C. C. HASKINS & C. H. WILSON.

MULTIPLE SWITCH BOARD FOR TELEPHONE EXCHANGES.

No. 266,287. Patented Oct. 24, 1882.

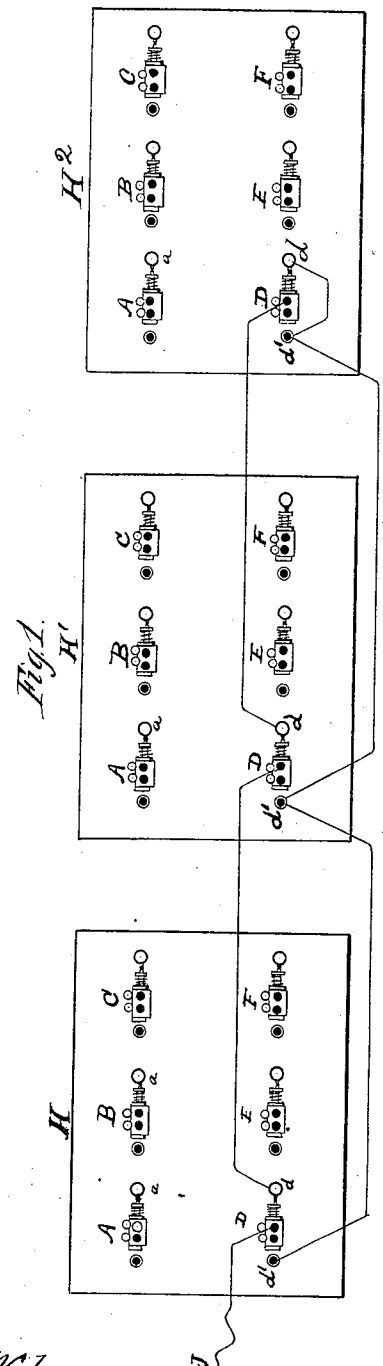


Fig. 1.

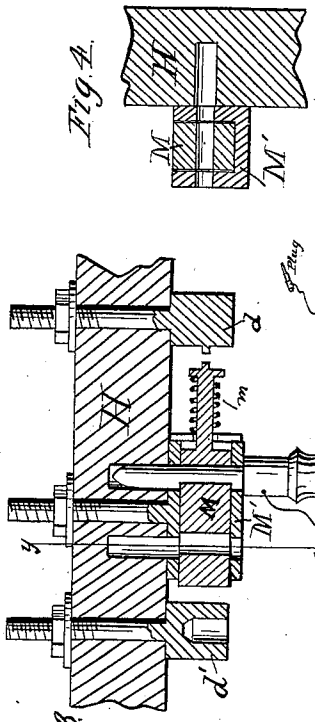


Fig. 4.

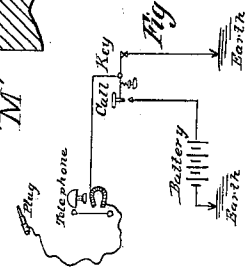


Fig. 6.

Fig. 3.

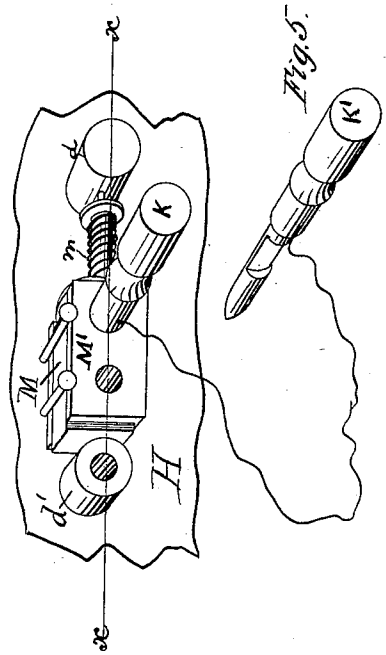


Fig. 2.

Fig. 5.

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UNITED STATES PATENT OFFICE.

CLARK C. HASKINS AND CHARLES H. WILSON, OF CHICAGO, ILLINOIS, ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

MULTIPLE SWITCH-BOARD FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 266,287, dated October 24, 1882.

Application filed October 23, 1879.

To all whom it may concern:

Be it known that we, CLARK C. HASKINS and CHARLES H. WILSON, of Chicago, Cook county, in the State of Illinois, have invented certain improvements in apparatus for connecting telegraph or telephone lines at the center or exchange offices, of which the following is a specification.

This invention is particularly applicable to the manipulation of the numerous wires centering in a telephone-exchange or central office. Under the telephone-exchange system at present in vogue the various lines are operated through a central exchange-office. Owing to the necessity for rapid connections and that no time may be lost at the central office, it is desirable that facilities should be arranged so that more than one person may be employed in answering calls and making the necessary connections between the several lines.

Hitherto it has been customary to convey all of the telephone-lines to a single switch-board at the central office. Upon this switch-board various connections were made as called for, with the serious inconvenience that if more than one operator was engaged confusion would be likely to result for want of room and by one getting in the other's way.

The object of the present invention is to provide a means whereby several duplicate switch-boards may be employed, to each one of which all the telephone-stations are connected, and so arranged that when any one line is in use or occupied at one of the switch-boards that fact will be rendered apparent at all the other switch-boards, thus preventing any confusion between the different operators at the several switch-boards, and also preventing any accidental lines.

In the accompanying drawings, which form a part of this specification, Figure 1 is a view of several duplicate switch-boards, there being three in this instance, arranged according to our invention. Fig. 2 is a perspective view of an improved switch such as we prefer to employ in working our invention. Fig. 3 is a sectional view on the line *x x* of Fig. 2. Fig. 4 is a sectional view on the line *y y* of Fig. 3. Fig. 5 is a perspective of one of the plugs removed from the switch. Fig. 6 is a diagram of the call-circuit employed in conjunction with the apparatus at the central office.

In the said drawings, H, H′, and H² are three switch-boards exactly alike, provided each with the several switches A B C D E F, arranged preferably in the same order upon the switch-board, although this is not material beyond the fact of convenience in locating the several switches and determining their ownership. These several switches A A A, all belong to the same telephone-line, and so with the other correspondingly-lettered switches, B B B, C C C, &c. The method of connecting these switches in circuit is shown at Fig. 1, in one instance only, at the switches D D D. The connections of the other switches, which may be precisely the same, are omitted to avoid confusion in tracing the connections.

J is a line-wire from a distant telephone-station entering the central office. This wire is connected first to the metal of the switch D at the board H. This switch being closed, the circuit is through it to the contact-plate *d*, and from this to the switch D on the board H′. That switch being closed, the circuit is continued from its contact-plate *d* to the switch D on the board H². That switch being closed, the circuit continues from its contact-plate *d* to the trying-post *d′* on the board H², and from this back to similar trying-posts *d′* on the boards H′ and H. In like manner the several circuits of the different telephone-lines pass normally through a series of switches, one switch of each series being on each of the different boards, and back through a series of trying-plates, one trying-plate of the series being on each of the different boards. Now, suppose it is desired to connect the line of the series of switches A with the line of the series of switches D on the board H. In this case the two metallic plugs K and K′ are taken, and one inserted in a hole in the switch A and the other in a hole in the switch D, which connects the two lines together through the metallic cord which unites these two plugs. At the same time, the switch being properly contrived, is by the insertion of the plug in each case thrown open and disconnected from its contact-plate—that is to say,

switch A has its connection with its contact-plate *a* broken and the switch D has its connection with its contact-plate *d* broken at the board H. Now, if an operator at either of the other switch-boards has a call for either of the lines represented by the switches A and D, he will first proceed to ascertain if those lines are in use at either of the other switch-boards, and this he will do as follows:

The central office is provided with a magnetic call-bell and circuit. (Shown in Fig. 6.) The call-bell may be one upon a telephone, for convenience. We will suppose that the operator on the switch-board H′ has received a call for the subscriber connected with the line of the series of switches D. He tests the question as to whether this line is in use upon either of the other switch-boards by inserting a plug from the circuit at Fig. 6 into the trying-plate *d′* on his switch-board H′. If he gets circuit, he knows that the line is unoccupied, as in this case he would in the ciricuit shown at Fig. 1; but if the switches A and D on the board H were connected, as previously supposed, he would not, by trying at the board H′, get the circuit, because the connection would be broken between the switch D and the contact-plate *d* on the board H; nor would he get circuit if the switch D on the board H^2 were in use, because in that case the contact-plate *d* and switch D on that board would be disconnected, and there would be no circuit from the trying-plate *d′* on board H′ beyond the contact-plate *d* on board H^2. Thus it will be seen that the circuit is always cut out behind the operator at each switch-board when any switch is in operation.

Of course the invention is not limited to any particular form of switch or plug, as it is quite obvious that many automatic devices could be substituted for the special switch and plug shown in the drawings; but we find the device shown in the drawings to be very complete and perfect, and at the same time simple in construction and operation. The switch shown in the drawings consists of a metallic slide-piece, M, worked in a metal guide, M′. Holes are pierced through both slide and slide-piece, and a spring, *m*, is attached to the slide-piece in such a way as to tend to force it into contact with the contact-plate *d*. When the slide-piece is in contact with said contact-plate the holes through the slide-piece and through the guide do not exactly register, although at this time the holes in the slide-piece are partially uncovered, so that when the pin or plug, which is furnished with a pointed end, is thrust into the hole it wedges back the slide-piece, opening or breaking the circuit or connection between the slide-piece and contact-plate.

It will be observed that we provide each switch with two holes. While this is not absolutely necessary, we find it convenient, for the reason that it may be desirable to connect two stations with the telephone at the central office before connecting them with each other, and two holes being provided, the plugs connecting the switches together may be inserted before the plugs belonging to the office-telephone are removed. A plug, when inserted, should be turned so that the slide-piece or lever M may fit into the notch of the plug. The plug is thus held securely in place.

Prior to our invention each telephone-line had been connected with a single switch on each of the multiple boards, and from the switch of the last board through an annunciator to ground, instead of passing back across the boards to the testing-plates *d′*, as shown in our drawings. The extended portions of our circuits containing the test or connecting plates we term "try-circuits." The attendants at the different boards are thus enabled to determine whether the line of any try-circuit is connected at any one of its series of switches upon either of the boards. If the line is in use, its circuit will be open at the switch where the connection is made, and the armature of the electro-magnet in the call-circuit will not be moved when the call-circuit is connected with the test-circuit of the line. If, however, the line is not in use, its circuit will be found closed when the call-circuit is united with the test-circuit. A current will thus be sent to line, and at the same time the armature of the electro-magnet of the signaling-instrument in the call-circuit will be moved. The attendant will thus be notified that the line is unoccupied, while at the same time a current from the calling-battery will be sent to line.

Signals may be sent between the central office and the subscribers' stations by means of the American district system or the Law system. In these systems a separate circuit is provided between the central office and the subscribers' stations. The subscribers upon this circuit are thus enabled to communicate their wants to the central office. These systems, being well known, require no further description.

Having thus described the construction and operation of our invention, we claim—

1. Multiple switch-boards provided with series of switches, one series for each telephone-line, and one switch of each series on each board, in combination with try-circuits, one for each line, extending to all the boards, and electrical apparatus whereby the attendant at any given board may make a preliminary test to determine whether the line called for is in use.

2. The combination of many normally-open telephone-circuits with two or more duplicate switch-boards at the central office, and series of switches, one switch on each board for each line, and series of testing-plates, one testing-plate on each board for each line, said circuits passing through their respective series of testing-plates, and a common circuit, in which is placed a signaling instrument and battery, whereby a switchman at a given board may determine whether the line of the subscriber

called for is in use at any other of the duplicate boards.

3. The combination of normally-open telephone-lines with multiple switch-boards provided with switches, one for each line on each board, and test or connecting plates, one or more in the try-circuit of each line, and a call-circuit including a signaling instrument and battery, whereby an attendant at either board may send current to any given line, and at the same time operate the signaling-instrument, substantially as and for the purpose specified.

4. The switch, in combination with a plug provided with a notch, and the slide-piece M of said switch, whereby the plug may be held in place, substantially as shown and described.

5. The switch provided with a plug-hole in the slide-piece M, and guide M′, in combination with a plug and contact-point *d*, whereby the circuit of a telephone-line is cut off from its try-plates *d′* when a plug is inserted, as and for the purposes specified.

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