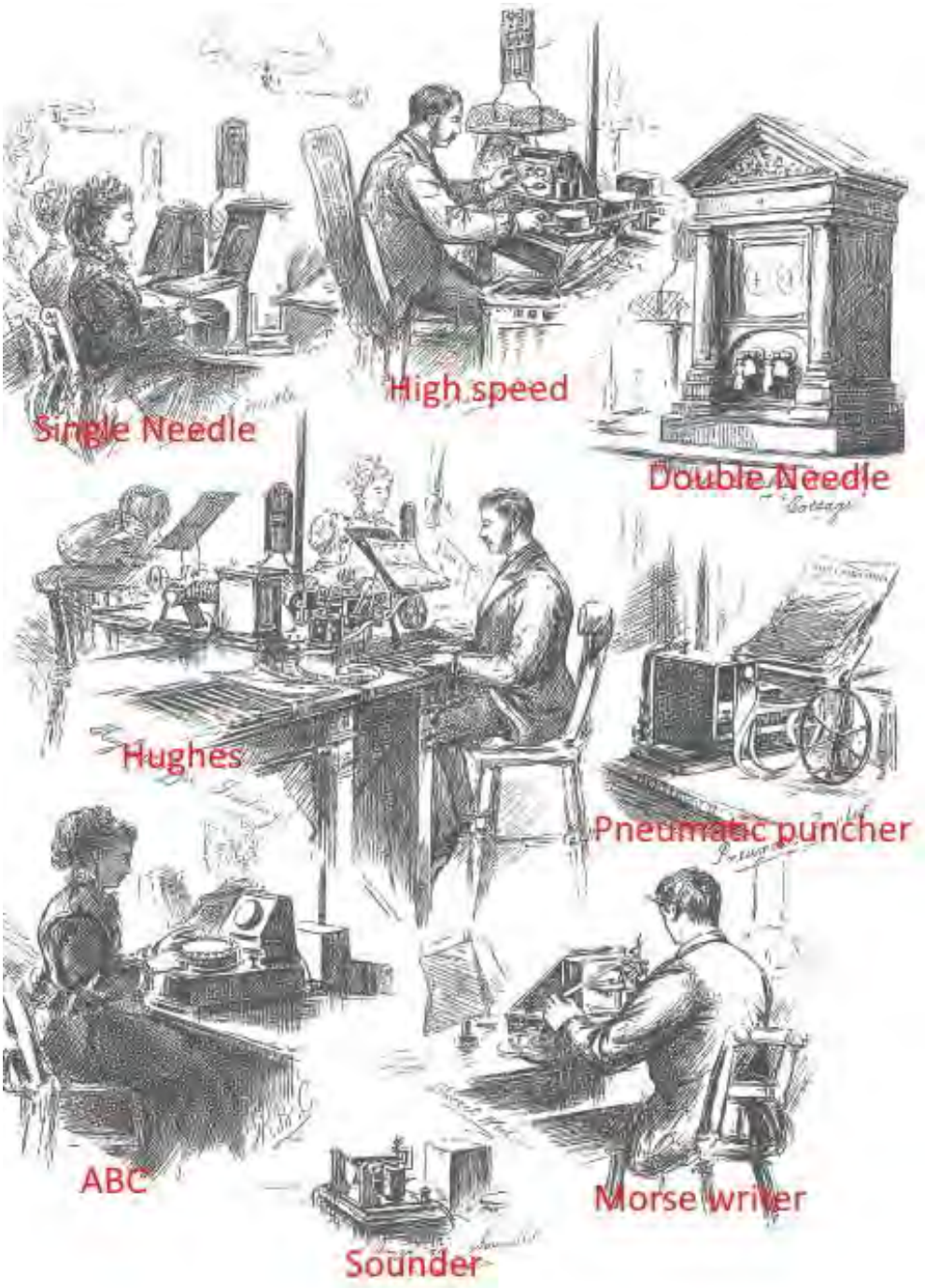
A VISIT TO THE CENTRAL TELEGRAPH OFFICE IN LONDON (in 1874…).



Sketches at the Central Telegraph Establishment, General Post Office by A. Bell

This is an article that appeared in the 'Illustrated London News' newspaper on 28 November 1874 (page 504). It was written following an extended visit by a reporter and is beautifully illustrated as you can see above.
This superb drawing contains an excellent representation of the eight telegraph devices in service at that time.

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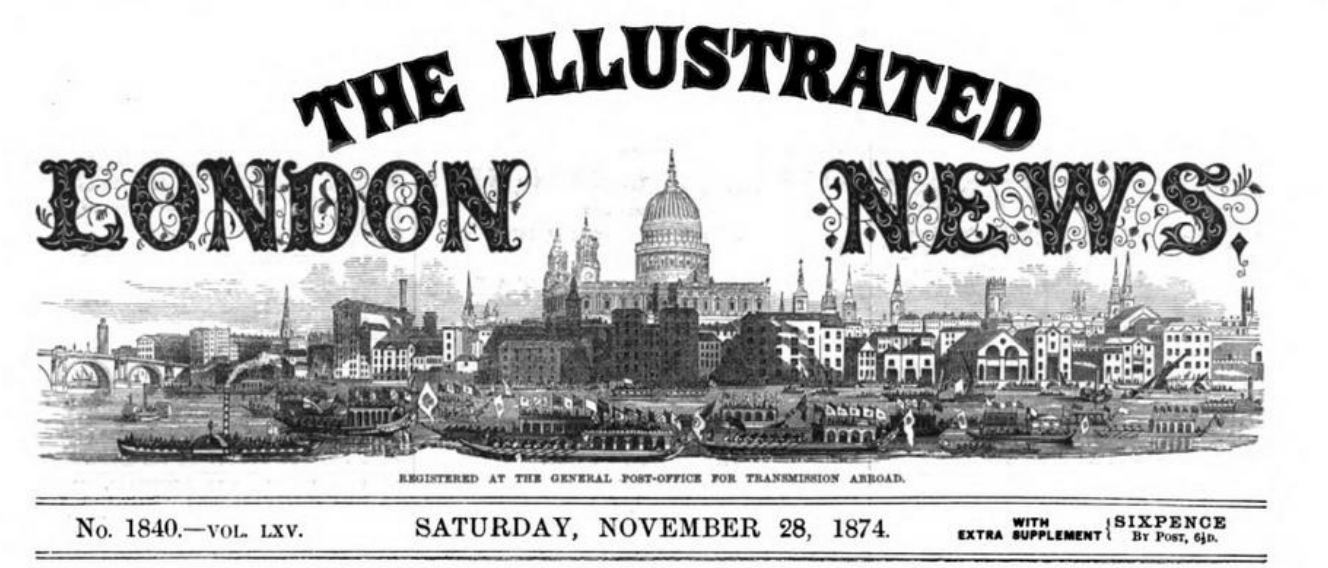

ARTICLE (#1)

Start

The Central Electric Telegraph Establishment at the General Post Office is one of the most admirable results of administrative organization for business, and of science applied by an apparatus of exquisite precision to the needs of social life. We have great pleasure in setting before our readers a few illustrations of the machinery and the methods here employed for the most rapid transmission of intelligence between all parts of the United Kingdom, and for its communication, also, to the submarine and foreign lines. Before attempting to explain the subjects which our Artist has drawn, we would thank the official gentlemen of this department—especially Mr. H. C. Fischer, the controller—for the opportunity lately granted us of making a personal examination. It would be superfluous to comment or to congratulate any of them upon the beautiful order and wonderful efficiency with which everything thus is arranged and conducted.

The large and handsome new building in St. Martin's-le-grand, at the corner of Newgate-street, facing the old building of the General Post Office, was shown in an illustration we gave some time ago. Its upper portion is occupied by the collective staff and instruments of the Central Telegraph Station, removed in January last, but with great additions, from their old quarters in a lane off Moorgate-street, near the Bank of England. There are 1,240 instrument clerks, of whom 740 are females, and there are about 270 messengers. This does not include the engineering staff, or that of the Controller. Between five and six hundred instruments are here kept at work, and the wires therewith connected within and beneath the building have an aggregate length of nearly three hundred miles. Besides this electric apparatus there are twenty-six lines of pneumatic tube, with air-pumps worked by three powerful steam-engines, for conveying messages bodily, by means of atmospheric power, between the principal City offices and the West Strand office, opposite Charing-cross Station, and the Central Telegraph Office.

It seems natural, in the first place, before we examine the instruments and their use, to look at the source of the electric fluid which constitutes their power. This is supplied by the galvanic apparatus in the battery-room, on the ground floor of the building. Here are many cupboards with shelves, upon which stand rows of earthenware jars, called Daniell's battery cells. Each contains a roll or hollow cylinder of copper, immersed in a solution of sulphate of copper, and an inner bath of sulphuric acid, with pieces of zinc or spelter. Several cells are usually joined to work together, the number being greater or less, for the generation of a more or less powerful current. This will depend on the distance to be traversed, the amount of work to be performed, and the season or the weather. As many as forty cells may be in joint use for a Liverpool message, or sixty for one to Edinburgh; but there is more "leakage" at some times than at others. The square boxes or jars, which yield a larger amount of electric force than the round ones, are employed for the Wheatstone instruments, as these, we shall presently see, convey many more

words in a minute. The engineer's foreman, who has charge of the Battery Room, informed our reporter that the contents of an ordinary cell would be decomposed, by constant working, in one week. But the material is not lost; the copper, when again restored by an easy process to the condition of solid metal, is of extreme purity, and is readily purchased by the manufacturers of telegraph wire. All wires are supplied to Government by contract, but the copper and zinc battery-plates come from a Government manufactory in Gloucester-road, Camden Town. The wires used here are copper, sheathed in gutta-percha. For the electric transmission of time signals, which require a very powerful single shock, not a long-continued stream of force, a special battery is used. This is the Le Clanché battery, formed by placing rolls of carbon, instead of copper, with smaller fragments of carbon, between the solution of peroxide of manganese, in the inner cell, and that of chloride of ammonia, in the outer cell. The Battery Room contains, in all, 23,000 cells, but many of these are worked in sets or groups, more or less numerous, connected with the same wire. There are, as we understand, about one thousand separate batteries here. The efficiency of any one of them can be tested in a moment, by the superintendent in the instrument-gallery above.

To this gallery, on the third door, we now ascend by the wide stair case, enjoying, by the way, the ample provision for clear light and fresh air, and the cheerful aspect of the whole interior. The instruments, of various kinds and uses, occupy a great central hall with four wings, one at each corner. These it will be convenient to mention as the north-east and south-east, the north-west and south-west galleries. The north-west gallery is for messages to and from Scotland, the north of England, and Ireland. The south-west is partly devoted to newspaper despatches and reports, and to the special "racing circuits;" the extra force of spare instruments, on Wheatstone's automatic system, is placed here, for use on particular occasions. The two eastern galleries are mainly occupied by the metropolitan telegraphs. They contain 203 instruments, of which 21 are duplex, 101 Morse printers, and 100 single needles. The central hall contains the instruments which are connected with the different provincial circuits of England. The provincial telegraph business employs 205 instruments at the Central Office; and of these 57 are Wheatstone's automatic, 20 are duplex, 7 are Hughes's type-printers, and 97 are Morse printers. But on the south side of the central hall are the pneumatic despatch-tubes for sending telegrams bodily, through an underground tube, to or from the more important London offices. On the west side is a tall and wide frame, called the test box, exhibiting in its front a great number of metal knobs and wires—these afford means of establishing an electric communication with any station throughout the kingdom. They derive their power from 4,000 cells in the Battery-Room. The battery test box, above referred to, and the sympathetic clock, with the chronifer, or regulator of clocks, are situated also here, between the two western galleries. The total floor space is 20,000 square feet; the mahogany desk space extends in length three quarters of a mile. Mr H. Eaton, as superintending engineer, is in charge of all the instruments on this floor. We are indebted to one of his staff, Mr. T. Hill, for much assistance in preparing this account.

It is a cheerful scene of orderly industry, and it is, of course, not the less pleasing because the majority of the persons sitting here are young women, looking brisk and happy, not to say pretty, and certainly quite at home. Each has her own instrument on the desk before her. She is either just now actually busied in working off or in reading some message, or else, for the moment, she awaits the signal, from a distant station, to announce a message for her reception. Boys move here and there about the galleries, with the forms of telegrams which have been received in one part of the instrument-room, and which have to be signalled from another, but which have first to be conveyed, for record, to the nearest of the check-tables and sorting-tables in the centre. Short pneumatic tubes facilitate the distribution and collection of papers in this building. The total number of messages daily received or sent at this Central Office is from 20,000 to 30,000. But of these a very large part, 17,000 or 18,000, are transmitted through the central office from other offices, and have to be repeated and forwarded; so that, in each case, there is the work both of receiving and despatching, though each is counted but as a single message. In addition to the number above stated, newspaper telegrams and reports, often lengthy, are sent through this office, more especially during the night. The female instrument-clerks do not remain for the night work, and their labour does not exceed eight hours a day, with half an hour allowed for dinner, which is comfortably provided for them in their own dining-hall. Five or six thousand of the day's messages are transmitted to or from the Anglo-American, the Eastern, the Northern, the Indo-European, the Submarine, and other foreign lines. Three thousand a day, on the average, are messages within the London district. The markets, the Stock Exchange, the races that may be going on, and other business of the day, communicated at once to all the chief towns in the United Kingdom, give some hours' employment to many instruments in the morning and afternoon, besides all sorts of private messages. In the night work of newspaper reporting, which begins at eight o'clock in the evening and continues two or three hours after midnight for the morning papers, 200,000 or 300,000 words are not unfrequently telegraphed to the provincial press. The heaviest task of newspaper-reporting telegraphy yet done was on a Budget night in Parliament, to the amount of 427,000 words. Let us now inspect, more particularly, the working of the instruments.

These are of several classes and of different capacities; but those working slower than others are made useful for the lines upon which there is not so much business to do. The general operation of the electric telegraph, as some of our readers must be aware, has been greatly improved, since its first invention, with regard to its action at the receiving end of the line. Instead of merely causing certain vibrations of an index hand upon a dial, it impresses certain marks upon a narrow slip or ribbon of paper which passes through the receiving instrument while the message is being delivered. These marks, in the Morse system, which is the one most used, consist of a dash and a dot, or rather a very short dash, and nothing more. With four or five marks of those two kinds, in a variety of combinations, all the letters of the alphabet are distinctly represented. The first four letters, for example, are rendered as follow

a . — b — . . . c — . — . d — . .

The flow of electric force is necessarily interrupted, in the operation of the sending instrument, at every instant when the positive and negative currents in that instrument are parted, which is done by a simple mechanism obedient to the sender's finger-touch. Its longer or shorter runs and breaks are necessarily recorded on the paper at the receiving end of the line. This record appears in the form, above shown, of extremely short lines, reckoned as dots, mixed with lines three times as long. The Wheatstone automatic signalling apparatus preserves this relative proportion with mathematical accuracy, by means of the mechanically-punched holes in the paper, which is passed through the transmitting instrument. But a clerk, after a little experience, is able to manipulate the dots and dashes nearly as accurately by hand. It is thus, by the arrangement of these dots and dashes, possible to convey an equivalent for every ordinary letter of the alphabet.

We now ask the reader to look at the Illustrations which fill another page. The "single-needle" instrument, shown in one of the upper corners, does not write the message by Morse's dot-and-dash alphabet on a paper ribbon; but it unfolds, by means of the deflection of its needle, from right to left and left to right, the messages as they are sent, letter by letter. Although there is no paper ribbon to record any marks, in the case of the single-needle instrument, the same series of signals is used here as with the Morse printer; a beat of the needle to the right being equal to a dash, and a beat to the left being the same as a dot, on the Morse paper. A clerk, therefore, who understands one class of instruments can very readily acquire the working of the other. The single-needle instrument is not so liable to get out of repair as those of more complicated structure. It is therefore in use at most of the small country stations.

The old "double-needle" instrument, in a case shaped like a cottage with a gable roof, appears in the opposite corner of the page. There are but two of this construction at the Central Office, and one is kept specially for the convenience of the clerk in charge of her Majesty's telegraph at Buckingham Palace, who has always been accustomed to this system. The other renders service to the Secretary's Department.

A very superior instrument is Wheatstone's Automatic, our illustration of which is found between the Single Needle and the Double Needle. It can send 120 words in a minute, instead of thirty or forty, as in the ordinary instruments upon Morse's system. It has also this advantage, that the letters it forms are not transmitted manually, but, as its name implies, automatically, by means of certain perforations, made before-hand, in a transmitting slip of paper, which can be made and used in multiple; so that a number of these instruments, each fed with its prepared slip, may simultaneously dispatch the same message. This is excellent for Press messages from London, sent to about twenty different provincial newspapers at the same time. The means are not difficult to understand. The instrument has two pins or styles, each thrusting upwards with very slight force. The one is connected with the positive, the other with the negative current, of electric action. The paper travels above their points so as to let them describe two parallel lines, a quarter of an inch apart. Corresponding exactly with these lines are two rows of little holes in the paper. But the two lines of holes, through which alone the little points can rise to a contact with the metallic conductor of electricity above, so as to complete the circuit requisite for electric action, are not continuous and uniform. The holes in a line stand at a varying interval from each other. So the effect is, that wherever the positive current, flowing upwards by the pin raised through a hole in the upper row, does not meet the negative current rising through an opposite hole in the lower row, there is a prolonged impression or dash on the paper in the receiving instrument a hundred miles distant. The speed. of Wheatstone's instrument can be regulated by fixing a lever, without any further trouble.

The function of expressly preparing for this admirable telegraph instrument those perforated papers which we have described is well performed by a mechanical worker, named the pneumatic puncher. This machine is worked by that atmospheric power, from the tubes and air-pumps in the basement, which conveys the despatches and records

that are written on paper. The person using it, when he has put in the paper ribbon to be perforated, reads the message to be sent, letter by letter, and plays on three keys, which set the punches or perforators in motion, as the paper glides over them, so as to produce the requisite arrangement of holes.

Hughes's type-printing instrument, as its name would denote, is one which actually inscribes on the paper at the other end of the line the capital letters of the ordinary printed alphabet, in a bold Roman type. It is very good for sending messages in foreign languages, and is therefore much used by the Submarine Telegraph Company. This instrument looks rather like a small pianoforte, with black and white keys, each of the keys when fingered producing a certain letter. The player is here seen, with his message in writing put before him, which he spells out upon the key-board.

The two instruments which are represented in working at the bottom of the page are Morse's direct writer and the A B C instrument. The former is the class of instrument most generally in use, both in the Postal Telegraph system in England, and also on the Continent, and in America. It is this class of instruments which has enabled electricians, by introducing duplex working (that is, working a wire in both directions simultaneously) practically to double the wire accommodation between the larger towns.

The A B C instrument is one of easy and familiar use for private telegraphs; it presents a circle of knobs, corresponding with the letters of the alphabet, which are to be pressed with the finger, as desired, after turning a handle. The raised dial opposite the lady sitting at this instrument is encircled by the letters of the alphabet, as the dial of a clock is by figures; and, each time that a stop at the distant end is pressed down, the hand fixed on the dial flies round, and stops at the letter indicated by the pressed stop far away. This sort of instrument is used in merchants' counting-houses, at clubs, newspaper offices, and some private houses; it is placed, too, at every station of the London Fire Brigade.

The Sounder, a recent American invention, gives each letter of the alphabet by a certain combination of more or less emphatic clicks, instead of those formed of dashes and dots in the telegraphic writing system. It has the disadvantage, with respect to official responsibility, of not delivering a printed record, as in the Morse slips, of the message which has been conveyed. At country stations it is more in use.

We shall give some further Illustrations next week and defer till then a description of the remaining features of interest in the Central Telegraph Establishment, St. Martin's-le-grand, London.
End

This article was followed up by three more on December 5, 12 and 19, respectively.
The first (above) is, at least to me, by far the most interesting. I hereby attach the URL links to the three others, along with a very brief commentary.

ARTIKEL #2

See https://babel.hathitrust.org/cgi/pt?id=njp.32101059280907&view=1up&seq=606&q1=central%20telegraph

ARTIKEL #3

https://babel.hathitrust.org/cgi/pt?id=njp.32101059280907&view=1up&seq=654&q1=central%20telegraph

On page 570 there is only a very brief text referring to the two previous issues and to the future one that will talk about the Instrument Gallery.
It does mention that "...the Instrument Gallery …. in which the whole of the instruments are placed, and are daily worked by more than twelve hundred "instruments clerks" reckoning altogether those on duty at different hours. The number of female clerks is about 740, but none of these remain on duty after eight o'clock in the evening."
In this edition there are no illustrations

https://babel.hathitrust.org/cgi/pt?id=njp.32101059280907&view=1up&seq=692&q1=central%20telegraph

Here are the illustrations on page 576 and, again, only a very short text on page 577.
The six illustrations show respectively 'tracing telegrams', 'the battery-room', 'message presses', 'the sympathetic clock', 'the chronopher, or time-sender', and 'the lines test-box'.

P.S.

I am very grateful that my friend Andy Emmerson was able to provide me with the text of the first article and the links to the other ones. The big drawing on page 1 is from my collection (a full size copy of the recto and verso sides of the original version-pages 504/505).

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