(No Model.)

2 Sheets—Sheet 1.

C. E. SCRIBNER.

MULTIPLE SWITCH BOARD.

No. 330,061. Patented Nov. 10, 1885.

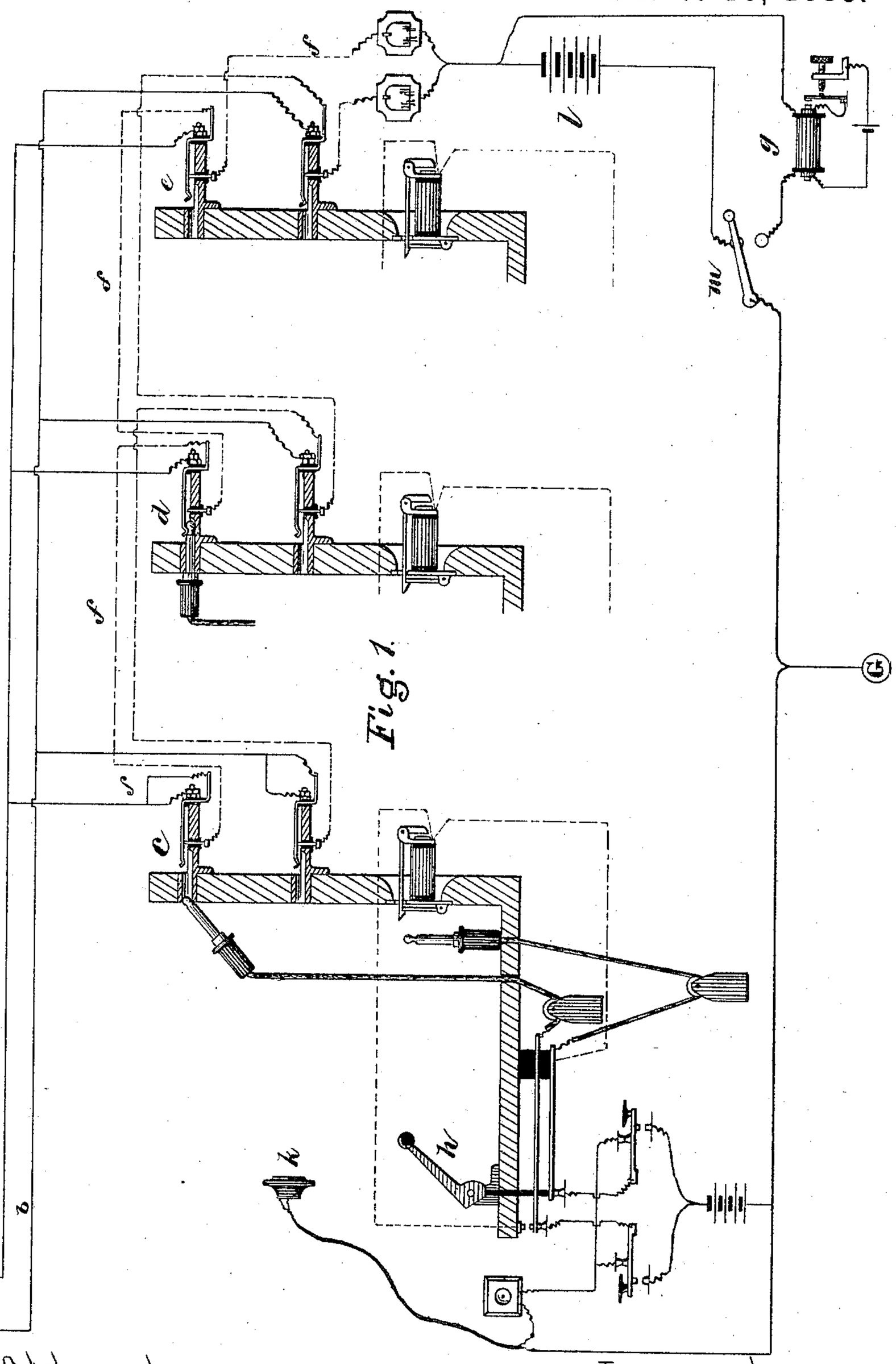

Fig. 1.

Attest

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Ernest P. Warner.

Inventor

Charles E. Scribner

By his Attorney

George P. Barton

(No Model.)

2 Sheets—Sheet 2.

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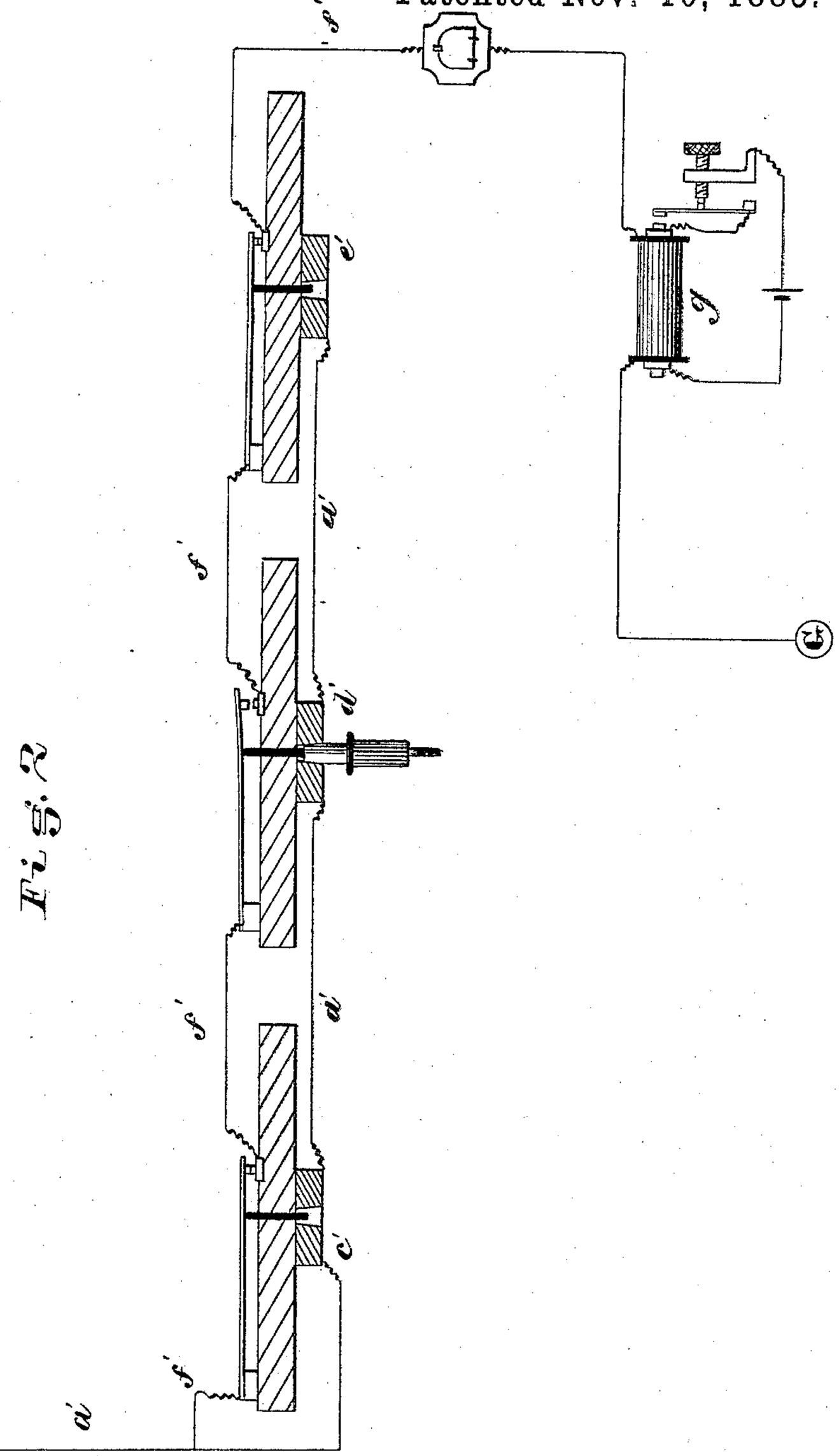

Fig. 2.

Attest

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UNITED STATES PATENT OFFICE.

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

MULTIPLE SWITCH-BOARD.

SPECIFICATION forming part of Letters Patent No. 330,061, dated November 10, 1885.

Application filed November 10, 1883. Serial No. 111,475. (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-Boards and Signals therefor, 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 signals, and is designed to enable the operators at the different boards to test to determine what lines are in use, while the circuits are so arranged that any two lines may be connected together upon any one of the boards without including in their circuit the resistance of the contact-points of the switches. Heretofore the different frames of the switches have been insulated and connected together by a normally-open wire. By applying a plug of a test-circuit to a frame of the switch a test has been made to determine whether the line of the switch is in use. If in use, the frame of the switch is found crossed with the line, and the circuit being closed as the plug-point touches the frame of the switch a click may be heard in the telephone of the operator, which, with a battery, is included in the test-circuit. If no cross is found, no click will be heard and the operator inserts the plug in the switch and makes the connection desired with the line. In all these systems heretofore used the contact-points of the switches have been included in the circuit of two lines when connected together.

My invention is designed to avoid the resistance of these contact-points by the use of circuits and apparatus more simple than any heretofore devised, while the operators are enabled to make the usual tests to determine whether any line wanted is already in use at another board.

My invention is illustrated in the accompanying drawings, in which Figure 1 is a view showing the circuits and testing apparatus, and Fig. 2 a detailed view of one of the line-connections with a modified form of switch.

The telephone-lines *a b* are each connected directly with the frame of a spring-jack on each board. The spring-jack switch is the same heretofore used, the tubular frame being insulated from the spring and ground contact-point. Each line is provided with a suitable switch on each board and is connected permanently to the frames of its switches. Each telephone-line is also connected, as heretofore, through all the springs and contact-points of its switches and through the individual annunciator of the line to ground. In the ground-wire I place a battery, or, preferably, the secondary of an induction-coil. Thus line *a* is connected permanently with the frame of switches *c d e*, while the portion *f* of said telephone-line passes through the springs and contact-points of said switches to the secondary of an induction-coil and to ground. At each board I provide the usual connecting cords and plugs and such other apparatus as may be necessary to receive calls and make the necessary signals and tests. I have shown a portion of this apparatus at board 1. At board 2 I have shown a plug inserted in switch *d*.

Suppose the operator at board 1 wishes to know whether line *a* is in use. By bringing the eccentric switch *h* to the position shown and touching the plug to frame of switch *c*, as shown, a derived circuit will be closed from the induction-coil or vibrator *g*, or from battery *l*, as the case may be, according to the position of the switch *m*, through the branch *f* and operator's telephone *k* to ground, if the line is not in use. In such case the operator listening at telephone *k* will hear a click and know that the line is free.

As shown, the line is connected at switch *d*, board 2, and the operator listening at telephone *k* will hear nothing, since the portion *f* of the line is open at switch *d*, as shown. She will therefore know that the line is in use.

It is evident that this arrangement of circuits may be used with various kinds of switches other than the spring-jacks having insulated frames, as described, and as shown in Fig. 1. In Fig. 2 I have shown simple connecting-bolts *c′ d′ e′* for making the line-connections, means being provided, as shown, for breaking the circuit *f′* when a connection is made at either bolt. With circuits thus arranged any two lines may be connected directly on either of the boards without includ-

ing the resistance of the contact-points of the spring-jacks in their circuit, while such signals and tests may be made as may be desired.

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

1. The combination, with a multiple switch-board of a telephone-exchange, of telephone lines and switches, one switch for each line on each board, each line being permanently connected to a metallic portion of each of its switches, and also connected through the contact-points of its switches and individual annunciator, a common ground-circuit, including means for producing electric currents, and connecting and testing apparatus at each board, substantially as and for the purpose specified.

2. At a telephone exchange central office, the combination of multiple switch-boards with telephone-lines each permanently connected to a metallic portion of its switch upon each board, each telephone-line being also connected through the contact-points of its switches and to ground, and means whereby the circuit of the branch wire of any given line is opened when a connection is made with the line at any board, whereby any two lines may be connected together upon either of the boards without including in their circuits the contact-points of either of their switches.

3. The combination, with a telephone-line connected with a switch on each of two or more multiple switch-boards and to ground, of the insulated frames of said switches, to which said line is connected by a normally-open branch or derived circuit, and testing apparatus at each board.

4. The combination, with a telephone-line provided at each switch-board of a multiple system with a connecting bolt or switch, of a portion of said line connected through an annunciator to ground, and means for breaking said line when a connection is made with the telephone-line at either one of its bolts or switches, substantially as and for the purpose specified.

5. The combination, with a telephone-line connected directly to a connecting bolt or switch at each of several switch-boards arranged in a multiple system, of a portion of said line being connected through a battery to ground, said portion being adapted to be broken when a connection is made with the telephone-line at either of its switches, and a ground-line, including a telephone, whereby a test may be made at any board to determine whether said branch line is broken.

6. In a multiple-switch-board system, a telephone-line provided with a spring-jack at each switch-board of the system, said spring-jacks being provided with insulated metallic frames, and said telephone-line being connected directly to each of said insulated frames, and also through an annunciator to ground through the springs and contact-points of said spring-jacks, whereby a connection may be made direct to the telephone-line at any board at the same time the portion of said line containing the annunciator is broken, substantially as set forth.

7. The eccentric switch *h*, in combination with the pair of flexible cords and plugs, the branch circuit, including telephone *k*, the multiple switch-boards to which the same telephone-lines are connected, the portion *f* of said circuit from each telephone-line, and the common ground-circuit, including the vibrator *g* or its equivalent, substantially as and for the purpose specified.

In witness whereof I hereunto subscribe my name this 1st day of November, A. D. 1883.

CHARLES E. SCRIBNER.

Witnesses:
PAUL A. STALEY,
ERNEST P. WARNER.