be realised if we bear in mind that Watson's ringer is still retained in principle. The introduction of magneto ringing as an accessory to the telephone led amongst other things to the provision of a switch with numerous contacts by which the circuit was automatically changed from the ringing to the speaking condition. Here, perhaps, it may be mentioned that the work done in connexion with the development of the magneto and other devices served more than a passing object. It reacted upon manufacturing ideas, and contributed to the evolution of those methods of mass production which constitute one of the distinguishing characteristics of present-day civilisation. And these methods were to be rapidly developed in connexion with that aspect of telephone progress concerned with devising means by which one subscriber could obtain communication with any other, subject to certain limitations, the chief of which, viz. that of distance, was itself to be gradually reduced in seriousness. The possibility and desirability of providing telephone exchanges was foreseen by Bell, who in March, 1878, wrote as follows:

> "In a similar manner it is conceivable that cables of telephone wires could be laid underground or suspended overhead communicating by branch wires with private dwellings, country houses, shops factories, &c., uniting them through the main cable with a central office, where the wire could be connected as desired, establishing direct communication between any two places in the city. Such a plan as this though impracticable at the present moment will, I firmly believe, be the outcome of the introduction of the telephone to the public. Not only so, but I believe that, in the future, wires will unite the head offices of the telephone company in different cities, and a man in one part of the country may communicate by word of mouth with another in a different place."

Bearing in mind its date, this prophecy was a remarkable example of a comprehensive and imaginative conception of future possibilities. But before Bell's ideal became an accomplished fact much difficult work based upon practical experience had to be undertaken. Prior to the invention of the telephone, exchanges were in use for telegraph purposes, but only to a limited extent. The development of the exchange idea was an inevitable outcome of telephonic necessities. Telegraphy and Telephony are two vastly different aspects of the art of communication. Telegraphy is concerned with the transmission of messages: Telephony with facilities for conversation. The idea of telephonic intercommunication—now finding its latest embodiment in the various automatic telephone systems, probably had its first practical application as an auxiliary to the district telegraph system of America. Briefly this method was as follows:—The subscriber pulled a lever which, in returning to normal, sent out a number of impulses which at the central exchange were translated into the morse code. A certain number of such impulses indicated that the subscriber required the services of a messenger, who was forthwith dispatched. The range of impulses was extended to include a number signifying that the subscriber required a through connexion. The first purely telephone switchboard is stated to have been installed in New Haven, Jersey, U.S.A., but only a single through connexion at a time was possible. This board was soon replaced by one accommodating eight subscribers, and providing for four simultaneous connexions. These exchanges, however, were not provided with ring-off facilities. These were designed a little later, and embodied in a switchboard installed in Chicago in 1878. The next step in the evolution of modern switchboard practice was the introduction of flexible cords, and also the introduction of keys, by which the operators' ringing or speaking set could be connected. Switchboards were now constructed capable of dealing with five or six hundred lines. Yet the number of lines, and, therefore, to a still greater extent the number of calls, increased rapidly and soon telephone engineers were faced with the problem of providing inter-connexion of any two numbers in an exchange having not hundreds but thousands of subscribers; at the same time avoiding the possibility of triple connexion and securing immediate disconnexion on the termination of a conversation. The solution was found in the multiple switchboard, which, by making possible large exchanges, opened up new vistas of telephone intercommunication. Until the adoption of the multiple idea, the subscriber's line terminated at one point only on the switchboard, and an operator could only attend to a comparatively small number of lines. But the multiple switchboard overcame this grave limitation by giving the operator access to every subscriber's line. Each telephonist answered calls from a certain number of subscribers, and also had facilities for calling any particular number on the exchange. The multiple switchboard also enabled the traffic to be spread equally between the operators—a most valuable improvement. In the earliest application of the multiple principle each subscriber's line passed through a large number of switch springs in series, each of which was a potential source of trouble. The difficulty was overcome by avoiding the use of spring jacks, and adopting the branching or parallel system in which the subscriber's line is continued round the exchange—the connexion to his switch spring in each multiple position being obtained by branch or teed lines. The evolution of the multiple principle was based upon an ever-widening practical experience, and tended always towards more reliable switchboard practice, and it survives alike in automatic as in manual exchanges. The rapidly increasing demands for service required then, as now, a vigilance constantly on the alert to improve the service in the direction of economy, rapidity, and instantaneous detection of faulty service. As the number of subscribers increased it became evident that the maintenance of the subscriber's apparatus was costly without being reliable. And so the question arose as to the feasibility of concentrating all the batteries at a central point, viz. the exchange. The practical development of this idea was to lead eventually to the Common Battery Switchboard. But in its more or less experimental applications the principle of common battery working was only partially applied since the first trial, installations had a common battery for signalling, but separate—though centralised—batteries in each cord circuit for transmission purposes. Again, in the earliest of the bigger exchanges, although a common battery was provided for signalling, each subscriber's transmitter was served by its own battery situated in the subscriber's premises. This modification was adopted in Great Britain for smaller exchanges, and is usually referred to as the Common Battery Signalling System. Later came an application of the Common Battery system, in which three common batteries were provided at the central station—the first serving the calling and supervisory relays, and also the transmitters of the subscribers, the second supplying the supervisory lamps, and the third feeding the operators' transmitters and the calling lamps. The coming of the common battery system, that is a single centralised battery for all the exchange services as the ultimate standard, brought with it the great advantage of automatic supervisory signals controlled by the receivers of the respective subscribers, and varying as the receiver at either station is on or off the hook. This type of board represents the highwater mark of local manual exchange practice. Its development necessitated the production of innumerable accessories and devices, many of them exceedingly ingenious, and all, in association, having for their object the utmost economy consistent with the greatest possible flexibility, rapidity and reliability of service. It was found necessary, however, to limit the size of common battery exchanges to 10,000 lines, since beyond this number operating became less reliable. This limitation involved the introduction of junction working between exchanges. And as the number of exchanges increased junction working became more complex, and involved the handling of a call by more than one telephonist. These factors tended increasingly to a less reliable and slower service as the latter expanded. The only alternative, if the standards of service were to be maintained in the dense centres of population, was to substitute manual working by some form

of machine-switching which would be both more reliable and quicker. Thus it was primarily to obtain technical rather than economic advantages that the attention of telephone authorities was directed to the development of automatic switching. But although this appears to have been the dominant consideration, yet it was powerfully re-inforced by the facts that operators' wages were continually increasing together with the resultant overhead charges, that it was difficult to maintain a regular supply of skilled telephonists, and that much greater accommodation was required for manual exchanges. Long before these aspects of telephone expansion challenged serious attention, however, automatic systems had been devised and patented. But it was Mr. Strowger who about 1891—the year in which his patent was granted—laid the foundations of that system which is now rapidly superseding manual exchanges as standard practice at least for large cities in this country. Much has been written of late on all aspects of automatics, historical, technical and trunking. But I may perhaps devote a few words to this latest phase of exchange development.

(To be continued).

WIRELESS TELEGRAPHY AND ITS APPLICATION TO SHIP AND SHORE WORK.*

BY COMMANDER F. G. LORING, R.N., *Inspector of Wireless Telegraphy, G.P.O.*

(Continued from page 62.)

There is still another duty which the coast stations do, and that is in connexion with Lloyds' work. It is to get Lloyds informed of the movement of ships, in return for which they pay an annual sum which reasonably covers the extra work entailed by the staff. Messages are also sent to ships on Lloyds' behalf in certain agreed conditions. If a ship is apparently in difficulties it is not every master that wants to tell Lloyds about it, and we ask if we can report to Lloyds.

The traffic in 1924 amounted to 480,000 words by landline, so that it is quite an additional piece of work to the coast station duties. We have a 15-year agreement with Lloyds in this connexion.

I want now to read you one or two stories collected from the staff, some of which illustrate the difficulties we have with foreign operators who do not know their regulations, here is one :—The usual practice is for coast stations to commence a fresh series of numbers on each voyage, and arising out of this, the following conversation took place :—

> Ship to Coast Station (Sends radio No. 2 ; Coast Station thinking perhaps No. 1 had been sent but not received) : "I have not had your No. 1."
>
> Ship Station : "There is no No. 1."
>
> Coast Station : "What have you done with No. 1 ? "
>
> Ship : "I sent it last voyage."

Operators talk of the general correspondence between passengers and the coast as "Love and kisses" messages. The other day a passenger to America sent to Lands End Radio messages to Misses So-and-So at Newcastle, Hull, London, Southampton, Plymouth and Falmouth, saying how much he missed them and how much he had enjoyed their company. No. 7 message was to his wife in the States, telling her he was "Coming home at last—How I long to be back."

Masters' service messages are ones which are sent on the service of the ship, and the ship owners always think that we should send them free. We have always refused. A certain vessel called at a port one day for water. After he had tested it he said it was salt and pumped it out again. The water company gave him a second supply. The same thing occurred. The water company then refused to supply any more water without payment. It took him 987 words at 11*d.* per word to explain to his owners what had happened !

A foreign steamer close to a British coast station was endeavouring to communicate with another ship, but was jammed by a third vessel. Owing to a similarity in the call signs of the coast and the ship stations, the operator made the mistake of attributing the jamming to one of our coast stations. At last the foreigner said "Shut up, bloddy Englishman." The interfering ship ceased working. Not until the foreign ship completed its communication did the coast station break its silence, and then only to acknowledge the remark of the irate foreigner. The difference in strength of the signals, and the note were sufficient to acquaint the latter that he had made a mistake ; he became apologetic. "Sorry I make a mistake ; is it excuse ? " No reply. "Is it excuse ? " he ventured again. Still silence. Then came the reply—"No bones broken, but there should be two o's and one d."

Direction finding is one of the most important applications of wireless telegraphy. It is accurate during daylight, and, under conditions which are known to the operator who takes the observations, is correct to within two degrees. Navigation is not an exact science, and positions may easily be several miles out. Direction finding by wireless has great advantages. A ship coming from a long voyage in thick weather, making an entrance to the Channel, does not know without wireless where she is ; she may be 20 miles out.

But if the ship can fix her position by wireless she can then without hesitation make her shortest course to her next point of departure. If she has no wireless bearings at all she must trust entirely to dead reckoning, and go slowly or even make a landfall. D.F. has another usefulness which is that it enables ships to render assistance in case of distress. There have been quite a number of cases of ships which have given their position falsely, and have been picked up by ships equipped with D.F. There are two methods in use to-day ; one is D.F. at coast stations, i.e. the apparatus is fitted at the coast station and a ship makes a signal, the bearing being taken and signalled to the ship. The bearings so given are not accurate when the bearing runs parallel to the coast, but in the Notices to Mariners the sectors which are or are not trustworthy are always indicated. Then there is the D.F. on board ship, i.e. if a ship wants to find her position she can ask a coast station to send a series of signals. The third method, in process of development, is to erect beacon stations which send out continuously some special form of signal, and ships fitted with D.F. observe them accordingly.

Another development still of these stations is a revolving beacon which sends out a directional beam whose interception indicates the bearing of the ship from the beacon.

FIG. 5.—*Analysis of the Distress Calls recorded at Post Office Coast Stations in the period Dec.* 21, 1924—*Jan.* 15, 1925.

Station.	Calls dealt with direct.	Intercepted Calls dealt with by another British Coast Station.	Intercepted Calls dealt with by a Foreign Coast Station.
Wick	3	12	12
Cullercoats	*Nil.*	7	1
Grimsby	2	8	8
North Foreland ...	4	13	7
Niton	2	8	6
Lands End	8	10	4
Fishguard	1	9	2
Seaforth	2	17	7
Port Patrick	1	4	14
Malin Head	2	1	1
Valentia	2	11	4
Total ...	27	100	66

NOTE.—In addition to the above Devizes broadcast particulars of two long-distance distress calls.

I am now going on to some remarks on distress. The total number of distress signals answered by British coast stations during the past 12 months has been 84. In addition, these were intercepted 852 times, i.e., although one station may get a call, many others get it as well, and the point is that our liability to miss a distress call is extremely remote. During three weeks last Christmas there were no less than 27 calls for assistance. I think these figures show you how important the P.O. organisation is to shipping.

The station called takes necessary steps to get assistance and to inform the authorities. No case has ever occurred of our missing a distress call. Such a call holds up all traffic for the time being, and the time taken to deal with the casualty varies from half an hour to perhaps three hours and even longer. The local coastguard, naval authorities, Lloyds, and certain others in special cases are advised of the event. All our wireless operators have to have a working knowledge of French and German—which is useful. A French ship in distress, on one occasion, could not understand the English vessel that went to her assistance, and the operator at Niton acted as interpretor. The question of the possible use of listeners outside the safety-of-life-at-sea organisation has been carefully considered by all the parties concerned and turned down. Our present organisation has stood many tests of efficiency.

I would like to call attention by an illustration to the importance of wireless to shipping in the case of distress, the importance of regular ship inspection

* Shorthand notes of an extempore address given before the London Telephone and Telegraph Society.

to ensure that the apparatus is in good order, the importance of good and intelligent operators to work the apparatus, and the significance with regard to insurance.

During a gale recently a certain ship sent out the distress signal, and said she had water in her holds. A ship went to her assistance, found her, then lost sight of her in a squall, and could not find her again. Nothing further was heard of her by wireless. In the end, the distressed vessel was reported by the assisting ship to Lloyds as probably foundered: the insurance rates then went up to 90 guineas per cent. Very soon afterwards the ship was reported as having arrived safely in port. On subsequent inspection of the ship it was found that the apparatus was in a bad condition, and the operator inefficient. Many regulations are made for the safety of life at sea: distress signals and the T.T.T. signal must be made on the 600 metre wave. All stations keep watch on that wave when not otherwise employed.

Fig. 6 shows the relative cost of the service and revenue it earns. The figure shows the curves of expenditure and revenue. Of course, we could not get figures during the War.

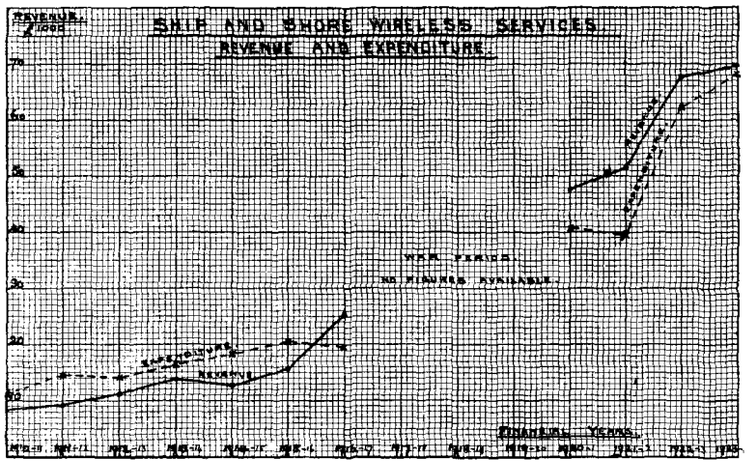


FIG. 6.

We make about 3,500 inspections of ships' apparatus every year. We try to inspect every ship once every year, but we cannot do it in practice. We have depots at Shields, Cardiff, London, Liverpool, and Glasgow, and an Assistant Superintendent and Overseer at each. We inspect the ships as opportunity occurs, and actually inspect at the rate of one inspection per ship per annum. Some troublesome ships we have to inspect three or four times. The inspection takes about three hours. The officer, if circumstances are favourable, usually manages two inspections a day, but the docks are so big and so difficult to get about that very often a man cannot do more than one a day. If the installations are unsatisfactory the fact is reported, and in an extreme case the ship may be detained. Foreign ships are inspected as well much as British.

The Inspecting Staff also carry out the examination of watchers. The watcher is supposed to listen out when on duty, for the distress signal. As a matter of fact, although quite an easy thing to do in theory, in practice the watcher never gets a distress signal! It is a physical impossibility for a man to sit down for six or eight hours at a stretch listening amongst many other signals which are unintelligible to him for a signal which is of very rare occurrence. Our inspections have saved lives and property on a number of occasions. On several occasions we have inspected a ship, found her apparatus faulty or with a dud operator, and insisted on the apparatus being put right and the operator changed. That ship has gone to sea and within 48 hours she has made a distress call.

The examination of operators is also quite interesting. There are 13,570 of them on our card index dating from 1908. We have a complete history of every one, the results of his examination, of reports for and against him, so that we can look into their histories, if necessary. The wastage on wireless operators is 10%: they are mostly young men and drift out of the profession about the age of 30 or 35. At the present moment there are 23 schools in different parts of the country, during the war there were no fewer than 45. The examination consists of two written papers on theory, a practical examination on the use of the apparatus, and an examination in Morse and rules. The percentage of faliure is high, but that is because a great many boys go in for it for the sake of gaining experience of an examination. The course usually lasts about 12 months, and an ordinary boy, if he is fairly intelligent, can obtain our standard in 12 months. Some take 15 months, and some as much as 18 months. After they pass they can go to sea as second operators but are not allowed to take charge until they have had six months' experience at sea.

Before I close, a forecast of what I think is likely to come about in the near future may be acceptable.

The chief development will be in regard to navigation by wireless D.F., which will be the practice throughout the Mercantile Marine when ships are near the land. It will be of great importance in getting ships to and fro speedily and in safety: it will relieve ships of the necessity of making a landfall. Another important development will be the equipment of an automatic device for registering signals of distress, and the effect will be greatly to increase safety of life and property at sea. We are now introducing an automatic device which will register a signal of distress, and if and when it is fitted on all ships there will be no necessity to keep any watch for the distress call. When the signal occurs a bell will ring in the operator's cabin and on the fore bridge of the ship, and the operator can tackle the calf in the ordinary way.

The third change of importance will be the interrupted continuous wave in place of spark, but I am strongly of opinion that the 600-metre spark has come to stay: at any rate it will die very hard, owing to its reliability, its cheapness, and capital invested in it. It is extremely useful for installations on "tramps," and they form the large bulk of shipping.

As regards traffic, I do not think it is going to increase very much more. There is a natural limit to the amount of traffic to be sent to the shore and *vice versa*, so that I think we are nearly at the point of our traffic saturation.

In the discussion which ensued, Captain H. J. M. RUNDLE, O.B.E., R.N. (*Inspector of Coastguard, Board of Trade*) said: Captain Loring was describing what was done on receipt of a wireless S.O.S. It may be of interest to know what happens when the message is received by the coastguard. The wireless operator is very busy: it has, therefore, become incumbent to relieve him of action in regard to any assistance which can be despatched from the shore. An area—embracing the British Isles and off-lying waters—has consequently been defined, and on the receipt of an S.O.S. message from a vessel inside this area the wireless station immediately informs a selected coastguard station termed "Wireless Liaison Coastguard Station." This station is as a rule the nearest coastguard station to the wireless station, and always one where we have a responsible officer. On receiving the message, which is telephoned from the wireless station, the position is immediately plotted on the charts in order to determine off which coastguard district it lies, and a message is then sent either by telephone trunk call or despatched over the land wire to the coastguard officer of the district concerned, who, on receipt of the message, informs the lifeboat nearest to vessel in distress, and takes all other measures necessary for the preservation of life. Directly that is done, a message is passed back, saying what measures have been taken, and is in turn passed on to the wireless station, who informs the vessel, as it is very important that those on board should be relieved of anxiety as soon as possible.

It depends very much on the distance of the vessel from the Wireless Liaison Coastguard Station how long it takes to initiate these measures, but there has been a case where the lifeboat has got away within 17 minutes of the receipt of the news. The Post Office gives special priority over telephone and telegraph for messages on lifesaving service, and I think I may say that the organisation, although in its infancy, will gradually improve as a means of saving life.

Mr. R. T. CHAMBERLAIN of *Lloyds*, added: I should like to express my best thanks for the opportunity of listening to a very interesting lecture. I heartily endorse the importance of the immense amount of work done by the P.O. in the interests of shipping and insurance in general.

At Lloyd's, from the earliest days, we have been in close touch with all forms of wireless telegraphy. In those early days we had stations of our own, and experiments were conducted on a large scale. We hoped to be the authority controlling the British Coast Stations, and spent an enormous amount in pioneer work, but we now recognise that it is a wise and sensible thing that wireless telegraphy, like all other kinds of telegraphy, should be in the hands of the State.

I can also bear personal testimony to the fact that in all things connected with ship to shore traffic the Wireless Telegraphy Department of the G.P.O. has been exceedingly businesslike in all its dealings with us. There are public departments to which we write a letter and get no answer, except a postcard, and, perhaps, after the lapse of many months there comes a reply intimating that the subject is still receiving attention. With the Wireless Department, we get answers straightaway. Undoubtedly, that is a matter for a public office to be proud of.

One thing that ought to be done by international regulation is to oblige a captain who has sent out an S.O.S. to inform all ships when and if the danger period is over. Time after time a ship has gone right out of her course to render assistance without any necessity, through the captain of a vessel either thinking his vessel was in danger when such was not the case, or omitting to advise all stations within hearing when his ship was no longer in need of assistance.

SOME IMPRESSIONS OF THE INTERNATIONAL TELEGRAPH CONFERENCE AT PARIS.

LOOKING back on the Conference which has just recently terminated, one of the first impressions left on one's mind was the excellent spirit in which, throughout, the whole of the discussions were conducted. It was the first Telegraph Conference since the War,—the first in fact since 1908 (Lisbon),—and apart from the controversial nature of many of the propositions which the Conference had to consider, there was the fear that national feeling, aroused to an intense degree during the war, had not altogether subsided. Complete peace, however, reigned at the Conference even amongst the Greeks and Bulgars, between whose respective countries' diplomatic relations were somewhat strained towards the end of the Conference over the frontier incident at Petrich. There were representatives of nearly 80 nations foregathered in Paris, from small states like Albania to all the great powers. Over 40 cable wireless companies were also represented at the Conference, but without the right to vote. Delegates from the United States were there in force—nine in all—but only as spectators, that country not yet being a member of the International Telegraph Union. One of the objects of the Americans in going to Paris was to make certain arrangements in preparation for the next Radio Conference which is due to be held in Washington during the autumn of 1926 or the spring of 1927. The Paris Conference did not see its way clear to adopt the detailed propositions drawn up at Washington in 1920 for a combined Telegraph and Wireless Convention, but it placed on record the wish that, after the Washington Radio Conference, the contracting governments should consider the best means of modifying the original Telegraph Convention of St. Petersburg and of introducing into it, by a congress possessing the necessary authority, the provisions of the Radiotelegraph Convention. If the next Washington Conference passes a similar resolution, there is some hope that, in the not too distant future, there will be one set of regulations for telegraph and wireless working instead of two as at present.

It was particularly interesting to rub shoulders with representatives of so many different nations, but it certainly has the effect of modifying certain of one's ideas. Having read something of the history and progress of Albania, I should not have been surprised to see that country's representative turn up at the Conference armed to the teeth, with daggers projecting from all parts of his picturesque costume, and it was something of a surprise to me to meet a mild looking gentleman attired in conventional morning dress as representing that disturbed country.

As the Conference proceeded one came rather to the conclusion that telegraph troubles were much the same all the world over, and were viewed in very much the same light. The difficulties that we experience here in the C.T.O. are identical with those met in the telegraph offices in Pekin, Buenos Aires, Cairo, Teheran and other distant places. Writing of Pekin recalls a discussion I had with one of the Chinese delegates, in which I commented on the excellent service by the Great Northern Company's route between China and England, the average delay for a long time having been under two hours. I was told that Pekin works direct by Wheatstone to Irkutsk, who in turn works by the same means to Leningrad. The distance, therefore, between China and England is spanned in three transmissions. It speaks well for the efficiency of the Chinese and Company's staffs and also of the maintenance of the line across the vast steppes of Siberia. It also makes one seriously think whether certain oriental countries are as backward as we are led at times to believe.

The Conference was opened on Sept. 1 by M. Chaumet, the then Minister of Commerce in the French Cabinet. After the usual preliminaries, the work of the Conference was relegated to two main sub-committees—tariffs and reglement,—Herr Lindow (Germany) being elected president of the former, and Mr. John Lee (Great Britain) president of the latter. In addition to these big sub-committees, there were sub-committees dealing with Telephone, Convention and Redaction questions on all of which Great Britain was represented. The Conference was held in the magnificent main hall of the Sorbonne University, and there it continued its deliberations nearly every day for a period of about nine weeks.

As regards the actual results of the Conference, although they are mainly of a negative kind, they may be said, from a British point of view, to be altogether satisfactory. It was known here before leaving for Paris that nearly every continental administration was going to the Conference with the definite object of pressing for an increase in rates on the ground that its telegraph services was being run at a loss. The discussion over rates and associated subjects such as code language proved to be long and difficult, and resolved itself mainly into a struggle between Great Britain and the rest of Europe. This administration took the view that having regard to the present state of trade generally, the margin of capacity on nearly all telegraph routes, and the growing competition of wireless, the time had passed when a sound case could be made out for an increased tariff to the public.

It was a dramatic scene in the Conference Hall when the head of the British delegation, with the knowledge that our delegation stood alone in splendid isolation, delivered a very able and reasoned speech outlining the case for Great Britain, a speech which was listened to with every attention and received with loud applause when it came to a close. In the subsequent voting, Great Britain was, of course, completely outnumbered, but it speaks well for the prestige of this country and the good work by the delegation, that they were able to arrange with certain continental administrations in their telegraphic relations with this country to leave the rates to the public at their present level. It is hoped, therefore, that rates to Germany, France, Holland, Norway, Sweden and Denmark, etc., will stand at the existing figure, but there will be an increase of ½*d.* in the rate to Italy, and certain other countries in the east and south-east of Europe, the increases to come into operation on April 1, 1926. So far as the rates to countries outside Europe are concerned there is not likely to be any appreciable increase to the public.

The question of a 50% increase in charge for code messages proposed by a number of continental administrations was ultimately turned down, mainly due to British opposition. This Administration's own proposal regarding the admission of "grouped" language ("Iwillcome," etc.), was also dropped. The whole question of code language, however, is to be considered in all its bearings by a special International committee whose report, it is hoped, will be furnished in time for consideration at the Radiotelegraph Conference at Washington.

Another important decision arrived at is to allow press telegrams to be accepted at the reduced rate throughout the 24 hours, the change, so far as present practice is concerned, being that Press telegrams for abroad will be accepted between noon and 6 p.m. under the same conditions as apply to the rest of the day or night.

A further decision reached was that there shall be two classes of Government telegrams, one with and the other without priority. The Conference supported Great Britain's view that a large number of Government telegrams were not really urgent and that Government departments should be asked to indicate those messages in which urgency of transmission is *not* desired. The prefix for a Government telegram with priority will be "S," and without priority "F." In both cases the messages will bear the unpaid indication "Etat" at the end of the preamble, as Government telegrams have privileges other than urgency, such as the use of secret language, etc.

The deferred service was only introduced some years after the Lisbon regulations were drawn up, and it has not, therefore,

hitherto been legislated for in the international regulations. This omission is now rectified with one or two interesting additions. The Japanese delegate at the Conference put up a strong case for the adoption of English as an alternative language to French. He pointed out that in telegrams between his country and the continent of Europe, English was the only medium of international correspondence, but as it was neither the language of the country of origin nor destination it was at the moment ruled out. The Japanese proposal was adopted, and it will now be permissible for an administration to notify languages other than its own which it proposes to accept in deferred telegrams. A further Japanese proposal, however, to adopt English as a second international language in all relations between administrations was turned down, the opposition in this case being led by the Irish delegate who, in a facetious speech, said if English were adopted why not Erse also. The speech was received with laughter, but it gave the clue to Italy and Germany to demand the same concession for their respective languages. On being put to the vote the Conference decided that French should remain the only medium for international correspondence.

Reverting to the deferred service, the Conference also adopted a Chinese proposition to permit, as plain language, the use of groups of four figures each in the text of deferred telegrams. It was pointed out by the Chinese delegates that their nationals were practically debarred from the use of the deferred service as the Chinese language cannot readily be translated into European characters without giving rise to errors. The concession, however, is restricted to China.

A proposition which gave rise to prolonged discussion but was in the end adopted in spite of this administration's strong opposition, was one by Germany to substitute the amount for the number of words in R.P. telegrams. The view of this administration was that the adoption of the proposal would give rise to an increased amount of work and would tend also to a greater liability to error. In the C.T.O. the conversion into sterling from francs and centimes of the numerous reply-paid telegrams will certainly mean an appreciable addition to the amount of work. It is an interesting commentary on the discussion that some of the delegates after the debate admitted that the advantages of the proposal were more than outweighed by its drawbacks.

So much for the details of the principal decisions of the Conference. Numerous other decisions were arrived at in connection with administrative, telephone, procedure, accounting and other questions, but it seems undesirable to overload the article with a mass of technical detail.

One of our most interesting experiences was a visit as guests of Radio France to the big wireless station at Sainte-Assise, about 25 miles out of Paris, on the road to Fontainbleau. Sainte-Assise is the transmitting station, the receiving post being at Villecresnes (about 10 miles nearer Paris). Both stations are operated by remote control from the central bureau in the Rue Montmartre Paris. The transmitting office at Sainte-Assise is in a lovely park which with the chateau was, in medieval times, the residence of one of the old seigneurs of France. The chateau itself is now given over to the company's administrative staff.

The station itself is a very large one, consisting of two masts for continental services and 16 masts of over 800 feet in height for the more distant services—New York, Indo-China, Buenos Aires, etc. Automatic transmission is in operation on all services. The amount of traffic passing through the station appears to be considerable, particularly to London (Marconi) and New York, and the company claim that they handle more than one-third of the total telegraphic traffic between Paris and those two cities. Following the Sainte-Assise visit, we were taken on to Fontainbleau. It was a beautiful autumn day, and the ride through the famous forest, many miles in extent, with all the trees in their lovely autumn tints was something to be remembered. The town itself, which is right in the centre of the forest, is very quaint and interesting, and is a very popular resort in the summer for Parisians anxious to get away from the noise and bustle of Paris. We were shown over the famous chateau, with its associations of Francis the First, and later attended a reception given by the *Préfet* of the town. During our long stay in Paris we saw a number of chateaux — Versailles, Vincennes, Fontainbleau, Meudon, St. Germain-en-laye, etc., most of them full of associations of Louis XIV and his successors. They are all magnificent castles, and apart from ravages in one or two exceptions during the time of the Revolution, in a good state of preservation. When one realises, however, the extent to which these huge places—built for the most part by forced labour—drained the resources of France, it is easier to understand why there was a Revolution and why Louis XVI met an unhappy fate.

Altogether we all enjoyed our experience, although towards the end of the Conference we all felt that we should be glad to get home again. The work of the Conference—although varied by many interesting functions—had been very heavy, particularly as the British delegation had so often stood alone in the discussions, and it had left the party somewhat jaded and worn. It had been a happy family party, a team working in perfect unison under a cheery and optimistic chief, a chief who had maintained the country's dignity and prestige abroad and whom we were proud to have followed.

E. E. S.

REVIEW.

"*Radio Engineering.*" *By J. H. Reyner, B.Sc., A.C.G.I.* (*Published by Radio Press, Ltd. Price* 15*s.*)

This book is one of a series dealing with the data required in each branch of electrical engineering.

As its title implies, this particular volume deals mainly with wireless telegraphy, but a section is devoted to a brief summary of useful data concerning land line and cable telegraphy and telephony.

The ground covered comprises radio calculations and measurements, tuning and radiation, valves, wireless transmitters and receivers, the design of masts and aerials, radio-telephony, high-speed working, direction finding and methods of eliminating atmospherics.

In appendices are given tables of weights and measures; conversion tables; mathematical tables; electrical, mechanical and physical tables and the most useful formulae in electricity and magnetism; concluding with the official wiring rules and regulations.

The book is very complete, and should be of great assistance to wireless engineers and to all who are in any way concerned with the practical designing or handling of wireless gear.

OBITUARY.

Mr. E. DAVIDGE, Assistant Traffic Superintendent, Manchester, passed away on Nov. 27.

Mr. Davidge was a conscientious officer, and held a high place in the esteem and affection of his colleagues. He came to Manchester in August, 1920, having previously been employed in a clerical capacity at Southampton.

PROGRESS OF THE TELEPHONE SYSTEM.

THE number of telephone stations working at the end of October, 1925, was 1,335,449. New business during October was exceptionally good, the number of new stations added during the month, 19,685, exceeding all previous records. The net increase for the month, however, was relatively small, owing to the fact that under the quarterly accounting system cessations are heaviest during the first month of the quarter. From a preliminary survey of the November returns, it would appear that the general improvement in new business will be reflected also in that month's figures.

The growth for the month of October is summarised as follows :

	London.	Provinces.
Telephone Stations—		
Total at Oct. 31	467,874	867,575
Net increase per month	2,895	5,516
Residence Rate Installations—		
Total	89,987	152,363
Net increase	1,128	1,883
Exchanges—		
Total	107	3,823
Net increase	—	21
Call Office Stations—		
Total	4,374	15,391
Net increase	24	129
Kiosks—		
Total	167	1,400
Net increase	10	69
New Exchanges opened under Rural Development Scheme for 1922—		
Total	—	800
Net increase	—	21
Rural Party Line Stations—		
Total	—	9,725
Rural Railway Stations connected with Exchange System—		
Total	—	658
Net increase	—	7

The number of inland trunk calls dealt with during August—the latest statistics available—was 6,793,520, an increase of 630,002 over the figure for August, 1924.

Calls to the Continent numbered 16,519 or 1,023 more than in August, 1924, the increase being in the Dutch traffic.

Although the number of originated calls continues to increase,—approximately 10 million calls now being handled weekly in the London exchanges alone,—the percentage increase in traffic barely keeps pace with the percentage increase in exchange lines, and as a consequence the average calling rate per line shews a tendency to decline. This is perhaps to be expected in view of the steadily increasing proportion of residence lines.

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

PROVINCES—Chapeltown, Leeds, Headingley, ,, Roundhay, ,, Stanningley, ,, Paignton, Devon } Automatic.
Coatbridge, Leigh (Lancs).

and among the more important exchanges extended were :—

LONDON—Greenwich, Putney, Sidcup, Wimbledon.

PROVINCES—Acocks Green (Birmingham), Camberley, Fishponds (Bristol), Giffnock, Hove, Kidderminster, Llandudno, Newcastle-on-Tyne.

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

Manchester—Sheffield.
Darlington—Stockton-on-Tees—Middlesboro'.
Lancaster—Kendal.
Birmingham—Stratford-on-Avon.
Buxton—Ashby-de-la-Zouch.
Leicester—Rothley.

while 78 new overhead trunk circuits were completed, and 73 additional circuits were provided by means of spare wires in underground cables.

TELEPHONE NOTES.

An Automatic Course for Traffic Officers.

"It is often said that we live in an age of talk, and certainly the habit of holding conferences, which is so marked a feature of modern life, seems to justify the charge." *Electrical Review* recently defended the conference habit, apparently in all seriousness, on the grounds that it is to new business system what going to church was to the old system under which a salesman and all his customers resided in one neighbourhood. Personal contact stimulated mutual respect and confidence. Recollection of this came back to one, irrelevantly, perhaps, as is often the case in such surroundings, while Mr. C. W. Brown was recently opening his first talk in the series to be given to traffic officers in the Engineer-in-Chief's automatic school. That this series of talks, and the demonstrations so ably given by Messrs. Brown and Smith, was completely successful is merely to state a fact that was obvious from the moment at which the series opened with an admirably phrased welcome. If "the test of knowledge is reproduction" it must be admitted that not all present could, and none would desire to, substantiate a claim to knowledge of this complex, if fascinating, subject. But with the admirable series of diagrams supplied anyone present will be able again, in imagination, to retraverse that pleasant journey, charting the course each in his own way so that he may as necessity arises go back to any particular cross road and explore the side roads at leisure. During the visit to Holborn and Tandem exchanges, in the London system, which are in course of construction, one's thoughts turned, charitably at last, to the long discouraging fight which the champions of the Strowger system fought in America during the nineties. Did the telephone men of that day foresee the point at which we have now arrived in London? If so, they might well be excused for failing to wish to shackle the telephone engineer of the future with currents the magnitude of which would have unnerved even the power engineer of that day. It was freely opined that no mean courage and optimism had been displayed in deciding to telephone so great a city as London on an automatic basis. There could be no better method of ensuring that co-operation between the two arms of the service most intimately concerned, on which ultimate success with the automatic system so largely depends.

"New Bottles and Old—."

The origin of the windmill is said to be altogether lost in the oblivion of the past, although its introduction into Europe is ascribed to the Saracens through the Crusaders. The first reliable evidence of windmills being used in Europe is found in reference to them in disputes concerning the tithes to be paid in respect of their use in the 12th century. By the beginning of the 19th century, however, they were widely used, and the whole of the grinding, stamping, sawing, and draining of the eastern counties of England was performed by wind power. Then came the steam engine, which largely replaced the windmill. But eventually the advent of the electrical storage cell seemed destined to find a new use for air power. As long ago as 1893 Lord Kelvin advocated its use for charging accumulators. That the use of the windmill for generating electricity has not been entirely lost sight of, is shown by the announcement that the Great Northern (U.S.A.) Railway is now using a wind-operated generator for energising its block signals. Our own engineers are also at present understood to be experimenting with this method of charging accumulators, with good prospects of success. There is, in fact, reason to believe that an economical and reliable wind-operated battery-charging unit has already been evolved. The importance of this will not be lost on those telephone administrations which are grappling with the problem of telephoning rural areas. Very little imagination is called for to see how a rural automatic exchange, energised by cells charged by means of a wind-operated generator, may very soon solve this long outstanding problem.

"Temporarily Out of Service."

"In practically every country, telephone service is suspended if bills are not paid," says *Telephone Review*. "The only exception to this rule that has been noted in recent years was in Russia, during the early part of the Bolshevik regime. Then, it was said, telephone service was given free to all who were 'Communists in good standing' . . ." Suspension of service is almost everywhere admitted to be a fitting penalty for the subscriber who uses *improper language to the operator*; but the number, and degree, of epithets which constitute impropriety is a question on which the opinions of subscriber and administration differ, and a few months ago the *Paris Herald* reported an angry meeting of the Telephone Subscribers' Association to protest against the action of the French Government telephone department in cutting off subscribers' service when "offensive or injurious comments on the administration, or personnel, are heard over the telephone"—a meeting humorously described as a "Congress of Telephone Martyrs." In Turkey

call-office service was at one time rendered impracticable by the peculiarities of the Turkish currency, the variety of small coins in circulation being the cause. Piastre and half-piastre pieces were of various sizes and metals. A somewhat similar problem confronted the telephone authorities of Poland a couple of years ago. This was finally overcome by an electrical device, which distinguished between the two similar coins on the basis of the resistance which they offered to the electric current.

"Who invented the Valve"?

"A 12-year battle for the basic patent rights of the modern vacuum tubes was concluded on Oct. 20 with their awards to the General Electric Co., says *Telephony*. The type of tube involved in the litigation was invented in 1912 by Dr. Irving Langmuir, asst. director of the General Electric research laboratory. The tube is characterised by its hard constant vacuum. It is estimated that 10,000,000 tubes embodying the invention are now in the United States.

"Photographs by Telephone."

The newspapers were the first to make use of the new art of sending pictures over the telephone, which was placed on a commercial basis in America a few months ago. These, however, have by no means monopolised the new service. An automobile manufacturer has sent pictures of new designs to his distant agents; a railway company has sent a picture of a new type of trolley car to all its directors for approval; bankers have experimented with the sending of pictures of cheques, for the purpose of identifying signatures; advertising agencies have used the service for securing immediate publication in a distant city; X-ray pictures, finger prints, wills and other legal documents have been transmitted—these represent a few of the many uses to which the service has already been put.

The Heaviside Layer.

"Apparently the first to call public attention" to the importance of the upper conducting air as a reflecting medium for electro-magnetic waves was A. E. Kennelly, on March 15, 1902, says *Electrical World*. "Heaviside's brief and somewhat casual comment" appeared a few months later in the article on "Telegraphy" in the Encyclopedia Britannica. "On the other hand, the announcement of Heaviside followed so closely, and his studies of the reflection of electro-magnetic waves were so extensive, that it would appear that the names of both of these distinguished scientists should be associated with the conducting layer," hence "it would eminently be proper to call it the Kennelly-Heaviside layer." We wonder; for is not the world still content to speak of the Darwinian theory and not the Wallace-Darwinian or even Darwinian-Wallace theory?

Maintenance Aeroplanes.

Germany is said to be using a specially designed light aeroplane for use in the inspection of long distance overhead lines where the right of way is inaccessible by car. The aeroplane has a cruising radius of 250 miles.

E. S.

RETIREMENT OF MR. W. HOWE.

FROM all sections of the Hants and Dorset district, members of the Post Office Telephones District Manager's staff assembled at Southampton to bid farewell to Mr. W. Howe, on his retirement from the service on pension, having reached the age limit. Light refreshments were served and a presentation was made, which took the form of an inlaid mahogany combination barometer, thermometer, &c., a set of Hardy's Wessex novels, and some cyclist touring maps.

Mr. S. O. Allen, district traffic superintendent, made the presentation, and in felicitous terms referred to Mr. Howe's history in the telephone service, and the records established during his period of office.

Mr. Allen said that Mr. Howe had devoted 45 years of his life to developing the telephone service in its various branches, which was surely a remarkable achievement. He was one of the pioneers, and commenced his telephone career only three or four years after the invention and application of the telephone to commercial life. Mr. Howe's remarkable gifts in organisation were recognised early in life, and he was prominent in the West of England telephone development up to 1893, when his activities were transferred to the Hants and Dorset district. In 1895 he assumed full control of the business, as district manager. Mr. Howe was instrumental in popularising and reducing the cost of the telephone service, and rapid development followed. As an instance of the development, there were about 100 telephones in Southampton at the time Mr. Howe assumed control. There were now about 3,000, and the Southampton district comprised 150 exchanges, with 30,000 telephones.

Many improvements had been effected in the external plant, and in the equipment of telephone exchanges, up-to-date common battery systems having been installed at Bournemouth, Winchester, and Ryde, while the very latest improvements, viz., automatic exchanges, were working very satisfactorily at Portsmouth and Southampton. The continuous hard work and large output, regardless of the number of hours per day, performed by Mr. Howe could not but be admired, and the resultant high standard of duty set to the subordinate staff. Mr. Howe possessed qualities necessary to teach others, and many of his staff had secured responsible positions throughout the country in the telephone service, and also in administrations in foreign countries.

Mr. Allen was sure that he voiced the wishes of the whole staff in wishing Mr. Howe every happiness and enjoyment in his retirement, well-earned, as a reward of many years' labour. Mr. Howe had a full capacity for enjoyment, as he had often expressed a love of nature, sport, music, art, astronomy, horology, and reading. The staff had endeavoured to interpret his wishes accordingly, and asked him to accept as a token of esteem and good wishes, a barometer to guide him in his selection of suitable periods for outdoor recreation, and a set of Hardy's novels for indoor recreation or to take with him on his cycling tours through his much-beloved Wessex, and also some cycling maps for the selection of tours.

Mr. Howe was the recipient also of a bookcase, presented by old colleagues now at headquarters and district managers throughout the provinces. In his response he said he could not recall how many times he had occupied the chair when offering valedictory addresses to departing members of the staff. He must accept the inevitable with good grace, but admitted having mixed feelings on his retirement.

RETIREMENT OF MR. JOHN MACFEE.

MR. JOHN MACFEE, Telephone Superintendent for Scotland and District Manager of the Edinburgh Telephone District, retired on Nov. 27. Before leaving, the staff presented Mr. Macfee with tokens of their goodwill. Mr. Macfee joined the National Telephone Company in Glasgow in 1882, and later he served as District Manager at Paisley, Hull, Sheffield, and Bolton. When the Glasgow Corporation Telephone Service was instituted, in 1900, Mr. Macfee was appointed Assistant Manager, and he afterwards became General Manager. When the Post Office took over the system of the National Telephone Company, Mr. Macfee was made Telephone Superintendent for Scotland, in the Secretary's Office, Edinburgh, and he filled that position and the District Managership of the Edinburgh District, which was combined with the Dundee district in 1921, until his retirement.

Mr. Macfee was a very popular man, but through his quiet and unostentatious nature, he was only known intimately to a few of the staff. If Mr. Macfee lacked aggressive qualities, he possessed something which is sometimes as valuable as any forceful quality in a man who presides over a big undertaking—the faculty of allowing the principal officers freedom to develop their ideas. In this Mr. Macfee was most successful, and there is no doubt that his method proved very advantageous to the service, for the work of the district proceeded smoothly, and the district became known as a very efficient one. This, after all, is the test of any undertaking. Mr. Macfee was *par excellence*, a manager who made the work of his staff very easy. He thus gave them full opportunity of displaying their zeal and enthusiasm, and the result was that the public was well served.

All those who knew Mr. Macfee will always remember him as a kindly, unassuming man. He never pushed himself to the front, and he never grudged his chief officers any credit which their energies gained for them. He might be spoken of as a manager who hardly allowed it to be manifest that he really managed at all. He had the balance, and he held it very evenly. But he had his enthusiasms too, and latterly the development of kiosks was one of his greatest interests. During his managership the Dundee and Kirkcaldy systems were converted to automatic working, and the success of these exchanges is well known. There was no hitch in either change, and it is believed that what was done in both towns is well appreciated by the public as well as by the Department.

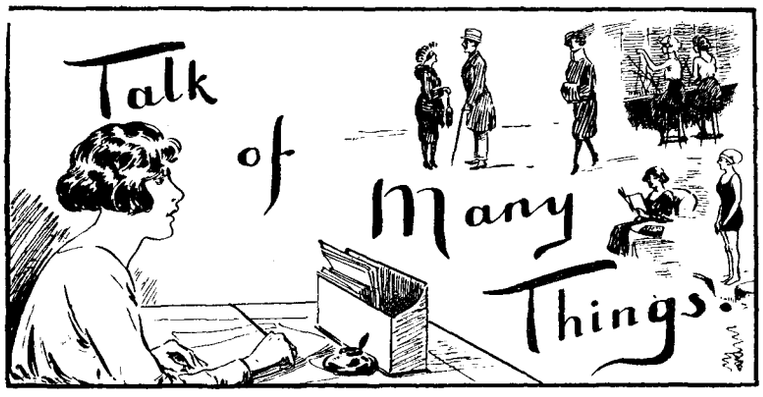
PRESENTATION TO MR. H. KITCHEN.

Mr. H. Kitchen, M.I.E.E., was entertained by his colleagues in the Northern Engineering District at the Central Exchange Hotel, Newcastle-on-Tyne, on Nov. 28, when he was presented with a gentleman's wardrobe, on the occasion of his promotion to the position of Assistant Staff Engineer, London. The gathering was representative of all ranks in the district.

In making the presentation the Chairman, Mr. J. R. M. Elliott, M.I.E.E., Superintending-Engineer, in a felicitous speech, referred to the many interests which Mr. Kitchen had in life. He was Captain of the Rifle Team before the War, and he had the distinction of registering the highest score when the Major O'Meara Cup was won by the district. He is a full member of the Institution of Electrical Engineers, and for some years lectured on technical subjects at Rutherford College, Newcastle, and at Jarrow Technical School. He has given addresses on colour photography and kindred subjects, and is now President of the Whitley Bay and Monkseaton Camera Club, and for some time was Vice-President of the Whitley Bay Wireless Society. He had always manifested a keen interest in the work and activities of the Institution of P.O. Electrical Engineers, and for a period of three years served on the main Council of the Institution.

Mr. Kitchen's enthusiasm, helpfulness, and genial personality will be very much missed in the Northern District. He has left many friends and he takes with him their heartfelt wishes for continued health and success in his new sphere.

WE TELEPHONISTS



Something about Nothing.

THERE is all the difference in the world between *writing about nothing* and having nothing to write about. Genius is necessary for the first, but it is the lot of most of us ordinary mortals to be in the latter position. How often have I prepared elaborately to write a letter—a letter which was to enrich the mind of its recipient with a weight of wisdom, to enliven him (or her) with flashes of brilliant wit, and one which was withal to charm by the perfection of its language and style. I have taken a clean sheet of notepaper, a new nib, fresh ink and an unsullied pad of blotting paper, and with a dictionary for support in my more human moments, I have approached my task with zest. To permit the collection and arrangement of my thoughts, I have gazed for a while into space for, of course, with a wide range of subjects for correspondence, careful consideration is required. Time has passed, and gradually my gaze of concentration has become a vacant stare. I have stared at the ceiling (at the patch where the water came in), at the floor, at the wall-paper, and out of the window, and eventually I have been forced to admit that the choice of suitable topics is really distressingly limited. I have persisted, I have bitten my lip and chewed my pen-holder to a fassel, but still inspiration has eluded me. Then in a moment of brightness I have decided that I can at least write the address and the date, and perhaps even commence with "Dear . . . " but there my imagination has stopped short. I have said "Tut" quite often (with no thought of Egyptian history I fear), my brow has puckered, and at last I have been reduced to abject misery or roused to a fury. In the latter event I have rent the virgin sheet into *infinity or cast it into the flames and gloated over its shrivelling agony.*

Lacking the genius required to write about nothing, I fear there is the danger, common to most of us, of falling into the grievous error of finding something. Consider the case of those who have succumbed to the temptation. They break out from a dignified silence, and we can no longer depend upon them as people who rarely answer our letters. They will write about something—that they have heard the first cuckoo or have picked the first primrose, or that roses are still blooming in Picardy. Then, worse still, they write about gas bills and income tax, rates and school fees, tailors' bills (which even the moths won't eat) and house repairs. They become horrid bores, and conclude by writing heavy essays, Blue Books and Traffic Inst—— (but no! let us not be disloyal). On the other hand, grace is often given to those who have nothing to write about and write about it. They may not reveal genius in its utmost brilliance, but they succeed charmingly. Theirs are the letters we like best—the letters that bring us happiness, that are read and re-read with a tear or a smile, that vibrate with the presence of an absent friend. They breathe again the words which once quickened our pulse and flushed our cheek, and we tie them up with ribbon and cherish them. They are, of course, all about nothing—just the trivial nothingnesses which only friends can exchange and appreciate—but they are nevertheless much more than something to someone.

PERCY FLAGE.

Wrong Number!

Our friends of the Press are often humorous at our expense—and we do not really grudge them their little jokes. It is not always, however, that their humour is of the right kindly sort which marks the article on "Wrong Numbers," by Mr. W. McCartney, in a recent issue of the *Evening News*. (We recall that Mr. McCartney was one of the contributors to that most useful series of articles on telephone practice which appeared in the *Evening News* just before the War.) Humorous without spite, the article on "Wrong Numbers" is funny enough to make us laugh at ourselves; and, with acknowledgments to our lively contemporary, we quote some extracts:—

I know a man who yesterday had a lunch of twelve oysters, mulligatawny soup, a bit of sole and mixed grill, with cheese and celery and biscuits and butter to round off the effort. The lunch and the conversation lasted two hours and a quarter: at the end of which time the man spent twenty seconds at a telephone before he was put on to his wrong number, and this is what he said: "I say, miss, here have I been ten or fifteen minutes at this confounded instrument getting wrong numbers all the time. I'm a busy man, and I think it's most disgraceful that you can't find anything better to do than waste a busy man's time in this disgraceful way—and heaven knows I speak clearly enough—and it isn't as if I had the whole darned day to waste in talking to people I don't want. So——"

He paused, listening. Then enpurpled, he howled into the vulcanite liqueur coffee cup that they put on telephone transmitters: "What number do I want? Why, the number I asked for twenty-five minutes ago."

He got it.

But was he satisfied even then? No.

"If I had my way," he said, "I'd drown 'em all."

* * * *

On the contrary, I think it would be rather distasteful to drown the telephone girl. Whether her voice is a mellow contralto or a canary soprano, she is a delightful companion; she is always at home to you at the other end of the wire; and you can meet—still over the wire, of course—as many of her as you wish.

You need no introduction. All you have to do is to pay twopence, and go on something like this: "I am the principal proprietor of the Bank of England, my dear, and I would wish you, if you can spare the time, and have no other pressing engagements, to enable me to have a little talk with Park Lane 1234567890. I want to buy a mansion there to give to our Bank doorkeeper as a Christmas present."

"I will most certainly endeavour to meet your wishes, dear sir," she replies.

Then you find that you have been put on to Mark Lane 9325967850 instead; but, being an adaptable man, you do not grumble, but buy your doorkeeper a packet of currants and a pound of tea—also instead.

If you take a dislike to the voice speaking from the Wrong Number, you retain your composure and, explaining the matter to the telephone girl, you say "I regret to inform you, my dear"—always call her "my dear"—telephone girls like it so much—"that I have been connected with a particularly repulsive subscriber at Mark Lane, in place of Park Lane, and that six out of the ten figures I mentioned to you are wrong."

The velvet "Oh, I'm sorry," that comes over the wire would melt the heart of a red-headed hangman.

"So am I," you say. "Let us weep together over the telephone."

No. The telephone girl is one of the few sparkling Londoners. Have you ever thought of this (a terrible thing):—

Suppose you always got the right number!

One of the disgusting faults of motor-buses is that if you ride on one with a label "Victoria" on its forehead you look up from your paper and find that you are at Victoria.

How much finer life would be if the driver took it into his head to drop you at Guildford or Horsham or Wapping.

Wrong numbers have no terrors for the man who knows what to do with them.

But let us go further than that. Let us accept the depressing idea of the efficiency desperado who takes 150 minutes for lunch and then commits an earthquake because a simple-living English girl at a telephone exchange gives him a wrong number, for which she is not responsible—it is another girl who has given it to her.

* * * *

As for wrong numbers, for the rest of your life do as I do. When I ask for a number and get the wrong ones—five or six, say—I say in the most *deferential* way: "I've had *my wrong numbers*. Thanks. Would you mind giving me the right one now? Then I can go."

The answer is, without exception, giggles.

But then, I am one of those happy people who are pleased with the telephone girl. You see, I have seen her at work; and I would like to see the 150-minute lunch man—carrying all that weight of responsibility—go to her switchboard and try to do her job.

Sermonettes—Third Edition.

(With renewed Apologies.)

Purr softly, gentle Purley!
(Keep to the rolling "r" and all is well)
Sheath thy sharp talons, arch thy glossy back
And seek with artless anticks to beguile
Thy district sup'rintendent.

Putt with good judgment, Putney,
And see thou hole'st in one when on the green!
(In common parlance, when thou'rt "on the carpet")
Avoid all fantasy, vain speculations,
And get right down to that which my soul loveth,
The sportive tack of brass.

Our Resolutions.

We wish every reader of and contributor to our column a very happy New Year, and suggest, as a "New Year's Resolution," that each exchange shall pledge itself to send at least *one* article or poem each month to our column.

We thank very sincerely the small band of regular contributors who are always so loyal to this column, and would assure them that their contributions are esteemed very highly by a large number of readers.

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

LONDON TELEPHONE SERVICE NOTES.

The Telephone Play.

On Friday, Dec. 11, at King George's Hall, Caroline Street, Tottenham Court Road, a delighted audience of over 600 members of the London Telephonists' Society witnessed the long-looked-for repetition of Miss McMillan's telephone play under its new title of "Yesterday, To-day and To-morrow;" and once more author, soloists, chorus, and producer combined to provide an entertainment which, in the words of one of the audience versed in the doings of the theatre, was "a better and brighter show than that provided by many musical plays staged in the public theatres."

The play centres round the figure of the Subscriber, past, present, and future. In Act 1 we see him brought to trial before a jury of telephonists for all the crimes in the Telephonic "Newgate Calendar." Act 2 depicts his reconcilaition with the fair maidens of the exchange. We see him filled with remorse and a burning desire to co-operate, shedding tears of grief as, towards the end of the act, the shadow of the Automatic System darkens the roseate path of a complete union of hearts. Act 3, after an amusing interlude at a Labour Exchange, reveals him consistent to the last in the role of complainant, bursting into the District Office, driven to despair by the Automatic System, the working of which would seem to be almost as exciting as an air raid! The inevitable "happy ending" is provided by a proclamation foreshadowing reversion to the manual system. Messrs. Pounds and Beck provide the humorous dialogue in Act 3; all the rest of the play being in verse, full of playful humour with occasional flashes of gentle irony, and constructed with the craftmanship and unfailing sense of harmony and rhythm characteristic of the author's verse.

COME THEN, RING UP THE CURTAIN!

Both soloists and chorus gave of their best, all members of the original cast adding to their laurels of last year, to the obvious delight of the audience. Of the new members, Miss A. Price, of "Transformers" fame, gave a finished and humorous performance of the part of the supervisor, ably supported by Miss Blacker; who, in the dual role of policewoman and assistant at the Labour Exchange, revealed a marked gift for comedy; while Mr. Hemsley proved an able comedian as well as an accomplished singer, his humorous by-play evoking continuous ripples of laughter. Encores were frequent and enthusiastic. All the favourite numbers of last year were repeated; and of the new items special mention should be made of the duet between the two subscribers "O can it be I hear aright?" when told of the coming of the Automatic System, a passionate farewell to the telephonists sung with delightful humour and point—and no little weeping—by Messrs. Cracknell and Hemsley; the song "Engineers are ordinary men," with its refrain "They want to be happy," charmingly sung by Miss Latimer; the rollickingly humorous quartette "When in trouble, dial O," by Messrs. Beale, Beck, Cracknell, and Hemsley; and the serio-comic love duet "Ah, dearest, how lonely they've made my life," by Miss Blair-Street and Mr. Cracknell, vigorously and deservedly encored despite the lateness of the hour. As for the chorus, charm of face and form, enshrined in a costume-setting designed with Miss Clayton's unfailing art, provided a picture which matched the fresh and tuneful voices; while the solo dance by Miss L. E. Jones at the beginning of Act 2 won a well-earned tribute of applause.

At the conclusion of the play there were enthusiastic calls for "Author," and Miss McMillan, on appearing with Messrs. Pounds and Beck, was the recipient of floral tokens of appreciation. In acknowledgement, Mr. Pounds paid a well-deserved tribute to the ability and untiring devotion of the accompanist, Miss Garvey, who, with the Misses Woodman and Grant, had done so much towards the success of the production; which, in response to a widely expressed wish, will be repeated on Jan. 29. To this performance members of the Engineering Department will be specially invited.

Many members of the audience who witnessed the play last year must have missed the presence of Miss Le Cornu, whose name appeared on the notices of this play, and whose tragically sudden death following an operation soon after rehearsals had commenced is fresh, in the minds of her colleagues in the cast. She has heard, fraught with a new meaning, the last lines of the prologue:—

> Will ye hear, then, the Story
> How it unfolds itself surely and certain?
> Come then—ring up the curtain.

* * * *

Culled from the Exchange.

Avenue Bazaar.—Our annual bazaar is a stirring event, and for weeks in advance all our staff were intent on raising the funds to equip every stall—the various methods did credit to all. Some sold luscious fruit to their colleagues at lunch, and some supplied chocolates for them to munch.

Others went canvassing friends and relations for small contributions and ample donations, whilst one read our tea-cups, and saw things sublime occurring to us at a penny a time. In fact, when the momentous day came at last, o'er the scene of our labours a glamour was cast by means of much bunting and floral display, which produced an effect that was really quite gay.

Miss Cox kindly opened the sale with a speech calculated our hearts and our pockets to reach—and for this gracious action anon was accorded a warm vote of thanks which was loudly applauded, and later confirmed in a tangible way when Miss Cox (with Miss Ashmead) received a bouquet.

The bazaar being opened, we wandered at will in search of the presents which later would fill the hearts of our kindred with joy or dismay—according as "winners" or "duds" came their way!

Each stall looked delightful—the stall-holders too, had most taking ways as we very soon knew! We were almost reduced to our very last "bean" before they allowed us to fade from the scene! The bran-tub and side shows of course claimed their share, and then for refreshment we had to repair to the room where the waitresses all were so charming, our craving for high tea became quite alarming!

We ordered hot crumpets, fruit, pastries and cream, and anon felt compelled just to linger and dream, but finally wound up with sardines on toast—a feast to make Barmecide give up the ghost!

Still, it cheered all those darlings at work in the kitchen to think that *two* hospitals they were enrichin'! whilst we in their cooking detected no flaws, and braved indigestion for such a good cause!

The total sum raised by our effort this year is £130 net, so I hear.

The Shadwell and Westminster Hospitals thus will jointly receive this love-token from us at a time which brings peace and goodwill toward men.

With thanks to all helpers I lay down my pen.—C. A. S.

Hampstead.—Wednesday, Dec. 2, was a long-looked-for day by the staff of the Hampstead Exchange.

For months previously a large number of supervisors and telephonists have worked early and late to ensure success for a sale of work in aid of the funds for the Forward Movement of the Y.W.C.A. The profits reached the very gratifying total of £100, and the organisers and helpers were well pleased at attaining the century.

SLOANE STAFF SPECIAL.

Sloane.—The Sloane staff held a Dance and Social on Friday, Dec. 4. Under Mr. Vincent's direction as M.C. and in company with many friends from other exchanges a merry evening was spent all too soon. The proceeds are to be devoted to the hospitals. The photograph shews the happy party during the interval.

RETIREMENT OF CAPTAIN CROMPTON.

Captain Charles Crompton, O.B.E., R.E., M.I.E.E., was born on Nov. 2, 1864, and entered the Post Office service at Liverpool as telegraphist in April, 1885. After being transferred to the Engineering Department at Liverpool in December, 1886, he was promoted to be Engineer in June, 1894, and stationed at Oban (Scotland West District). Early in the following year the submarine cable connecting Oban with the islands of Mull, Coll and Tiree was broken and Captain Crompton established *Wireless* communication between Morvern on the mainland and Craignure in Mull. The system used was that devised by the late Sir W. H. Preece, then Engineer-in-Chief of the Post Office, and a considerable number of public telegrams were satisfactorily dealt with during a period of ten days until the cable ship arrived and restored normal conditions by repairing the submarine cable.

It should be noted that the foregoing constituted the first occasion on which Wireless Telegraphy was used commercially in Great Britain, if not in the world. Senator Marconi arrived in London later the same year (1895) and with the assistance of the British Post Office conducted experiments which resulted in the wireless system as known to-day in all parts of the world.

In 1896 Captain Crompton was transferred to Warrington (North Wales District) in connection with the transfer of the trunk telephone lines from the late National Telephone Co. to the Post Office.

During the latter part of the South African War, viz. from March, 1900, to November, 1901, Captain Crompton was loaned to the Royal Engineers (Telegraph Battalion) Southern District, and acted as Superintending-Engineer of a sub-division with headquarters at Basingstoke (Hants).

After this Captain Crompton was given charge of the underground cabling of London for the then extensive Post Office scheme of telephoning the Metropolis. In 1904 he went as Executive Engineer to Bradford (Yorks) in charge of an extended and important section, but two years later was recalled to London as an Assistant Staff Officer on the personal staff of the Engineer-in-Chief. In 1908 he went to Edinburgh as Assistant Superintending Engineer (Scotland East District).

When the late War broke out he was appointed adviser on telegraph and telephone communications in all Scotland to the General Officer commanding, Scottish Command, and later, to the Commander-in-Chief, Coast of Scotland, Rosyth, with the rank of Captain, and dealt with the communications of the premier services as well as many others which sprung up; R.A.F., Anti-Aircraft, Ministry of Munitions, etc., etc., until some time after the end of the war. He was awarded the O.B.E. in 1921 for his services.

In August 1921 Captain Crompton was promoted to be Superintending Engineer in charge of the South Wales Engineering District with headquarters at Cardiff, and transferred in 1924 to the charge of the Scotland (West) Engineering District with headquarters at Glasgow.

Having completed 40 years' service he retired under the age limit on Nov. 30, thus ending his engineering career as head of the same District in which he started as a junior engineer 31 years ago.

At a meeting of the Engineering Staff at the Head Post Office, Glasgow, he was presented with a handsome canteen of cutlery from his colleagues in the service.

RETIREMENT OF MR. ARCHER SMITH.

On the retirement from the service of Mr. Archer Wellen Smith, District Manager, Manchester, the opportunity was taken by the staff to show their tangible appreciation of his personal qualities in the form of presentations. Mr. J. G. Maddan, Postmaster-Surveyor, Manchester, presided. Supporting him were Messrs. A. C. Godfrey, Chief Clerk, H. Elliott, Contract Manager, and J. L. Parry, Traffic Superintendent of the Post Office Telephones staff, while representing the Manchester Post Office were Messrs. A. E. D. Wilson, Assistant Postmaster, and G. R. W. Jewell, Chief Superintendent, Telegraphs.

In a brief introductory speech, Mr. Maddan called on Mr. Elliott, who referred to the extensive telephonic developments which had taken place in Manchester during Mr. Smith's presence among them.

Mr. Godfrey presented a brief r/sum/ of Mr. Smith's career in the telephone service, which dated back to the year 1891, when the retiring District Manager was engaged by Messrs. Taskers, of Sheffield, as an engineer's clerk and draughtsman. This firm was amalgamated with the National Telephone Company in 1892, and Mr. Smith was appointed sub-engineer. A year later saw Mr. Smith as local manager at Chesterfield, while in a similar capacity he later migrated to Northampton and Birmingham in turn. In 1899 his services were further recognised by his appointment as district manager for The Potteries, a post which he held for three years before he was transferred to Wolverhampton. Since then he had seen service in a similar capacity at Belfast and Newcastle, before he was transferred to Manchester, the largest provincial district, three years ago. During this latter period Mr. Godfrey had found him to be a hard worker, anxious for the well being of his staff, and of a cordial and estimable disposition. He was sure the audience would be with him as he voiced these sentiments, and he knew that all would associate with him in wishing Mr. Smith a long period of well earned rest.

After Messrs. Parry, Wilson and Jewell had spoken of the genial characteristics of their retiring colleague, Mr. Maddan made the presentations, which consisted of a complete three-valve wireless set, the gift of the staff of the Manchester District of the Post Office Telephones. This was supplemented by the presentation of a gold mounted fountain pen and propelling pencil, a token of goodwill and esteem from the members of the Manchester Engineering Staff.

FOOTBALL: BLACKBURN *v.* MANCHESTER.

As a complement to the Cricket Match of July last, when the Blackburn District Office entertained their Manchester comrades—and rivals—and played an inconclusive draw, the teams representing the respective offices recently lined up to face each other for mastery in the soccer code.

The game was played on the ground of the Breightmet United Football Club, at Bolton.

Teams :—

MANCHESTER—J. S. McFadden; T. E. Nichols, R. German; J. J. Green, R. Stafford, J. McManus; Messgr. Fowler, W. Lee, W. Groves, J. Phillips, Messgr. McDonald.

BLACKBURN—F. Gilmore; A. Hargreaves, T. Hilditch; H. Hinchley, R. B. Fazackerley, H. Hare; W. O'Brien, E. McGonigle, A. Turner, C Fallows, A. Jones.

Referee: J. B. Mayoh, Manchester.

Linesmen: Messrs. E. Arnold Riley and J. F. Bridges.

At the end of 15 minutes the determination of the Manchester forwards was rewarded, for PHILLIPS netted from a corner. Three more goals for Manchester were subsequently added by LEE (2) and McMANUS. McDONALD scored one from a splendid centre, and then FOWLER went on to score a sixth. A minute before the interval, Turner was going clean through when he was heavily brought down, and from the resultant penalty kick HILDITCH drew first blood for Blackburn.

In the second half FALLOWS scored for Blackburn, but Manchester were not yet a spent force, PHILLIPS and McMANUS put on 2 more goals for them. After GROVES had scored a ninth the Blackburn forwards reduced the deficit with a well-conceived goal, the finishing touch to which was given by TURNER. The Manchester team were too fast for their opponents, and their combination was also superior.

Of the Blackburn men, Gilmore in goal several times distinguished himself with fine saves, and was in no way to blame for the defeat. Hargreaves and Hilditch had far more to do than Nichols and German, and they did it valiantly, very ably assisted by Fazackerley, a hard-working centre-half.

Final:

MANCHESTER TELEPHONES	9
BLACKBURN TELEPHONES	3

Mr. J. T. Whitelaw, District Manager, and Mr. Barclay, Traffic Superintendent, Blackburn, were present, Mr. A. C. Godfrey, Chief Clerk, Manchester, representing his team in the unavoidable absence of Mr. Archer Smith, District Manager, through indisposition. Tea was later partaken of at Messrs. T. Seymour Mead's Cafe in Bolton.