

THE LORIMER AUTOMATIC TELEPHONE.

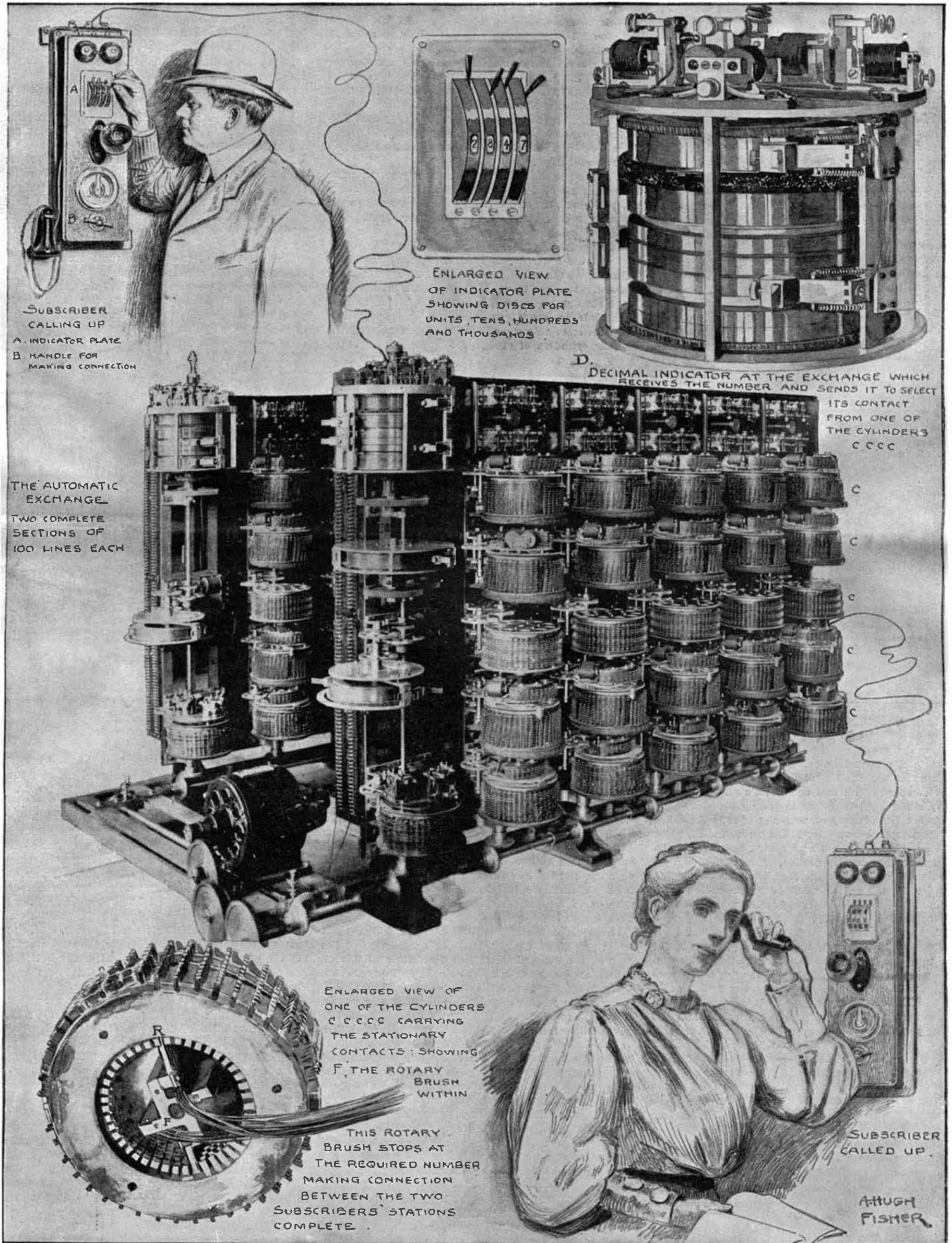
Two Americans, the Lorimer brothers, have offered to the French government an automatic telephone system of their own invention. The apparatus will soon be put to the test of regular service at a telephone exchange and its adoption or rejection will depend upon its performance. As the apparatus is very complicated an explanation of its action and its advantages will be given without any minute description.

The apparatus now in Paris is designed for an ex-

change having not more than 200 subscribers, half of whom are connected with each section of the apparatus. Communication between two subscribers connected with one section is established entirely within that section, while communication between subscribers of different sections calls into action four pieces of apparatus of the sender's section and one of the receiver's. In the illustration these two sections, each designed for 100 subscribers, are shown in the central figure. An electric motor, shown at the lower left of

this figure, drives a horizontal arbor which lies between the sections and extends throughout their length. This arbor drives a series of vertical spindles, each of which gives motion, as required, to its column of superposed disks or drums. For throwing the parts of this complex apparatus in and out of gear mechanical devices have been used, as far as possible, in preference to electrical ones.

Current for the subscribers' instruments as well as for those of the exchange is furnished by accumulators



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By courtesy of Illustrated London News

at the exchange—an improvement which does away with individual batteries and magneto-calls.

On the left of each of the two sections is seen an apparatus called a decimal indicator, which serves to identify the subscribers. It consists of a number of superposed circles of contact pieces. Each subscriber's wire is connected with one of these contact pieces.

In the axis of the column of circles is a rotating spindle carrying contact brushes which transmit the subscriber's calls to the other parts of the apparatus. As soon as the call is made the brushes stop, the number is transmitted and the brushes resume their rotation. The sole function of the decimal indicator is to call the other parts of the apparatus into action as they are required. This ideal telephone girl instantly transmits every order and at once turns to her other patrons, all of whom she visits every three seconds in search of fresh commands. Meanwhile, what becomes of the call—that is to say, the number of the subscriber called up?

By various stages it is transmitted to the auxiliary organs of the section, which is composed of exactly similar divisions whose number depends on the volume of communication. Each of these divisions consists of five cylinders, C C C C C, alike in appearance but unlike in function.

The topmost cylinder, called the primary connector, represents the plug of the calling subscriber which the operator inserts in the switchboard. It receives the number from the decimal indicator, the division starter (the single cylinder at the lower left), and the controller of the decimal distributor (the circle of contacts on the same axis with the indicator). The units of the number are received in the interior of the primary connector, the tens by the distributor placed above it.

The cylinder immediately under the primary con-

After from one to four seconds the pointer is seen to move over all the other buttons, making a complete revolution and returning to the position of communication. During this movement the number called for has been transmitted to the exchange. The pointer is controlled by the signal transmitter at the exchange, as has already been stated.

Having thus sent his call the subscriber takes down his receiver, applies it to his ear and presses a button which rings the bell of the person called up. The sound of the bell is heard in the caller's receiver and indicates that the communication is established. Failure to hear the bell indicates that the line is not free. In this case the receiver is hung up and the call is repeated a few minutes later. The whole operation is very simple.

Subscribers' instruments of this character suffice for all cases in which the exchange serves fewer than 10,000 subscribers. If there are more than 10,000 lines the subscriber's instrument has an additional lever which indicates the particular exchange (of 10,000 subscribers) to which the person called belongs, and puts at the caller's disposal an auxiliary wire connecting the two exchanges.

The caller is thus switched temporarily to the other exchange at which all the operations described above are performed, his own exchange serving merely to put his wire in connection with the other exchange.

Thus a subscriber of exchange K, wishing to talk to a subscriber of exchange W, turns his supplementary lever to the letter W, and is immediately connected with one of the wires running from K to W (unless all such wires are in use). Then, when he has indicated his number—which, in this case, is the number of the inter-exchange wire which has been assigned to him—the remaining steps in the transmission are made by four cylinders of exchange W, precisely as if the

space which has been included for the accommodation of a power plant and the tunnel approaches to the station. The site is bounded by Seventh Avenue on the east, Ninth Avenue on the west, and on the north and south respectively by Thirty-third and Thirty-first Streets. The whole of this area will be covered at the lower level by the station tracks. At the easterly end, the tracks will converge from twenty-one to four, and they will extend beneath New York city, two of the tracks below Thirty-second and two below Thirty-first Street, ultimately passing under the East River to Long Island City. At the westerly end, the tracks will converge to two tracks, which will pass beneath the North River in two separate steel-and-concrete tubes.

From what has been said above, it will be seen that the site of the station and yard is bisected by two important thoroughfares, namely, Eighth Avenue and Thirty-second Street. Eighth Avenue divides the site into two equal portions, the westerly half constituting the station yard, while the easterly half constitutes the station proper; and here it is that the imposing structure which forms the subject of our front page engravings will be erected. It will have a frontage on the avenues of 430 feet, and on the streets of 780 feet, the sides of the building forming a perfect parallelogram. Below the surface of the street, and within the area covered by the building, the station will be divided into three levels, on the lowest of which will be the tracks at a depth of 40 feet below street grade.

The question of the architectural treatment of a building of this magnitude, and to be used for this special purpose, was one that called for the most careful consideration, and New York city is to be congratulated on the fact that the Pennsylvania Railroad Company were willing to forego the opportunity to erect a huge office building above the station site, and



The façades extend 430 feet north and south and 780 feet east and west.

THE PENNSYLVANIA RAILROAD STATION, NEW YORK, AS SEEN FROM THE SOUTHEAST.

connector is the secondary connector which receives in like manner the number of the subscriber called up, and corresponds with that subscriber's plug in the ordinary system.

In short, the primary connector attends to the caller and the secondary connector to the person called, while the connection between the two instruments puts the two persons into communication.

The third cylinder is the signal transmitter which sends back to the caller electrical impulses which cause a pointer on a dial attached to his instrument to indicate the number called up.

Below this is the interconnector which indicates the hundreds and thousands and therefore the section (of 100) to which the person called up belongs. The interconnector always stands at 00 if the number of subscribers is less than 100. The lowermost cylinder is a rotary commutator, which controls the relays that stop and start various parts of the mechanism at the proper moments.

In the apparatus shown in the illustration each of the two sections contains five of these vertical divisions, each of which is composed of five cylinders. Five divisions usually suffice for 99 subscribers. If the communications are very numerous one or more supplementary divisions may be added without disarranging the section.

The subscriber's instrument contains, in addition to the usual transmitter, receiver, and call bells, an indicator with four disks, for units, tens, hundreds, and thousands. By depressing the handle of each disk to the proper degree the desired number is caused to appear, as shown in the illustration. Then a quarter turn of the handle below sends the call and causes the pointer surrounded by a circle of metal buttons, which is shown just above the handle, to move from the position of communication to the next, or calling button.

call had come from a subscriber of that exchange.

It may happen that the apparatus of the exchange is overwhelmed with demands. In that case the calls are stored up and are transmitted, without the necessity of repeating them, as the divisions become free. This delay will be avoided if the apparatus comprises a sufficient number of divisions. It has already been stated that a section can be extended, by adding one or more divisions, as links are added to a chain, but it is preferable to install, at the outset, a sufficient number of vertical divisions to meet all probable demands.

If a division becomes out of order it can be cut out and repaired without interrupting the service of the section, for the decimal indicator selects available divisions and passes over the others. In ordinary service, too, this intelligent and silent foreman judiciously distributes the work among his subordinates, giving a fair share to each.

With the system now in use a break occurring in a subscriber's wire is not detected until an attempt is made to communicate, and then hours or even days may elapse before the wire is repaired. With the Lorimer system, on the contrary, any defect in a circuit is instantly indicated at the exchange by the ringing of a bell and the flashing of two lamps corresponding to the section and division to which the damaged wire is attached. Linemen are at once sent out and the break may be repaired before the subscriber has had occasion to know of its existence.

PENNSYLVANIA RAILROAD'S TERMINAL STATION, NEW YORK CITY.

The excavation for the new Pennsylvania terminal station has a total width of about 500 feet and an extreme length of slightly over 2,000 feet. Roughly, it includes four large city blocks, with some additional

preferred to memorialize their final entrance into New York city by the erection of a magnificent and purely classic structure, commensurate with the importance of the company and the dignity of the great city in which it has at length found a fitting terminal.

The architectural design of the entire exterior is a Doric colonnade 35 feet in height, surmounted by a low attic, the total height of the elevation being 60 feet. In the center of the building, however, in order to accommodate the great waiting room, the roof of the structure reaches a height of 150 feet, and the line of the building is also pleasingly broken at the corner of Eighth Avenue and Thirty-third Street, where there is an elevation of four stories for the accommodation of the offices. The unusual extent of the building in area and its general type are suggestive of the great baths of ancient Rome; in fact, the architects of the building, McKim, Meade & White, took the baths of Caracalla, which are still magnificent in their ruins, as the inspiration of this architectural plan. The dignity and beauty of the building are enhanced by the contrast of the lofty "skyscraper" buildings of the vicinity; and when the structure is completed, the eye will turn with a sense of relief from the exaggerated perpendicular lines of the modern office building to the long, low perspective of this station, relieved at its mid-length by the lofty walls and roof of the waiting room. The exterior construction is to be of pink Milford granite, similar to the building stone of the Boston Public Library and the University Club in New York. This is a particularly effective structural stone, and its soft shades of color are decidedly pleasing to the eye.

The main entrance to the station for foot passengers will be at the center of the Seventh Avenue façade and opposite the intersected end of Thirty-second Street. Once inside the building the passenger will