

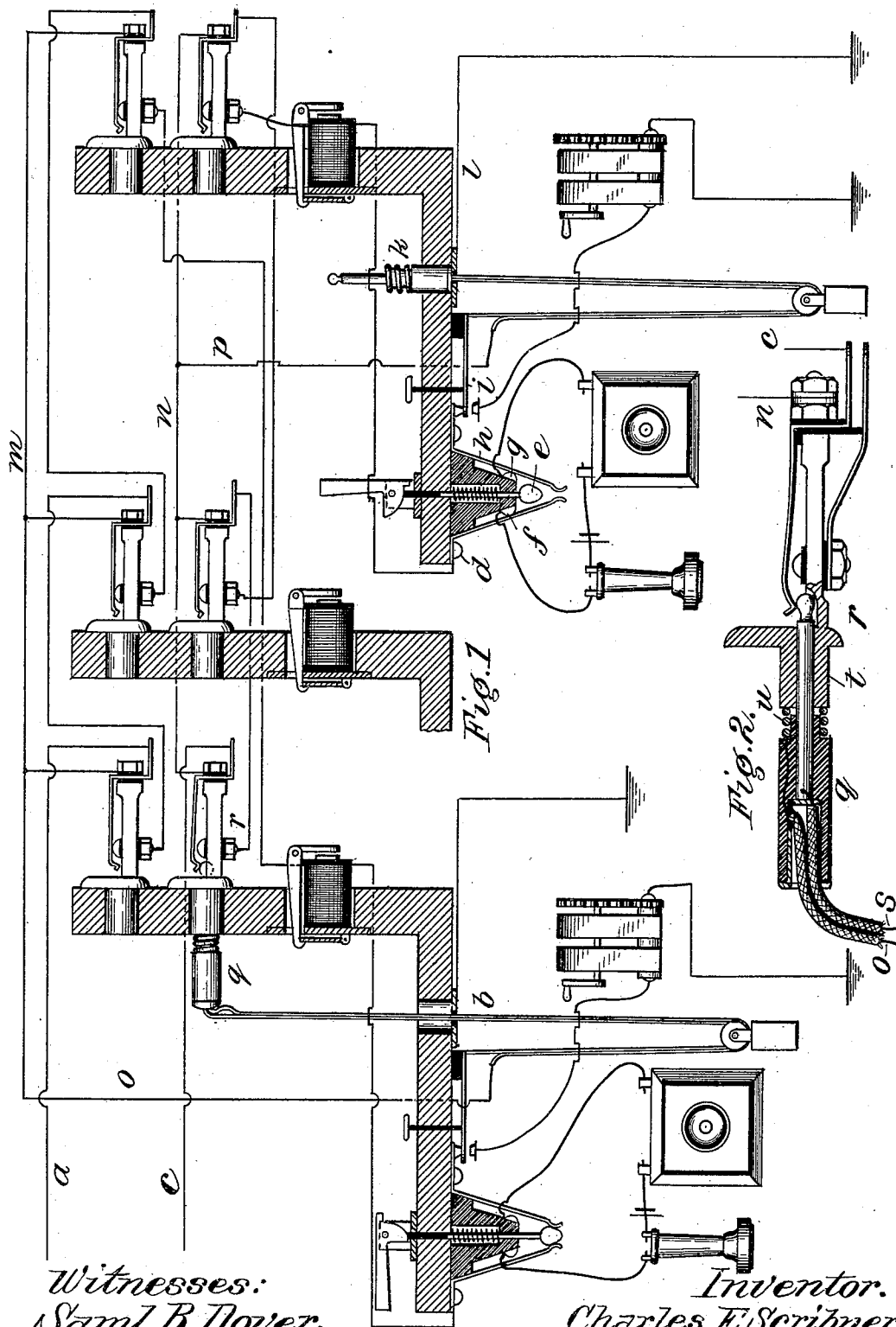
(No Model.)

C. E. SCRIBNER.

MULTIPLE SWITCH BOARD TEST CIRCUIT.

No. 356,426.

Patented Jan. 18, 1887.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## MULTIPLE-SWITCH-BOARD TEST-CIRCUIT.

SPECIFICATION forming part of Letters Patent No. 356,426, dated January 18, 1887.

Application filed November 6, 1886. Serial No. 218,194. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Multiple-Switch-Board Test-Circuits, (Case 113,) 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.

My invention relates to test-circuits for multiple switch-boards of telephone-exchanges.

Heretofore a test-wire has been provided for each telephone-line. These test-wires have been connected upon the different boards with the test-rings of the spring-jacks of their respective lines, and so arranged that a plug inserted in any spring-jack of a line upon either of the boards will cross the test-wire with its telephone line. When a line is connected at its spring-jack by a plug thus inserted, a test made at any other of the boards will indicate that the line is busy. The test consists in touching a plug to the test ring or plate of the line and listening at a telephone included, with a battery, in the circuit with the plug. In case the cross is established at another board, circuit will be closed through the telephone, and the operator will know by the click in the telephone that the line is busy. If, however, the operator, when testing, hears no click or sound in the telephone, he will know that the cross has not been established, and hence that the line is free. This system of test-wires is described and claimed in my patent, No. 305,021, of September 9, 1884. It has been found desirable in some instances to provide a terminal plug connected with a flexible cord in the circuit of each line, so that any two lines may be connected together by simply inserting the plug of one line into a spring-jack of the other line. In such case there would be no connection between the line whose plug is inserted and the test-wire of said line, since there would be no plug inserted in any spring-jack of said line to make the cross.

The object of my invention is to provide circuits and switching apparatus whereby the test-wires of any two lines are connected to-

gether when the plug of one line is inserted in the spring-jack of the other line. The test-wires of two connected lines are thus made common, and a test made at any spring-jack of either of the lines upon either of the boards will indicate that the line tested is busy.

My invention consists in providing, in connection with the plug and flexible cord of each line, a branch connection to the test-wire and a connecting device upon the plug, whereby when the plug is inserted in a spring-jack the usual cross will be established through the medium of the plug between the test-wire and the wire connected with the spring-jack, while at the same time a branch connection will be closed from said plug to the test-wire of the line whose plug is inserted in the spring-jack.

My invention will be readily understood by reference to the accompanying drawings, in which—

Figure 1 is a diagram showing sections of three multiple boards and two telephone-lines connected therewith, the two lines being connected together at the first board. Fig. 2 is a detailed view of the plug inserted in a spring-jack, and showing the manner of making the connections between the test-wires of the two lines.

The line *a* is normally connected with a spring-jack on each of the boards, and from the spring-jack on the last board through an annunciator placed on the first board, through a switching device to the flexible cord and plug, and from the plug which normally rests upon a ground-plate, *b*, to ground. The other telephone-lines are connected in the same manner, the individual annunciators of the different lines being distributed on the different boards, so that the cord and plug and the annunciator of any given line will be at the same board.

I will describe the switching apparatus of the operator as shown at the last board.

The telephone-line *c*, after passing through the switches on the different boards and its individual annunciator, is connected with spring *d* of the switching device or loop-key. When the plunger *e* is raised in the position shown, spring *d* will rest upon point *f*, and thence the

circuit may be traced through the operator's telephone outfit to point *g*, and thence to spring *h*, and thence to calling-key *i*, to which is connected the flexible cord. This cord is provided with a terminal plug, to the point and metallic heel of which it is connected. The metallic heel of the plug *k* rests upon the ground-plate *l*. Thus the wire *c* is connected across the switch-boards, through its individual annunciator, the switching device or loop-key, and the telephone, to the calling-key *i*, and thence through the cord and plug to ground. On forcing down the plunger *e* the springs *d h* are disconnected from points *f g*, respectively, and are connected together through the medium of the plunger *e*. In this position of the loop-key the telephone is cut out, the circuit of the line remaining closed to ground, as before described.

The test-wires *m n* are connected, as shown, with the test-rings of their telephone-lines, respectively. From each of these test-wires I have provided a branch connection, so that when a plug is inserted in any spring-jack the test-wire of the line whose plug is thus inserted will be crossed or connected with the telephone-line. Thus I have provided the branch circuit *o* for test-wire *m* and the branch circuit *p* for test-wire *n*.

A detailed sectional view of plug *q* and the spring-jack *r*, in which it is inserted, is shown in Fig. 2. The main strand *s* of the cord is connected, as above described, with the shank and heel-piece of the plug, and the plug, when inserted, connects strand *s* with the line *c*, as shown. The shank of the plug comes against the test ring or socket *t*, and thus test-wire *n* is crossed through the medium of the plug with wire *c*.

Upon the rubber handle of the plug I provide a connection, *u*, which may be in the form of a coiled spring, as shown, and when the plug is inserted this contact *u* comes against the test-ring *t* of the plug, and thus branch wire *o* is connected with the test-ring *t*, to which the test-wire *m* of line *c* is permanently connected. It will thus be seen that test-wires *m n* are connected together when plug *q* is inserted, and both are connected to the line *c*, as before described. Thus the test-wires are made common—that is to say, by means of plug *q* and the circuits described lines *a* and *c* are connected together for conversation, and their test-wires *m* and *n* are connected together and at the same time crossed with the united circuits of the telephone-lines *a* and *c*. The fact that this cross exists may be deter-

mined at any other of the boards—as board 2 or board 3—by means of the usual test at the spring-jack.

It is evident that the connection *u* may be made in many different ways. I prefer the coiled spring which I have shown and described.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the test-wires of the different telephone-lines, of a multiple-switch-board system of branch connections, one for each test-wire, said branch connections being connected through flexible conductors to contacts upon the plugs of the lines of said test-wires, respectively, whereby the test-wires are connected together and crossed with the circuit of the telephone-lines when any two lines are connected by the plug of one line inserted in the spring-jack of the other line, substantially as shown and described.

2. The combination, with a telephone-line connected with a switch upon each of two or more multiple switch-boards, of a test-wire connected with the insulated ring or test-piece of each of said switches, a plug and flexible cord in the circuit of said line, the plug normally resting on a ground-plate, and a branch circuit from the test-wire through a second strand of the flexible cord to a contact or connection on the plug, substantially as shown and described.

3. The combination, with line *a*, connected with the multiple boards, of test-wire *m*, connected with the test plates or rings of the switches of line *a*, a flexible cord and plug, *q*, inserted in the spring-jack of another line, and connection *o* from test-wire *m* to a contact, *u*, whereby said test-wire is connected to the insulated ring or test-piece *t* of the said spring-jack, substantially as and for the purposes specified.

4. The combination, with two telephone-lines, of test-wires, one for each telephone-line, spring-jack switches, one on each board for each line, and flexible cords and connections, whereby on inserting a plug of one line in the spring-jack of another line the two lines are united and the test-wires connected together and crossed with the circuit of the united lines.

In witness whereof I hereunto subscribe my name this 1st day of November, A. D. 1886.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE P. BARTON,  
CHAS. C. WOODWORTH.