

The left-hand-side finger-shaft has a magnet and clutch. On being energized the finger-shaft is kept revolving until the proper finger is in position to trip the wipers of the level required. These wipers, being tripped out of place, as they revolve with the switch make contact on the tags as they move around, while the wipers at the other levels, not being tripped out, pass over the tags at their levels, but do not touch them. This process goes on through the selectors until the connector is reached. The connector has on its top a special kind of impulse-maker, so that it can find any particular line. If the subscriber required is at a private branch exchange the connector will find the first trunk to that exchange, but if that trunk be "busy" the contact with the busy tags will cause certain other changes to take place in the circuits so that the connector will now begin to hunt for an idle trunk.

Silk webbing of a special kind is used for multiplying the banks. The bank-switches are easily removed for repairs. They sit in a seat, and on top is a small bridge-piece, through the top of which a hollowed pin is dropped. The top of the switch is placed in the hollow and the pin then screwed to the bridge. This acts as top and bottom support. The top of the switch has a ring commutator, and these rings bear against springs, so that by this means circuit is made to the wipers. This is the same in all. The wipers have a flat spring bearing on them with a good pressure. The switches are turned with a power of about 5 lb. The wipers are reset as they pass by a shaft roller on the right-hand side near the cams, after having left the arc to return to normal. A special feature of the apparatus is that it has been designed so that there are no adjustments. The springs of the sequence switch—i.e., the switch with the cams—may at odd times require adjusting, but even that is remote. Any switch can be removed in a few seconds and another inserted. The grade of manufacture is high.

This description has referred more particularly to the semi-automatic, but there is nothing to prevent the registers and senders from responding to impulses made by the subscriber just as they respond to the combinations set up by the operator on the keyboard.

This system is giving such satisfaction that the American Telephone and Telegraph Company has decided to establish two 10,000-line exchanges in the City of New York, and began more than a year ago to make the tools for the manufacture of the various parts.

The American Automatic Company's System.

The American Automatic Company, of Urbana, Ohio, have developed this system. They began in 1906. The invention dates back to 1903.

There are four or five small exchanges in operation. Broadly, the principles are not unlike those of the Strowger system, and the wipers have no vertical movements: they rotate horizontally. The calling-device is involved, and alterations are contemplated by the company. At present the dial may have to send in as many as fifty impulses, whereas other systems send in only ten as a maximum at a time. The final connectors are limited to fifty subscribers, as compared with a hundred on other systems.

This system was not seen by me, but from what is known it is not developed to the stage of giving service as quickly and satisfactorily as other systems.

The Siemens-Halske Automatic System.

This is practically the Strowger system. The rights to use the patents of the Automatic Electric Company, of Chicago, in Germany were purchased by the Siemens-Halske Company, of Berlin. The engineers of the Siemens-Halske Company disapproved of the Keith line-switch, considering that the plunger was unsatisfactory and uncertain in its action under certain conditions, and that as 100 lines were controlled by one master switch, which might fail, some change to improve these features was desirable. They accordingly developed a piece of apparatus which they style a "pre-selector" to take the place of the Keith line-switch. Each subscriber's line therefore has a "pre-selector," the function of which is to connect the subscriber's line over an idle trunk to a first selector. In some cases a second "pre-selector" is introduced between the first "pre-selector" and the first selector, as by so doing the number of first selectors, somewhat expensive pieces of apparatus, may be kept at a minimum.

The "pre-selector" has arms which rotate and make contact with terminals disposed at intervals around an arc. When an idle trunk is found it stops. Alternating current at twenty-five cycles per second is provided as power, so that the steps are rapid.

On the selectors as manufactured by the Automatic Electric Company the magnets and the springs operated by them are attached to the selector itself. The Siemens-Halske engineers have removed these from the selectors and assembled them together. The magnets, now called "relays," are placed on a frame prepared for them, and are fitted with a metal cover common to a number of them so as to exclude dust. The apparatus has also been adapted to work semi-automatic, and special impulse-sending machines are employed to transmit the impulses. The apparatus is constructed and finished in the most workmanlike manner.

Generally speaking, the semi-automatic operation is very similar to that of the North Auto-manual at Ashtabula, while the full automatic is practically the same as the Strowger with the mechanical modifications referred to.

At Amsterdam a semi-automatic equipment, supplied by Siemens-Halske, of 1,500 lines, was seen in operation. The equipment had been installed only a few months, and was the first semi-automatic in Europe. The service was stated to be quite satisfactory, and it was intended to add another 2,500 lines, which were expected to be in operation by May of this year. The apparatus was all of a first-class finish and appearance. The attendants were able to answer up to 500 calls per hour. The equipment for the operators was of the type by which the call is made to seek an idle operator.