

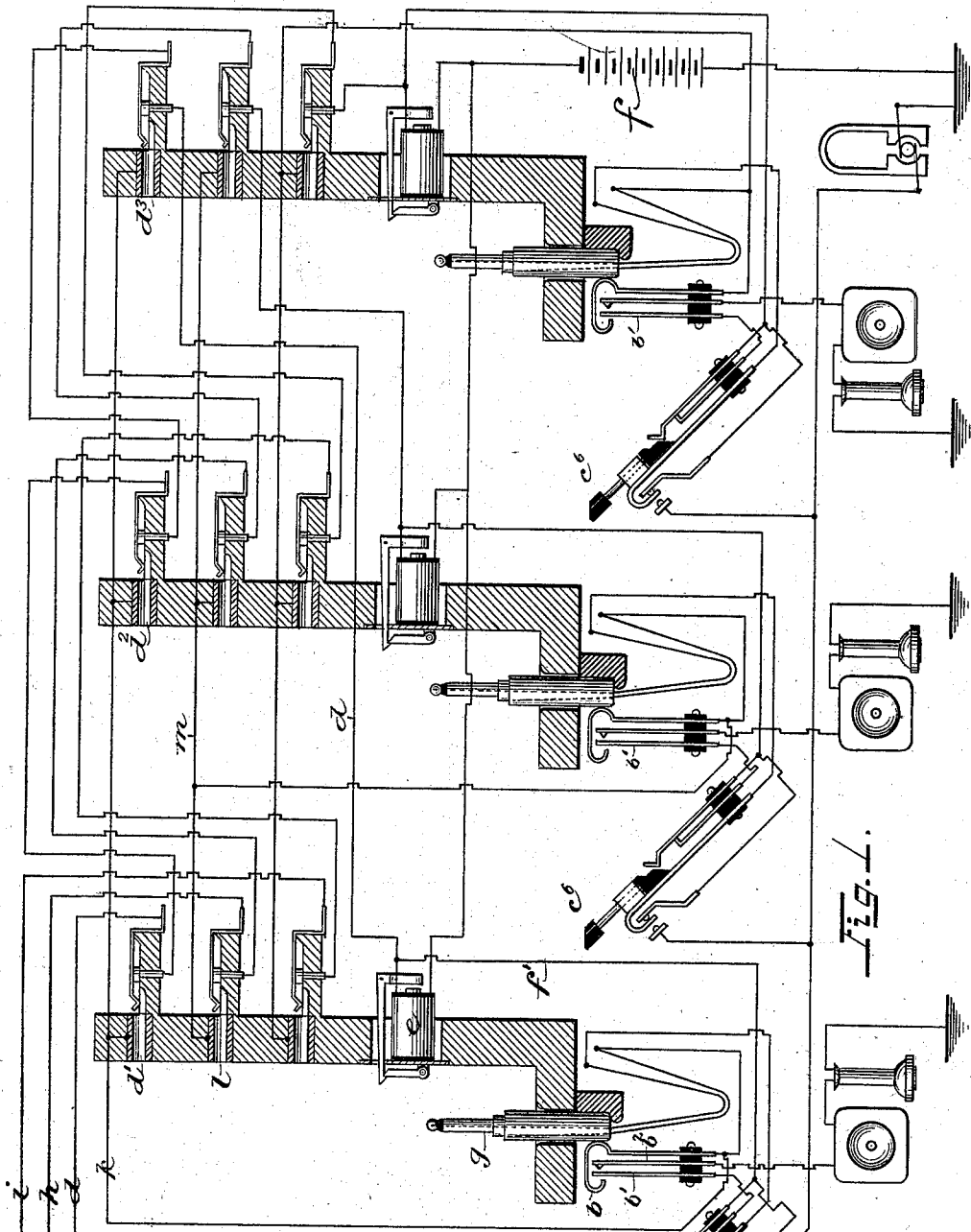
(No Model.)

2 Sheets—Sheet 1.

C. E. SCRIBNER.
MULTIPLE SWITCHBOARD.

No. 552,728.

Patented Jan. 7, 1896.



Witnesses.

C. Hawley.
Geo. R. Parker.

Inventor.

INVENTOR.
Charles E. Scribner
BY: George A. Barton
Attorney.

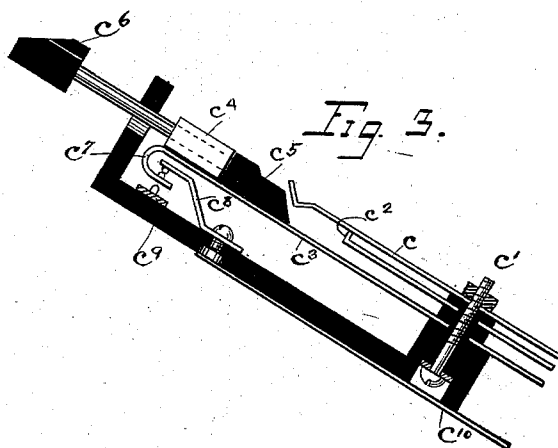
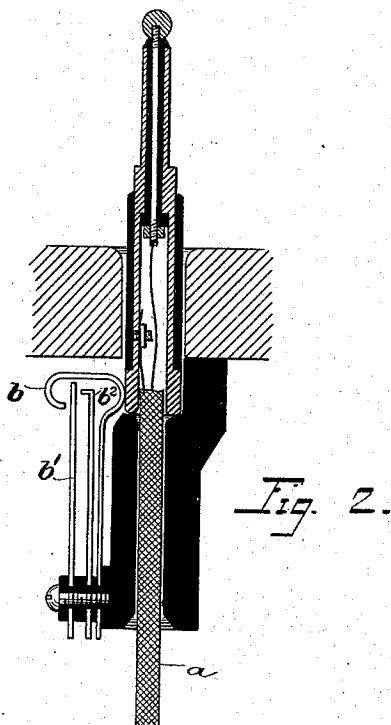
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UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

MULTIPLE SWITCHBOARD.

SPECIFICATION forming part of Letters Patent No. 552,728, dated January 7, 1896.

Application filed June 1, 1889. Renewed May 5, 1893. Serial No. 473,330. (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 Switchboards, (Case No. 195,) 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.

In telephone-exchange systems it is desirable that any two lines when connected for conversation should be entirely disconnected from all other circuits and free of resistance, even the usual clearing-out annunciator being objectionable.

My invention herein relates more particularly to that class of telephone-exchange systems known as the "single-cord multiple-switchboard system," and its object is, speaking generally, to provide for making the necessary tests to determine whether the different lines are busy when called for, and at the same time leave the talking-circuits when conversation is going on between subscribers free of resistance and free from connection with the test-circuits.

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

Figure 1 is a diagram showing three telephone-lines connected with three multiple switchboards, together with the operator's outfits at the different boards. Fig. 2 is a detailed view of a grounding-switch and one of the loop-plugs resting in its socket so as to hold the grounding-switch open. Fig. 3 is a detailed view of one of the ringing and listening keys.

Like parts are indicated by similar letters of reference throughout the different figures.

Referring to Fig. 2, the cord *a* is provided with two strands, one being connected to the tip of the plug and the other to the sleeve of the plug. Thus each strand is provided with a separate terminal upon the loop-plug. The plug being inserted in its socket wedges the spring *b* of the grounding-switch away from spring *b'*, spring *b'* being adjusted so as to stand away from contact *b*². On removing the plug from its socket spring *b* comes against spring

b' and forces said spring *b'* against contact *b*². Thus on removing the plug the springs *b* and *b'* and the contact *b*² are connected together.

Referring now to Fig. 3, spring *c* is connected with the screw or bolt *c'* as shown. This spring *c* normally rests against the contact *c*². Upon the free end of spring *c*³ is mounted a guide *c*⁴, which carries a wedge *c*⁵ provided with a handle *c*⁶. This handle *c*⁶ may be moved inwardly to thrust the wedge *c*⁵ under the spring *c* to lift the same from contact *c*². This motion of the wedge serves to disconnect the operator's telephone, as will be hereinafter described. The free end of the spring *c*³ is bent as shown at *c*⁷, so as to come between two contacts *c*⁸ and *c*⁹. The spring *c*³ is normally in contact with contact *c*⁸ and hence with the connection or spring *c*¹⁰. By pressing down on the handle *c*⁶ the portion *c*⁷ of spring *c*³ is separated from contact *c*⁸ and closed to contact *c*⁹. Contact *c*⁹ is connected with the calling-generator, as will be hereinafter explained, so that a subscriber may be called by pressing down upon handle *c*⁶.

Referring now to Fig. 1, telephone-line *d* is connected in the ordinary manner through spring-jack switches *d'* *d*² *d*³ upon the different switchboards and from the contact of switch *d*³ upon the last board to an annunciator *e*. The circuit passes through this annunciator *e* to a ground-wire containing a battery *f*. The portion of the wire containing the annunciator *e* may be considered as a branch and the wire *d* may be considered as extended by the wire *f'* to spring *c* and contact *c*⁸ of the calling and listening key. From contact *c*⁸ the circuit may be traced through spring *c*³ to the strand of the cord connecting with the tip of the plug *g*. From spring *c* the circuit may be traced through contact *c*² and thence to the spring *b'* of the grounding-key. Thus when the plug is in its socket and the listening and calling key in the position shown the wire *f'* will be open. It will be seen that the telephone of the operator is connected with contact *b*² of the grounding-key. Telephone-lines *h* and *i* are connected in a similar manner with a switch on each of the boards, each being provided with a branch including an annunciator, these branches uniting in the ground-wire containing the common battery *f*. Each

wire is provided with its test-circuit. Thus wire *d* is provided with the test-circuit *k* which is connected with the test-piece of each of the switches *d'* *d''* *d'''* and with the spring *b* of the grounding-switch and then with the sleeve of plug *g*.

It has been usual to connect the test-wire of a line with the line—that is to say, to establish a cross or connection between them through the medium of the plug when the plug is inserted. This is avoided in my system herein described when the lines are in use and no clearing-out annunciator is included in the circuit, so that the circuit is as free and unobstructed as is possible.

I will now describe the operation of my system as illustrated in Fig. 1. We will suppose the subscriber of line *d* sends a current to line. This current will pass through the annunciator *e*, finding ground through battery *f*. The annunciator *e* will thus be thrown down. Thereupon the operator will pick up plug *g*. The contacts of the grounding-switch will thus all be connected together and the wire *f'* will find a connection through the operator's telephone—that is to say, the extension *f'* from wire *d* will be connected after passing through the spring *c* and contact *c''* of the listening and ringing key with spring *b'* and thence with contact *b''*, which is the terminal of the branch to ground containing the telephone. Thus immediately on taking up plug *g* the operator's telephone will be connected with the subscriber who sent in the call. The operator having received her order, we will say, for connection with line *h*, will proceed to test said line *h* by touching the tip of plug *g* to test-piece of spring-jack switch *l* of line *h* upon her board.

It should be observed that when plug *g* is lifted the test-wire *k* of line *d* is also provided with a ground connection through the telephone, since said test-wire *k* is connected with spring *b* of the grounding-switch, so that any line tests busy as soon as the plug of the line is lifted from its socket.

As before stated the operator upon being informed that connection is desired with line *h* proceeds to test said line by touching the tip of plug *g* to the test-piece of switch *l* of line *h*. If line *h* is free—that is to say, if there is no ground connection upon test-wire *m*—she will insert plug *g* into switch *l*, thus completing the connection between line *d* and line *h*. She would then push down on handle *c''* of her calling and listening key, so as to call up the subscriber of line *h*, and then she would insert the wedge under spring *c*, so as to lift the same from contact *c''*. This lifting of spring *c* disconnects the telephone. The two lines will then be connected together and there will be no connection from either of said lines to either of the test-wires *k m*, and said test-wires *k m* will be connected together through the medium of the sleeve on the shank of the plug and the strand of the cord connecting therewith, which strand is pro-

vided with a ground connection, as before described, through the operator's telephone. Thus both lines will test busy when connected and will not be subject to any of the currents which may be induced upon said test-circuits *k m*.

The annunciator *e*, connected as described, will serve as a clearing-out annunciator. Being, however, connected in a branch circuit it will not in any way harmfully affect the telephone-currents which may be transmitted over the united circuit of the telephone-lines.

When the shutter of annunciator *e* falls, the operator will draw out the wedge and listen in, and having assured herself that the subscribers are through talking will pull out plug *g* and place the same in its socket, as shown.

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

1. A grounding switch having opposing contact pieces one connected with the operator's telephone and the other connected with the test circuit, of a telephone line connected with multiple switch boards, the terminal plug of said telephone line inserted in its socket and serving to hold said opposing contacts separate, said contacts being adapted to close together when the plug is lifted to connect the test circuit to ground through the telephone set, substantially as described.

2. A grounding spring jack consisting of three contact points, one point connected with the test pieces of the spring jack switches of a telephone line, said switches being on different switch boards, another of said contact pieces being connected with the operator's telephone set and the other being connected with said telephone line after the same has passed through said switches in combination with the terminal connecting plug of said line adapted to operate said contact pieces when said plug is resting in its socket to separate the same, said contacts being adjusted to close together when the plug is lifted, substantially as and for the purpose specified.

3. The combination with the three contacts of a grounding switch of the test circuit, of a telephone line connected with one of said contacts, the operator's telephone set connected with another of said contacts and the telephone line closed to the other of said contacts after passing through the switches upon the switch board and a key included in said telephone line, which, on being opened, disconnects the telephone line from the said test circuit, substantially as and for the purpose specified.

4. The combination with a telephone line, of a terminal plug connected therewith, a socket for said plug and a switch with which the operator's telephone is connected, said switch having one of the springs or levers thereof projecting into the path of the plug when inserted in the socket to disconnect the telephone from the line, which on removing

the plug the switch acts to bring said telephone into circuit.

5 5. The combination in a telephone exchange system, of a telephone line provided with a terminal plug, a test circuit *f*, said telephone line connected with a distinct piece or connection of each of the two or more switches of the line at different sections of the board, a socket for the said terminal plug, and a
10 switch provided with a ground connection and adapted to be operated by placing the plug

in its socket and removing the plug therefrom, whereby on the removal of the plug from its socket the test circuit is automatically connected with the ground.

In witness whereof I hereunto subscribe my name this 27th day of April, A. D. 1889.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,
GEORGE P. BARTON.