

THE GOVERNMENT TELEGRAPH SERVICE.



THE "WHEATSTONE AUTOMATIC."

IN CASSELL'S FAMILY MAGAZINE for January last year, we endeavoured to give an accurate description of the real nature and scope of that widespread but little-known service engaged in forwarding telegraph messages by submarine cables. In the present paper it will be our aim to give a similar account of the inland telegraph service of this country.

Everybody knows that the postal telegraphs are in the hands of the Government, and that all the *employés* engaged in the work of erecting, maintaining, and working these telegraphs are Civil servants of the Crown, from the Postmaster-General down to the message-boy who delivers the telegrams. Formerly the telegraphing of this country was done by several rival companies, such as the United Kingdom, and the Electric and Magnetic Companies; and in order to benefit the public by making the system more



THE "MORSE."

complete and lessening the tariff, it was proposed by Mr. Allan as long ago as 1854, and by Mr. Bain in 1856, to transfer the powers and works of the two latter

companies into the hands of Government. In 1861 the Edinburgh Chamber of Commerce took the project up in earnest, and the transfer was finally effected in 1870, at a round cost of twelve millions sterling.

The acquisition of the telegraphs and the growth of letter transport necessitated a new central post-office in London, and the foundation-stone of the new General Post-Office, St. Martin's-le-Grand, was laid in December, 1870. This spacious building fronts the old Post-Office, and cost for site and erection some £200,000. It is built of Portland stone, covers an acre of ground, and contains nearly 200 rooms. It was formally opened early in 1874. There are the Postmaster-General's chambers, and those of other officials, including the Controller of Telegraphs and his subordinates. The third and fourth floors are principally used for telegraph work, and the basement



THE "SOUNDER."

contains the engines and the "battery room," where 25,000 galvanic batteries are stored. In the quadrangle are situated the boilers, and a pump for drawing water from an artesian well specially bored for the supply of the building.

This Central Telegraph Station of London (or T.S. as it is telegraphically known) is one of the most interesting "sights" in the world. It is by far the largest in existence, and a greater number of more varied messages pass through it daily than through any other telegraph office. Figuratively speaking, it is the chief ganglion or brain, where centre all those nerves of communication which interlace the sides of the planet. The ends of these wires, between five and six hundred in number, are brought into one large room in which all the telegraphing is done—wires that lead by devious routes to all lands, and which, if properly connected up by a pre-arrangement at different places abroad, would enable the humblest person in that room to send his thoughts right round the world in less than a tenth of the time which vaunting Puck required for his girdling feat. A busy and novel scene presents

itself to any one entering this immense operating room, a scene reminding one somewhat of a large city bank. The eye ranges over scores of low counters, covered with delicate telegraph apparatus, form-racks, and green-shaded lamps. At these tables, in front of their special instruments, sit hundreds of young men and women, mostly the latter, some of whom are intently engaged in manipulating the small lever or key by which they send the messages, or "reading" received messages from long slips of paper; others are resting in quiet until fresh work arrives in the shape of a message to send off or to be received. A striking

are set something like 700 instruments, presided over by 1,000 employes, male or female.

The traffic which is despatched from day to day by the Postal Telegraphs comprises Provincial Press messages, by which news is supplied to any newspaper or club-room, at reduced rates, throughout the country; foreign, metropolitan, and inland general messages; private wire messages; and time-signals. Private wires are those wires hired out to parties for a yearly rental; and Greenwich time-signals are sent twice a day, at 10 a.m. and 1 p.m., to any part of the country, or hourly to any part of the metropolis



THE OPERATING ROOM AT THE GENERAL POST OFFICE.

feature is the absence of all stress and bustle. Life seems to flow very pleasantly amongst these smiling young ladies and respectable young men, seated in their chairs beside each other; and were it not for the hurrying clatter of the busy instruments resounding on all sides, the spectator would lose sight altogether of the ceaseless activity which reigns here, and the play of human interests which is going on around him.

The operating room is in the form of an H, the cross-bar being the principal open space and body of the room. It is spacious, clean, well ventilated, and will soon be lit at night by the electric light. There are despatched and received the foreign and miscellaneous messages. One of the sides is reserved for the metropolitan messages, and the other for the Provincial Press news. The area of the whole apartment is 2,000 square feet, and it comprises 2,400 feet of tabling, on which

within two miles of the Post-Office, for an annual fee. The Government have no exclusive monopoly of private lines; and hence we find Exchange Telegraphs for announcing the price of Stock, District Telegraphs for domestic convenience, Fire Telegraphs for giving alarms of fire at the Brigade Stations, and telephone lines doing business in competition with the Government system.

The ordinary messages are sent by the operator working a small lever, or "key," up and down at the rate of about twenty-five words per minute. The Press messages are sent during the night by male operators working the Wheatstone Automatic sending instrument. This is an exceedingly ingenious and beautiful little instrument, designed by the late Sir Charles Wheatstone for automatically sending messages at very high speeds, thus substituting mechanical for

hand-sending. The message is first punched out in a series of holes on a tape of paper, and compressed air is employed to work the puncher, so that the work of punching is as easily performed as playing the keys of a piano. When passed through the automatic sender, this punched slip of paper controls the current sent into the telegraph line in accordance with the message punched upon it. One of these slips can be passed through several automatic senders one after another, and thus the same Press message may be sent to half a dozen different parts of the country one after another, and as there are usually several different towns on the same line, it will be received at each of these on its way. Further, the puncher can be made to punch three or four of these slips simultaneously. To give an idea of the speed attained by the Wheatstone Automatic, we may say that it is not unusual to send 150 messages of twenty words, with addresses, in an hour by it; and when the line is worked on the "duplex" system—that is, two messages crossing each other on the same wire at once—the extraordinary number of 300 messages, or at least 6,000 words, per hour (100 per minute) has been done on short lines. On long circuits, say from London to Aberdeen, the rate attained by the Wheatstone is 100 messages per hour. By the automatic system, half a million words are frequently sent in a night from T.S. to the Provincial Press.

Messages are received on two kinds of instrument, the "Morse" and the "Sounder." The Morse instrument marks the message in ink on a slip of moving paper, whereas the Sounder strikes it out by a hammer-and-anvil arrangement. In the one case the signals are read by the eye, and in the other by the ear of the clerk. In both instruments the signals are made by means of electro-magnetism. The currents, coming in from the telegraph-wire and the distant station, are passed through an electro-magnet which forms part of the instrument, and at the moments of their passage they cause the electro-magnet to attract a piece of soft iron attached to a small brass lever in such a way that the lever is tilted up. In the Morse the lever, by this tilting movement, impresses an inking-wheel against the moving paper and makes a mark, long or short, "dot" or "dash," according to the length of the current. In the Sounder, which is simply a Morse deprived of its inking arrangement, the lever strikes against a metal stop, as a hammer hits the anvil, and gives out a ringing stroke. The ear learns to distinguish the long and the short signals or dots and dashes of the Morse code by the long or short pauses after the strokes. Because of their greater simplicity and convenience, Sounders are rapidly superseding Morse instruments at T.S. A clerk can sit listening to the clicking of the message and write it at the same time. The American type, or "pony" sounder, as it is called from the resemblance of its clatter to a pony's trot, is employed. It is the smallest telegraph instrument in use, being only three or four inches square, and each one is half enclosed in a mahogany screen placed on the table to form a recess for it. By this contrivance the clerk hears the particular indications of his own instrument

better amidst the surrounding din. On one or two long lines to the north of England, when there is press of business, the American "quadruplex," whereby four messages are passing simultaneously on one wire, two from each end, is applied to the Morses and Sounders. On the shorter lines, the older "needle" and A B C instruments are still employed.

A special feature of the great operating room at T.S. is the pneumatic service, by which written telegrams are bodily despatched from T.S. where they have arrived, to local London offices from which they are to be delivered, or local telegrams are received at T.S. for despatch elsewhere. For this purpose, lead pipes are laid from T.S. to these offices, and the air being exhausted in them by the engine at T.S., when the telegrams are packed into india-rubber carriers and inserted in the tubes, they are sucked or blown, as the case may be, through the tubes to the other station. The longest tube goes to the House of Commons, and the carrier takes eight minutes to traverse that distance. When a carrier sticks fast inside a tube, the following test is made to determine its whereabouts. A delicate membrane is stretched over the end of the tube, and a pistol is then fired close to it. The wave of sound hits the membrane and travels along the tube till it meets the obstructing carrier, when it is deflected back again, and in time agitates the membrane as before. The distance of the carrier is then calculated by the time taken by the pulse to travel to it and back again. These tubes are manipulated by boys.

In the whole Government Telegraph Department of the United Kingdom there are some 12,000 persons employed. About 1,400 of these are engaged at T.S., and rather over one-half (700) of the latter are females. Several hundreds more are to be found scattered about the London local offices. This army of officials is divided into the manipulating or operating staff, and the engineering or constructing staff, corresponding to the common soldiery and the scientific corps. Over all is placed Mr. Fischer, the Controller; and the chief of the engineering staff is Mr. Graves, while Mr. W. H. Preece directs that portion of the engineering staff which is chiefly concerned with the electrical testing of the lines and experimenting with new instruments. Of these the operating staff is by far the most numerous and publicly important, and it is of them that we will mainly speak.

If all fields of female labour were as easy and inviting as telegraphing, there would soon be a solution of the woman's rights difficulty. It is work for which women are eminently suited, where the strain is not too great on their powers of endurance and patience; for they are docile and apt, and divine the tenor of a message very quickly as it is received—a valuable quality when the lines are working badly and signals are confused. For ordinary lines, where the traffic is not too heavy and long-continued, female clerks are even better than male ones; but for press work, "rushed" through for hours on end by an automatic transmitter, men are superior to them, and consequently all the press work is now done by young men,

while the metropolitan messages are reserved for girls. Between these two extremes, the ordinary commercial telegraphing done in the body of the T.S. room is performed by male and female clerks indiscriminately. This differentiation of the work has necessitated a reduction of the female staff, and during the last two years no female clerks have been taken on. As soon as the reduction has been carried far enough there may be openings for a few more girls.

Our readers may be curious to know from what class of life these young women are drawn. To all appearance most of them are ladies of the governess type; a great proportion are handsome and carefully dressed. They are all drafted from that broad and ill-defined section of the community, the middle class—some from the higher ranks of the middle class, daughters of professional men or merchants, who come simply to earn pocket-money and do some regular work; the majority from the mid-middle class, whose fathers may have a large family to support, or who have suffered reverses of fortune; and others from the smaller-shopkeeping class, who prefer the work to going out as governesses, and who, having received all the necessary education, have attained—for there is here an elevation of their status—to the grade of Civil servants. Many of these young ladies leave their telegraph instruments to return every night to elegant homes; and the dresses they wear at their work, though neat, are purposely plain.

Any person, male or female, desiring to enter the Telegraph Service applies to the Postmaster-General for admission to the competitive examination. He or she must be over fourteen and under eighteen years of age. The examination consists in reading, writing to dictation, and arithmetic. On passing, he or she is examined medically, and certificates of respectability are required from three householders. If these tests are satisfactory the clerk becomes a "probationer" without pay, and practises two or three months at the Government Telegraph School, at Telegraph Street, Moorgate Street, E.C., where he learns to send and receive messages on the needle instrument, Morse, and Sounder, and to punch "slip" for the Wheatstone Automatic at a certain rate of words per minute. On leaving the school the clerk is placed at work in T.S., and is termed a paid probationer, and receives 8s. per week. After a month or two of this training, he is a fully-fledged operator, and receives 12s. per week; this is subsequently raised after two or three years to 16s. and 18s. per week. The average salary of operators is now from 18s. to £1 per week, paid fortnightly. Any of the female clerks can rise to a supervisorship, or head of a section, the maximum salary being £150 per annum; and any of the male staff can rise to the highest post in the service—the Controllership—with a salary of at least £1,000 a year. The most eligible posts

for rising operators are, however, the superintendentships; the superintendents are over the supervisors, and have charge of a department. These are all males, and earn from £200 to £400 a year. The recruits for the engineering staff have hitherto been drawn from the operating staff, but it is to be hoped, for the benefit of the service, that a special scientific training and examination will be inaugurated for these gentlemen in future. Besides the superintendentships at T.S. there are divisional superintendents for different districts of the provinces.

Female clerks work from 8 a.m. to 8 p.m., in relays of eight hours each. Half an hour is allowed at mid-day for dinner, which is cooked on the premises, and served at a cheap rate—a plateful of hot meat, bread, and vegetables costing only 9d.; and even a 6d. share can be obtained. Tea, bread, and butter are served gratis to all the operators after 5 p.m., it being found that the fifteen minutes' absence of the clerk from his instrument thereby saved is more valuable than the refreshment supplied. The night-duty is exclusively done by the male clerks, who take it in rotation—every clerk doing night-work during one week out of three.

As regards the perquisites of the profession, each operator gets a fortnight for holiday yearly, with full pay running on, every supervisor three weeks, and every superintendent a month. In a case of illness, the official doctor will prescribe if the patient visits him. For the female staff there is a "matron," to whom are referred all questions of delicacy affecting the conduct of the work. A clerk confined at home through illness receives two-thirds of his wages during a period not exceeding six months, and half his wages afterwards until the nine months or full year of absence sees the end of official forbearance. Female clerks in ill-health or convalescent can get a seaside change to Brighton or Hastings for a month; there being three vacancies for girls at the former, and two at the latter place. Here the privileged young lady is sent at Government expense, and receives 2s. a day of extra pay while doing only six hours of work. Absences from hygienic causes are, of course, more frequent among the female operators than the male, the relative percentages being $5\frac{1}{2}$ as compared with $2\frac{1}{2}$. Like all Civil servants, telegraphists are entitled to a pension at the age of sixty, whether fit or unfit for further work; and in special cases of permanent ill-health they may receive a pension after ten years of service, the amount being one-sixtieth of the salary for every year employed. An operator receiving 30s. per week would, after thirty years of service, obtain a pension of 15s. per week; one receiving £2 per week, £1 pension, and so on. The amount of pension, whatever the term of service, is however limited to two-thirds of the salary earned.

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