

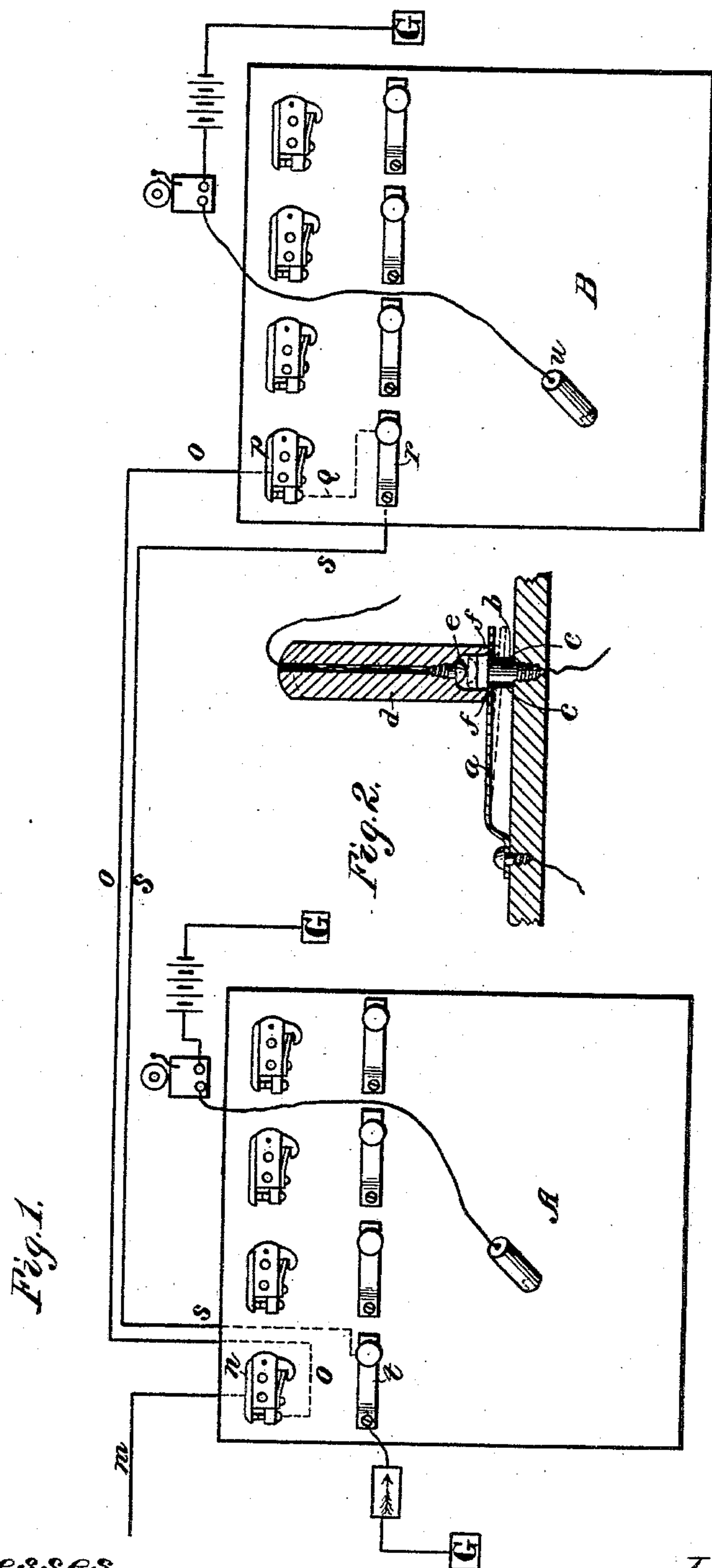
(No Model.)

C. E. SCRIBNER.

MULTIPLE SWITCH BOARD FOR TELEPHONE EXCHANGES.

No. 321,391.

Patented June 30, 1885.



Witnesses.
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MULTIPLE SWITCH-BOARD FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 321,391, dated June 30, 1885.

Application filed February 24, 1881. Renewed June 9, 1885. (No model.) Patented in England November 29, 1879, No. 4,903; in France January 16, 1880, No. 134,596, and in Belgium January 28, 1880, No. 50,413.

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, of Chicago, Illinois, have discovered certain new and useful Improvements in Multiple Switch-Boards for Telephone-Exchanges, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

10 A district telephone-exchange consists of a central office, with which the telephones of many subscribers are connected by independent lines, and where, upon request, any one subscriber may be put in communication with
15 any other one of the subscribers. All the independent lines, therefore, must be connected with a single switch-board. When the number of subscribers is large, and a single attendant cannot do the necessary switching, duplicate or multiple switch-boards are provided, all the wires being branched to each of the multiple boards, so that each board is complete in itself, and thus any two subscribers may be connected by an attendant at either
25 one of the duplicate or multiple boards. An additional board is required for about every fifty new subscribers. The subscribers are apportioned so that a switchman at a given board answers only the calls of those assigned to his board. When a third subscriber wishes to communicate with one of two who are already connected, great confusion often arises. This is wholly obviated by the use of my invention, which consists in so placing the cut-outs or switches, and connecting them from
35 one board to another, that the switchmen, respectively, at the different boards may readily ascertain whether the wire of a subscriber called for is in use—that is, whether it is connected with the wire of some other subscriber at any other board.

Figure 1 of the drawings represents two multiple switch-boards, A and B. Fig. 2 is a detailed view of the test-key and plug.

45 The telephone-lines are connected each with a switch or spring-jack on each switch-board, and thence back across the boards through other switches, and from the last board to ground. Thus the circuit of telephone-line *m*

may be traced to its switch *n*, and thence by wire *o* to its switch *p* of the second board. From the switch of the last board the circuit continues by wire *Q* back through switch *r*, and thence by wire *s* to switch *t*, and thence through an annunciator to ground.

Switches are sometimes termed "bolts." The portion of the circuit between the switch *p* of the last board and the ground may be conveniently termed the "test-circuit," and the switches included in the test-circuit may be termed "test-keys."

In the drawings I have shown but two switch-boards, A and B. It is evident, however, that any number of switch-boards may be used, each being provided with a switch and a test-key for each line, so that any two subscribers may be connected upon either of the multiple boards.

The connection between any two subscribers is made by means of a pair of plugs and cords, in the usual manner.

The test-key shown in Fig. 2 consists of the flat metallic spring *a*, fastened at one end rigidly to the board, and the metallic pin *b*, with which the spring is normally in contact. The portion of the pin between the board and the pin-head is surrounded by a sleeve, *c*, of hard rubber. When the spring is carried away from contact with the pin-head, the contact between the spring and pin is broken.

The plug consists of the hard-rubber piece *d*, provided with an opening, preferably through its center, for the conducting-cord, which terminates in a metallic point, *e*, placed within the cavity of the rubber piece *d*. The point *e* should be so placed that when the rim *f*, or other projection of non-conductive substance, first touches the spring said point *e* will not be in contact with the pin-head. On pressing the projection *f* against the spring *a*, said spring is carried away from contact with pin *b*, while metallic point *e* is brought into contact with said pin *b*.

By reference to Fig. 1 it will be seen that I have placed a test-key near each subscriber's jackknife switch on each of the multiple boards.

The subscribers' telephone-lines are con-

nected, severally, with a switch and test-key
 on each board. For example, telephone-line
m passes through switch *n* of board A, and
 thence by line *o* passes to the next board, B,
 5 and through switch *p*, and thence by line Q to
 test-key *r*, and thence back to the first board,
 A, by line *s* to test-key *t*, and thence, in the
 usual manner, through an annunciator to
 ground.
 10 By the use of my test-key the attendant is
 enabled to test and call by the same motion.
 Suppose attendant at board B wishes to con-
 nect any other of the subscribers' switches
 with the switch *p*. Before making the connec-
 15 tion the attendant must first see whether the
 switch *n* is not already connected with some
 other switch of board A, and, second, proceed
 to call up the subscriber wanted if he does not
 find line *m* in use. The testing and calling
 20 are done by simply pressing the plug *u* upon
 test-key *r*. The ground-wire *s* is taken off
 when the spring and pin of the test-key *r* are
 separated, and immediately the circuit of the
 battery connected with the flexible conduct-
 25 ing-cord is completed through the bell by the
 contact formed between the metallic point *e*
 and the pin *b*, as indicated in Fig. 2. If the
 line *m* is in use at switch *n*, the circuit of line
o will be open at the contact-points of switch
 30 *n*, and the switchman at board B will get no
 response from his bell. He will therefore
 know that the line wanted is in use, and will
 notify the calling subscriber thereof; but in
 case the line *m* is not connected at switch *n*
 35 the bell at board B will respond, and a cur-
 rent will be sent along line *m* to the station of
 the subscriber connected with line *m*, thus
 calling him up. When the subscriber thus
 summoned answers the call, the final commu-
 40 nication may be made with switch *p* in the
 usual manner.

As thus described, it will be seen that there
 are two switches, or a pair of switches, on each
 board for each line. One of these switches is
 used for connecting the line of the pair with 45
 any other line. The other switch is included
 in the test-circuit, and is used primarily for
 testing to determine whether the line in whose
 circuit it is included is connected with any
 other line upon any of the other multiple 50
 boards.

It is a law of this system that when two
 lines are connected upon any one of the boards
 all the test-keys of each of the two connected
 lines are cut off. Therefore, when battery is 55
 connected to any one of the test-keys of a line
 which is in use, the circuit will be open at the
 switch where the line is connected.

This application is filed as a division of a
 prior application filed by me October 25, 1879. 60
 I claim—

1. Two or more duplicate switch-boards,
 each provided with a switch and a test-key
 for each subscriber's line, and a plug and con-
 ducting-cord at each board, in combination 65
 with circuits, substantially as shown and de-
 scribed.

2. The combination of normally-closed tele-
 phone-line circuits with two or more multi-
 ple switch-boards, each provided with a switch 70
 and test-key for each line, and switching ap-
 paratus at each board for connecting local bat-
 tery through a signal-instrument to the line
 of a subscriber, whereby an attendant at any
 given board may test and signal at the same 75
 time.

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