

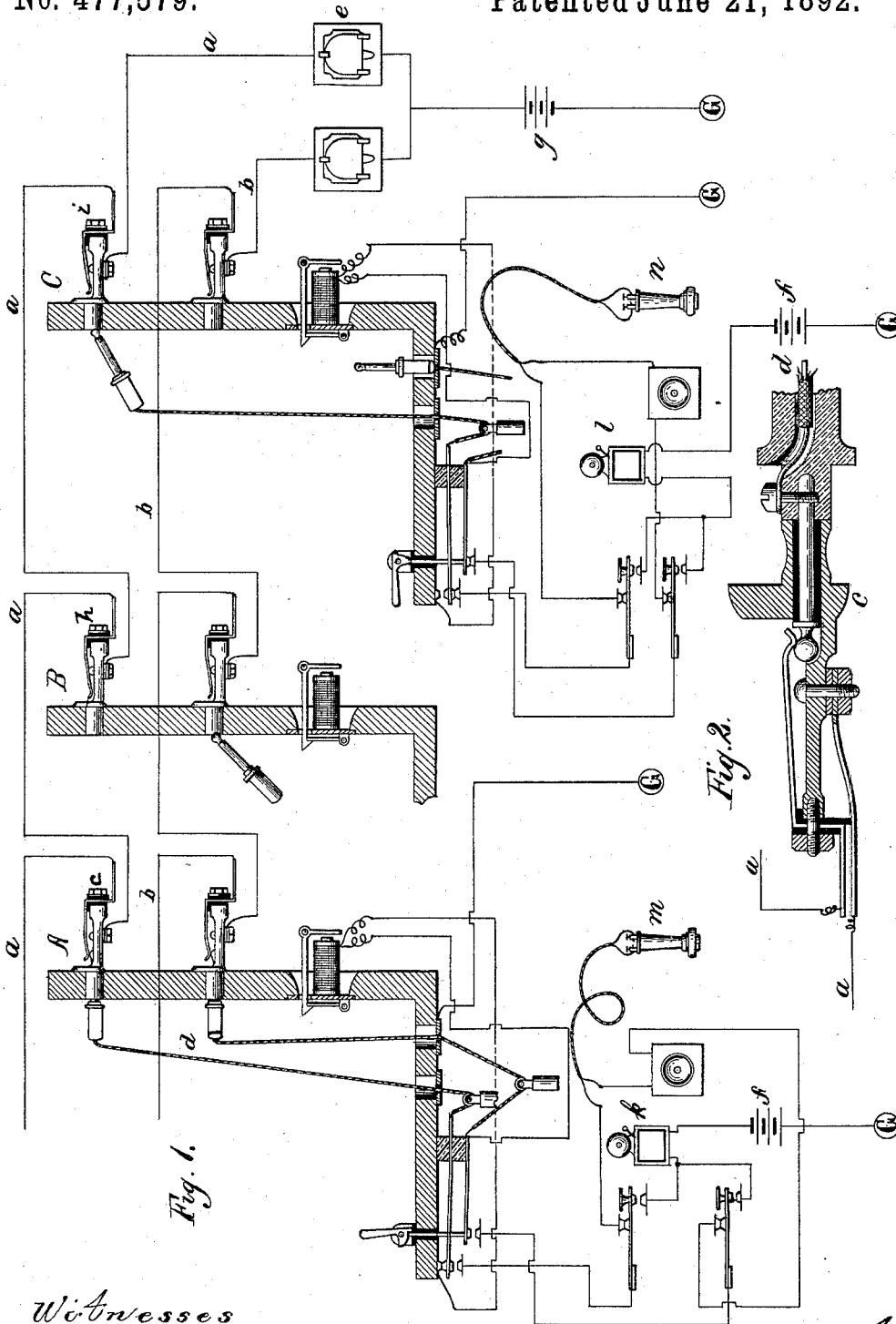
(No Model.)

C. E. SCRIBNER.

TEST CIRCUIT FOR MULTIPLE SWITCHBOARDS.

No. 477,579.

Patented June 21, 1892.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## TEST-CIRCUIT FOR MULTIPLE SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 477,579, dated June 21, 1892.

Application filed May 12, 1885. Serial No. 165,278. (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 Test-Circuits for Multiple Switchboards, (Case No. 97,) 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 multiple-switch-board circuits; and it consists in providing a battery in the ground-circuit of the telephone-lines at the central office and testing apparatus at the different boards, whereby it may be determined at any given board whether a line wanted is in use at any of the other boards.

In the drawings, which are illustrative of my invention, Figure 1 shows the circuits of two telephone-lines connected with their switches on three different boards, the battery in the common ground of said lines, and the testing apparatus. Fig. 2 is a detailed view of the plug, the shank of which, except the point, being provided with a sleeve of insulating material.

Referring now to Fig. 1, A B C are three multiple switchboards. The telephone-line *a* is connected through a spring-jack switch on each board, and thence through the annunciator and the battery to ground. The telephone-line *b* in like manner is connected with a switch on each of the boards through its annunciator and battery to ground. The spring of each switch is insulated from the metallic frame.

When a plug is inserted in a switch, the spring only comes into electrical contact therewith, since the portion of the plug which comes against the metallic tube or frame of the switch is insulated, as shown in Fig. 2. Thus when a plug is inserted the spring is lifted from contact with the opposing point or lug provided on the frame, and the line is thus cut off from all succeeding switches and connected to the flexible cord. The portion of the line thus cut off will be open at the switch in which the plug is inserted. Thus line *a* is cut off by switch *c* and connected to

flexible cord *d*. The portion of the line between said switch *c* and the annunciator *e* is thus left open at said switch. It is evident that when the lines are thus connected the switchman at any given board is able to cut off a line from all succeeding boards. I provide a battery *f* in a local circuit including a signal-instrument at each board and switching apparatus for said circuit and pairs of flexible conducting cords and plugs.

It is by means of the test-batteries and signal-instruments at the different boards, the operator's telephone, and the battery *g* in the ground-wire of the telephone-lines that I am enabled to test to determine at any given board whether a line wanted is busy. All the spring-jacks of any given line that is free will be found connected with battery *g*. On the contrary, lines when busy are cut off from said battery *g* by the switch of the line at which the connection is made. Thus line *a* is cut off from battery *g* at switch *c*, as before described. It will be seen, however, that switches *h* and *i* of said line upon boards B and C, respectively, remain connected with said battery *g*. By closing the circuit of a telephone to either of said switches current from battery *g* will be sent through the telephone and the presence of the current will be indicated by the click or sound heard when the circuit is closed. Thus at board C the telephone *n* is shown included in circuit of battery *g*. Thus the circuit may be traced from ground through battery *g* by line *a* as far as switch *i*, and thence to the tip of the plug, which is touching the test-frame of switch *i*, thence through the strand of the cord, and thence, as shown, through the telephone, and thence through the other cord to the metallic heel of the plug resting in its socket at board C, and thence from the plate on which said heel rests to ground. The operator listening at the telephone and hearing the signal when the circuit is thus closed will know that the line is not connected at any spring-jack between his board and battery *g*, and therefore that he can use the line without crossing in upon any other connection. This test, however, does not indicate whether the line is connected at some preceding board.

In order to do this, I provide at the different boards signal-instruments  $k$   $l$ , each in the circuit of battery  $f$ .

By connecting the circuit of the signal-instrument and battery at any given board with the insulated spring of any spring-jack upon said board current will be sent to the line connected with said spring-jack and the signal-instrument will be operated, provided said line is free. If, however, the line is in use at some preceding board, the signal-instrument will not respond, as the circuit will be open in the spring-jack at which the line is in use, and the operator will thus be apprised of the fact that the line is connected at a preceding board. Thus by means of a telephone  $m$  or  $n$ , connected to the spring-jack of any given line, the operator may determine whether said line is in use at some succeeding board, and by means of a signal-instrument  $k$  or  $l$ , connected with the spring of the spring-jack of any line, it may be determined whether the line is in use at some preceding board.

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

1. In a multiple-switchboard system, spring-jack switches, one spring-jack switch on each board for each line, each spring-jack switch consisting of a metallic tube or frame and a spring insulated therefrom, the telephone-lines connected through their respective spring-jack switches on the different boards to a ground-circuit including battery, a pair of cords and terminal plugs at each of the boards, one of said plugs being normally

grounded, and a switch in connection with each pair of cords for bringing the operator's telephone into the circuit of any particular pair of cords at either of the boards, whereby a test may be made of any board to determine whether any given line is open at any succeeding board.

2. The combination, with telephone-lines, each connected with a different spring-jack on each of the switchboards and thence through a battery to ground, of operator's testing apparatus consisting of a telephone to indicate the presence of battery, together with an electro-magnetic signal and a test-battery, whereby a test may be made toward ground and toward the subscriber's station over any line from any board to determine whether a line is busy.

3. Multiple switchboards and telephone-lines connected therewith, a source of electricity for sending electric current upon all the lines of the exchange, and an electro-magnetic device for indicating such current, in combination with an electro-magnetic signal and test-battery to indicate a broken or open circuit existing upon any one of said lines at another board, whereby it may be determined at one board whether any particular line is connected or in use at any other board.

In witness whereof I hereunto subscribe my name this 8th day of May, A. D. 1885.

CHARLES E. SCRIBNER.

Witnesses:

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EDWARD C. NICHOLS.