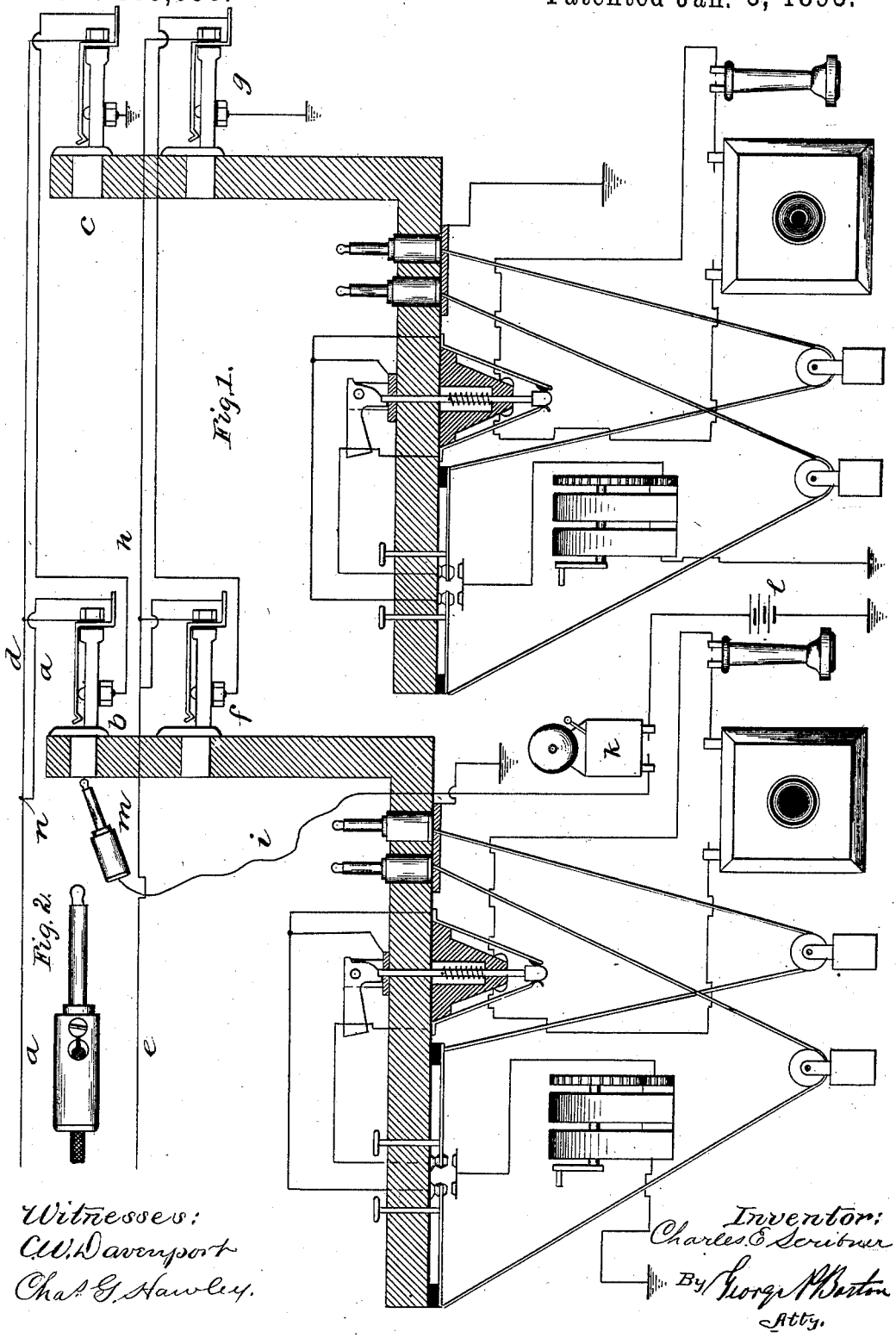
(No Model.)

C. E. SCRIBNER.

TESTING APPARATUS FOR MULTIPLE SWITCHBOARDS.

No. 489,098. Patented Jan. 3, 1893.



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UNITED STATES PATENT OFFICE.

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

TESTING APPARATUS FOR MULTIPLE SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 489,098, dated January 3, 1893.

Application filed June 19, 1888. Serial No. 277,558. (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 Testing Apparatus for Multiple Switchboards, (Case No. 172), of which the following is a full, clear, concise, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

In telephone exchange systems employing multiple switchboards, individual annunciators have usually been included in the telephone lines in order that any subscriber by means of a generator included in circuit at his station may call up the central office. It has, however, sometimes been found convenient to employ separate circuits for signaling between the subscribers and the operator at the central office. This system is usually spoken of as the Law system or Firman system.

My invention relates to this latter system of telephone exchange in which the telephone lines are connected directly to ground after passing through the springjack switches, and its object is to provide a ready means for determining at one board whether a line wanted or called for is in use at any other of the boards.

In the accompanying drawings which is illustrative of my invention, Figure 1 is a diagram illustrative of two telephone lines each connected with a different springjack switch on each of two boards and to ground with the keyboard apparatus of the different boards and testing apparatus at one of the boards. Fig. 2 is a detailed view of an ordinary connecting plug.

Telephone line *a* is shown connected through the spring and contact of switch *b* and thence through spring and contact of switch *c* and thence directly to ground. The branch wire *d* extends to the insulated frame or test piece of each of said switches *b*, *c*. Telephone line *e* is shown connected in the same manner through the spring and contact of switch *f* upon the first board and thence through spring and contact of switch *g* of the second board and thence directly to ground. The branch *h* connects with the insulated frames or test pieces of each of said switches *f* and *g*. I have not shown the independent circuits for communicating between the subscribers and the central office, such circuits being old and well known. At the first board I have shown ground circuit *i* which includes a bell or buzzer *k* having a few convolutions of coarse wire upon its core, and a small battery *l*. The battery and bell are so proportioned with respect to electromotive force and ampère turns that the bell will not respond when the circuit includes any substantial resistance. If, however, the circuit is closed directly to ground, the bell will respond. The circuits of the lines extending toward the subscribers' stations will, of course, be of considerable resistance. Tracing, however, through the springjack switches and to ground, they will be without substantial resistance. When a plug is inserted in any switch the direct circuit to ground at the central office is opened to all the test pieces of the line.

We will suppose that line *a* is called for at the first board. The operator by touching plug *m* to the frame of switch *b* as shown closes circuit of battery *l* through buzzer *k* to test frame of switch *b* thence over branch *d* to point *n* and thence through the spring and contact of switch *b* and the spring and contact of switch *c* directly to ground. Therefore buzzer *k* will respond and the operator will know that the line is free. In case the line were connected, however, at some other board, as, for example, at switch *c*, the ground circuit would be open at the switch where the connection was made. The operator then testing would find no circuit through switch *c*. She would, however, find circuit from point *n* over line *a* toward the subscriber's station and from the spring of switch *c* through the pair of cords and plugs to the other line which might be connected therewith, which other line, of course, would contain the usual amount of resistance. The resistance, however, would be so great that bell *k* would not respond. Thus the operator on closing plug *m* to the test piece of any line could determine whether or not the line tested was busy. If busy, bell *k* would not respond. If free, bell *k* would vibrate.

Having thus described my invention, I

claim as new and desire to secure by Letters Patent:

1. The combination with telephone lines each connected through a springjack on each of two or more boards and directly to ground, of a branch or test wire connecting each line with the test piece or insulated frame of each of its switches and testing apparatus consisting of a circuit including a test plug, having a single contact a battery and an indicator proportioned with respect to electromotive force and ampère turns, as described; whereby it may be determined at one board whether or not any given line is connected or in use at any other of the boards.

2. A telephone line connected through a series of springjack switches, one on each of two or more multiple switchboards in two branches, one branch extending through the spring and contact of each of said switches and directly to ground, the other branch being connected to each of the insulated frames or test pieces of said switches, in combination with a connecting plug at each of the switchboards and a test circuit connecting the branch including the test pieces to the ground; whereby, on inserting a plug in any springjack of the line, the direct ground connection will be removed from the test pieces of all the switches, substantially as and for the purpose specified.

In witness whereof I hereunto subscribe my name this 13th day of June, A. D. 1888.

CHARLES E. SCRIBNER.

Witnesses:

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