

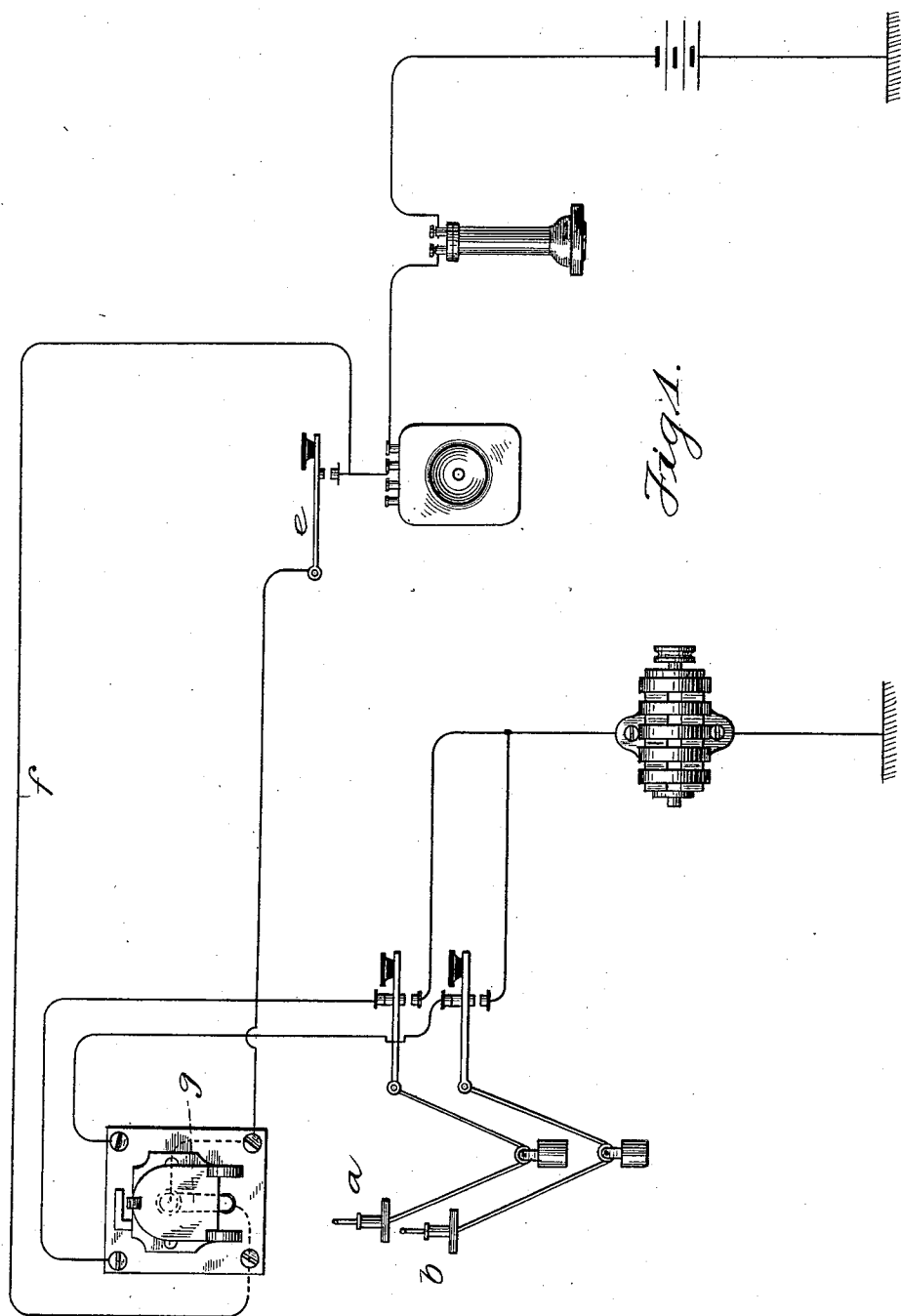
(No Model.)

2 Sheets—Sheet 1.

W. E. McKIVITT.
TESTING APPARATUS FOR SWITCH BOARDS.

No. 405,221.

Patented June 11, 1889.



Witnesses:
Chas. G. Hawley.
Ella Eder

Inventor:
William E. McKivitt
By George M. Barton
Attorney.

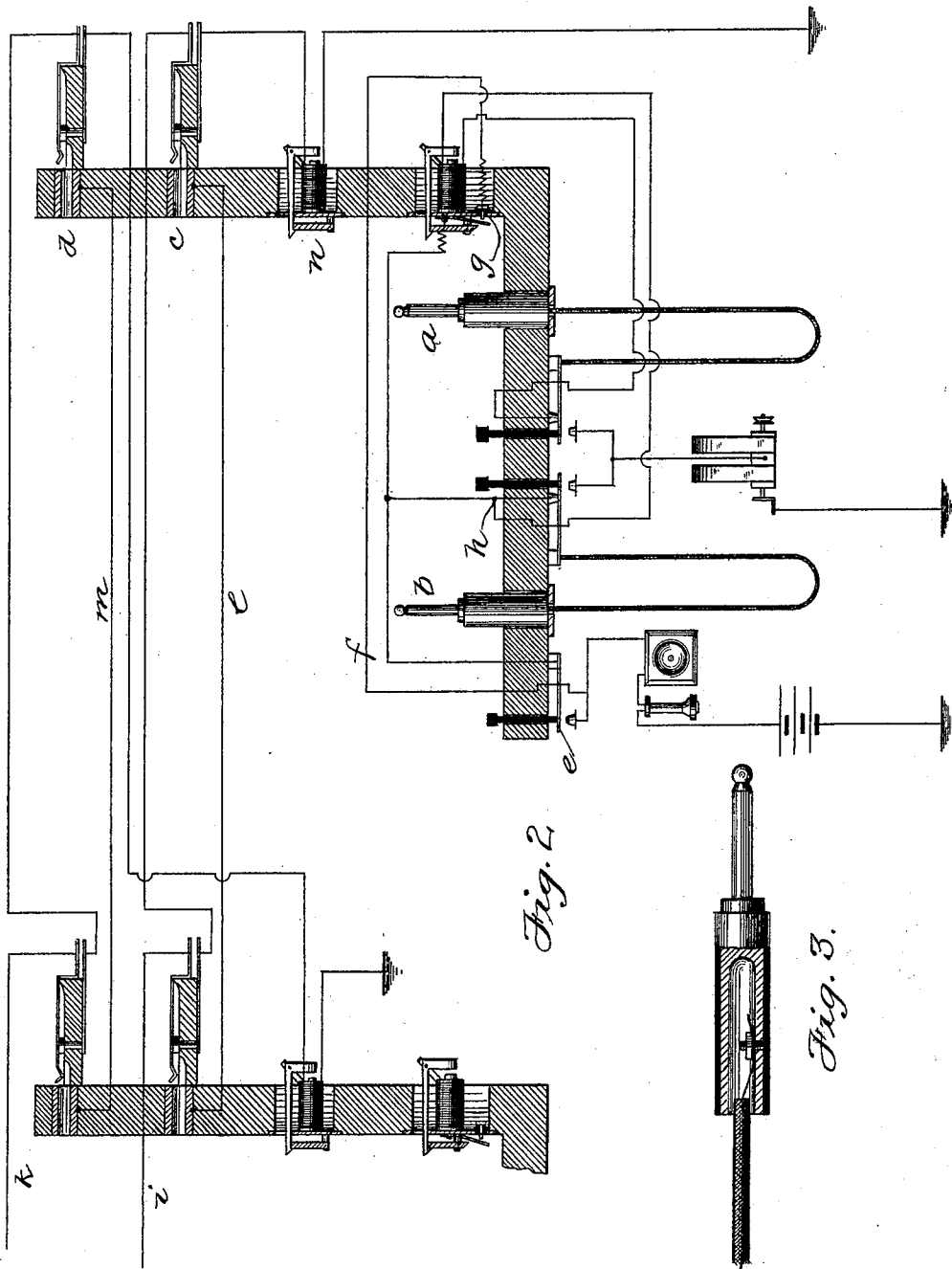
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UNITED STATES PATENT OFFICE.

WILLIAM E. McKIVITT, OF ST. PAUL, MINNESOTA, ASSIGNOR TO THE
WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

TESTING APPARATUS FOR SWITCH-BOARDS.

SPECIFICATION forming part of Letters Patent No. 405,221, dated June 11, 1889.

Application filed December 18, 1888. Serial No. 293,963. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. McKIVITT, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a certain new and useful Improvement in Testing Apparatus for Switch-Boards, 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 the apparatus at the central office of a telephone-exchange, and its objects are, first, to enable either of two connected subscribers to connect with the operator's telephone automatically by throwing down the clearing-out shutter; second, to arrange the circuits in such manner that the plug of either cord of a pair may be used to test whether a spring-jack has a line connected to it or not; third, to provide a clearing-out shutter whereby the test-circuit is closed when the shutter is thrown down to announce a clearing-out signal, and, fourth, to provide apparatus whereby the operator may at will connect with the pair of cords while either of two subscribers connected through the conductor or strand of said cords may automatically make connection with the operator's telephone.

My invention consists in the combination, with the operator's telephone outfit, of a key in the circuit connecting with a pair of cords, the clearing-out annunciator, the circuit-closer operated by the shutter of the drop, and a branch circuit around the said key.

My invention further consists in a pair of cords, including a clearing-out drop, a telephone-circuit, including a test-battery, and a contact-point operated by said drop to connect together the telephone test-circuit and the pair of cords.

A key or circuit-closer is provided upon the clearing-out annunciator of the different pairs of cords, which circuit-closer is closed by the falling shutter. This circuit-closer is placed in a circuit leading from the different cords in such manner that when the clearing-out shutter falls a branch or half-connection will be made with the operator's telephone from the united circuit of the tele-

phone-lines connected through the strand of said cords. Either subscriber may thus speak directly to the operator as long as a plug remains in its spring-jack switch, provided the shutter of the clearing-out drop is down.

In the accompanying drawings, which are illustrative of my invention, Figure 1 is a diagram showing the operator's telephone connected in a normally-open battery-circuit, the pair of cords with the terminal plugs, and the clearing-out annunciator with a branch wire, including the circuit-closer of the clearing-out shutter. Fig. 2 is a diagram showing two telephone-lines connected with two different switch-boards with my key-board apparatus upon one of the boards. Fig. 3 is a detail view of one of the plugs.

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

The pair of connecting-cords is provided with ordinary plug-terminals *a b*. These plugs are adapted to be inserted in different spring-jack switches or terminals—as, for example, switches *c d*—to connect the lines of said terminals together. By means of a key *e* a connection may be made between the operator's telephone and the strand or conductor between the plugs. In addition to this key *e* for connecting with the listening operator's telephone, I provide the branch wire *f* and connect in the circuit thereof the circuit-closer *g* of the clearing-out annunciator. The clearing-out annunciator shown is of the form patented to Franklin G. Beach, August 23, 1881, No. 245,931.

As shown more clearly in Fig. 2, the wire *f* extends to the back contact of the circuit-closer *g* of the clearing-out shutter. When the drop of the clearing-out shutter falls and the spring of the circuit-closer is forced against the back contact thereof, the circuit of wire *f* is closed through the circuit-closer, and thence the circuit may be traced to the connection at *h*, with the conductor between the plugs. Thus whenever the clearing-out annunciator is operated to throw down the shutter, the operator's telephone is automatically connected with the circuit of the wires formed through the pair of plugs and cords.

The telephone-line circuits *i* and *k* are run through the switches on the different switch-boards in the ordinary manner and through the ordinary individual annunciators to ground.

The insulated frames of the switches of each line are connected in the ordinary way. Thus the frames of the switches of line *i* are connected by wire *l* and the frames of the switches of line *k* are connected by wire *m* in the ordinary manner. Suppose current is sent in over line *i*, throwing down individual annunciator *n*. The operator on inserting plug *a* in switch *c* and depressing key *e* will be connected with the said line *i*. In case the subscriber calls for connection with line *k*, the operator will insert plug *b* into switch *d* of the line. The two lines *i* *k* will then be connected together through the plugs and the conductor between them. Either subscriber thus connected by sending current may throw down the shutter of the clearing-out annunciator, thus automatically making connection with the operator's telephone. The operator is thus compelled to receive the subscriber's order.

The time heretofore spent in waiting for the operator to listen in and receive the order for a second connection is thus saved. As the ground-circuit, including the operator's telephone, contains, also, a battery, either plug, when connected to a switch, will be included in circuit with said battery and the telephone, when the telephone is connected to the conductor between the cords.

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

1. The combination, with the operator's telephone outfit, of the key *e* in a circuit connecting with a pair of cords, the clearing-out annunciator, and the circuit-closer operated by the shutter of the drop and the branch circuit *f* around the key *e*, whereby the operator may at will connect with the pair of cords, while either of two subscribers connected through the cords may close the circuit of

branch *f* at the annunciator, substantially as and for the purpose specified.

2. The combination, with the pair of cords, including a clearing-out annunciator, of a telephone-circuit, including a battery and a circuit-closer operated by said annunciator-drop to connect together the circuit containing the telephone and the pair of cords.

3. The combination, with the pair of cords, including a clearing-out annunciator, of a telephone-circuit, including a test-battery, a circuit-closer operated by said annunciator-drop to connect together the branch circuit, containing a telephone and battery, and the conductor between the plugs, substantially as and for the purpose specified.

4. The combination, with a normally-open telephone-circuit extending from the clearing-out annunciator to earth and including a battery, of a circuit-closer included in the conductor connecting a pair of plugs and a branch circuit, including a key *e*, said branch being connected with the flexible conducting-cords of said pair of plugs, substantially as and for the purpose specified.

5. The combination, with the annunciator, of a circuit-closer operated by the falling of the annunciator, a pair of cords and their terminal plugs, including the clearing-out annunciator, a telephone and battery included in a ground-circuit branched through the circuit-closer of the clearing-out annunciator, the conductor between the plugs, and the switches upon the switch-board, whereby on connecting either plug with a switch upon the switch-board the battery will be closed through the telephone to said switch, substantially as and for the purpose specified.

In witness whereof I hereunto subscribe my name in the presence of two subscribing witnesses.

WILLIAM E. McKIVITT.

Witnesses:

ALLAN BLACK,
WHITNEY WALL.