

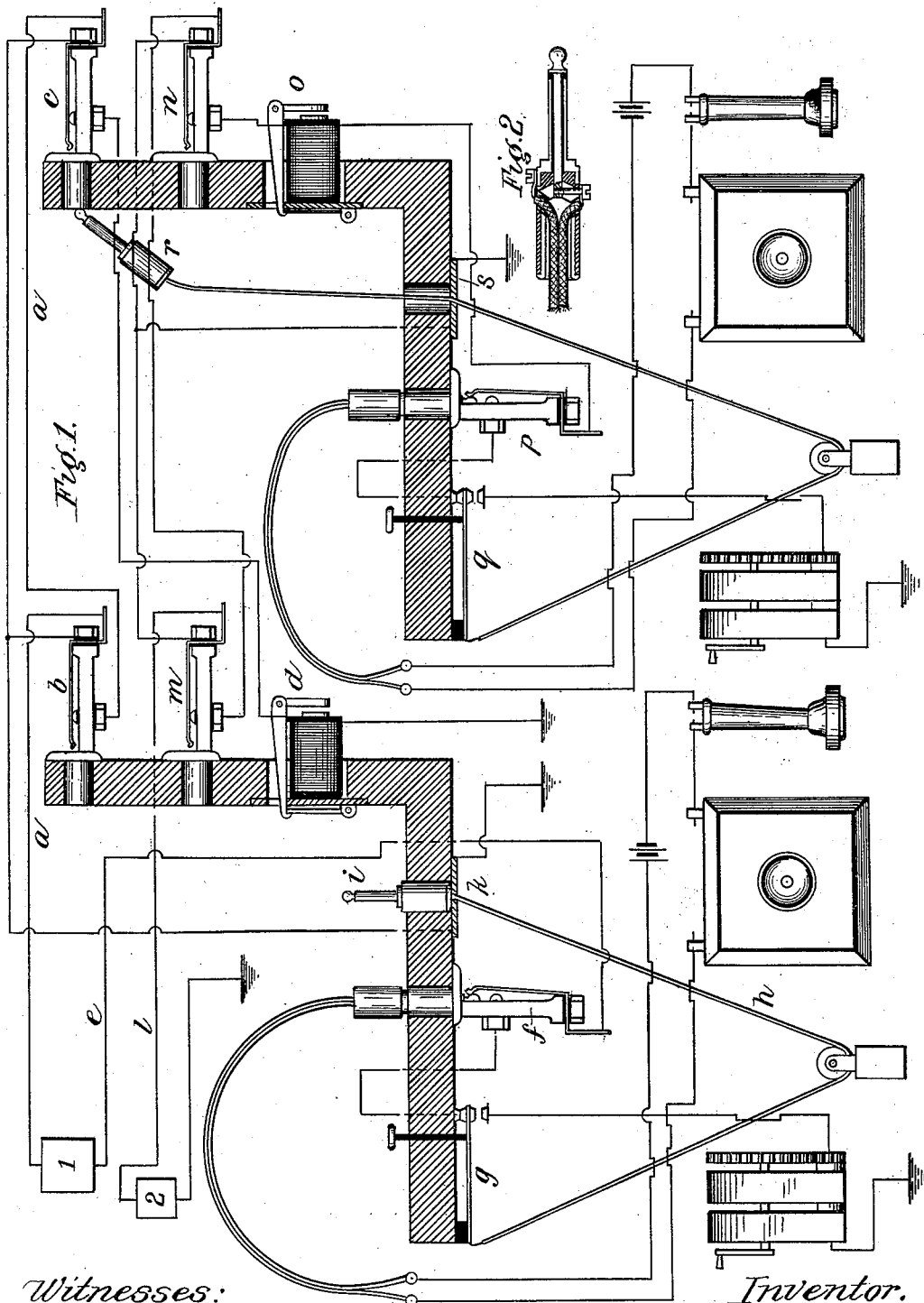
(No Model.)

C. E. SCRIBNER.

MULTIPLE SWITCH BOARD CIRCUIT.

No. 384,477.

Patented June 12, 1888.



Witnesses:
Saml. B. Dover.
Wm. M. Giller,

Inventor.
Charles E. Scribner
By George A. Barton
Attorney.

UNITED STATES PATENT OFFICE.

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

MULTIPLE SWITCH-BOARD CIRCUIT.

SPECIFICATION forming part of Letters Patent No. 384,477, dated June 12, 1888.

Application filed December 27, 1886. Serial No. 232,710. (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-Board Circuits, (Case 133,) 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 systems of a telephone-exchange; and its objects are, first, to make both ends of a metallic circuit accessible at one of the switch-boards; second, to enable the operator to connect two such lines together in such manner that one annunciator will remain in circuit as a clearing-out annunciator; third, to enable the operator at one of the boards to connect one end of a metallic circuit with the switch of a ground-circuit, so that the annunciator of the metallic circuit will remain in circuit as a clearing-out annunciator; fourth, to enable an operator at any one of the boards to test to determine whether any line wanted is in use or connected at any other of the boards, and, fifth, to bring the key-board or table apparatus at each board within as small a compass as possible and make the same more simple and efficient.

My invention consists in connecting one side of the metallic circuit through the spring-jack switches of the line, one on each of the boards, through an annunciator to ground, the other branch of the metallic circuit being connected through a spring-jack switch or listening-key on the table of the board where the annunciator is placed and thence through a calling-key and cord to a plug which rests, normally, upon a ground-plate. Thus normally both ends of each metallic circuit are grounded at the central office. I also provide, in connection with each metallic circuit, a test-wire which connects together the insulated frames or test-pieces of the line. This test-wire is normally open; but when a plug is inserted at any switch a cross or connection is established between the test-piece and the line, as described and claimed in my patent, No. 305,021, of September 9, 1884.

Each circuit consisting of a single wire is normally connected from the ground at the subscriber's station through spring-jack switches, one on each of the switch-boards, through an annunciator to a listening-key or switch on the table, and thence through the calling-key and a flexible cord to the terminal plug of said cord, and thence to ground through the ground-plate on which said plug normally rests. Thus each telephone-line may be provided at the central office with a flexible cord and plug. By inserting the terminal plug of any line in the switch of another line it is evident that the two lines may be connected together.

When the plug at one end of a metallic circuit is inserted in the switch of another line, the annunciator of the line whose plug is thus inserted will be left in the circuit to serve as a clearing-out shutter. The annunciator of the other line, however, will be cut off at the spring-jack where the connection is made. When the plug of the calling subscriber is thus inserted in the spring-jack of the called subscriber and the two are connected together, it will be seen that no cross or connection will be established between the test-wire connected with the test-pieces of the spring-jacks of the calling subscriber and the said calling subscriber's telephone-line. I therefore provide a ground-connection which is automatically closed to the test-wire of the calling subscriber when his plug is lifted to be inserted in the spring-jack of another line. This automatic ground-connection forms no part of my invention herein, and therefore will not be described in detail.

Upon the switch-board having a listening-key I use the form of my spring-jack switch in which the spring is insulated, while the contact-point against which said spring normally rests is simply a lug projecting from the frame, and is not insulated therefrom. By inserting a loop-plug in this switch the tip of the loop-plug connects with the spring and the insulated sleeve on the shank of the plug connects with the frame, and thus I am enabled to loop the operator's telephone into the circuit.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 shows two sectional views of two multiple switch-boards with two telephone-lines, one metallic and the other ground-connected therewith, and the key-board apparatus and circuits which I have invented. Fig. 2 is a detail sectional view of the loop-plug for looping up the telephone into the circuit of any line.

The metallic circuit extends from subscriber's station 1, as indicated by branch *a*, through the spring-jack switches *b c* on the different boards, and thence through the annunciator *d* to ground. The other branch, *e*, of said metallic circuit extends from the subscriber's station 1 to the central office and to the operator's listening-key or spring-jack switch *f*, and thence normally to calling-key *g*, and by flexible cord *h* to plug *i*, and from said plug *i* to ground-plate *k*, upon which the metallic heel of said plug normally rests.

The ground-circuit extends from the ground at the subscriber's station 2 by wire *l* through switches *m n*, one on each of the switch-boards through annunciator *o*, and thence to the spring of the listening-key or spring-jack *p*, and thence normally to the calling-key *g*, and by flexible cord to the terminal plug *r* of said cord, the metallic heel of said plug normally resting upon the ground-plate *s*. Thus a ground-circuit is normally connected to ground at the subscriber's station and to ground at the central office.

In order that the metallic circuit may be connected with the ground-circuit, it is only necessary to lift plug *i* and insert said plug *i* in switch *m*. The circuit which would thus be formed may be traced from ground at subscriber's station 2 over line *l* to switch *m*, thence to the tip of plug *i*, and thence by the flexible cord to key *g* and the frame of spring-jack *f*, and from said frame, when the loop-plug is inserted, as shown, to the insulated sleeve of the loop-plug, and thence through a strand of the cord of the loop-plug which includes the telephone back to the tip of the loop-plug, and thence to the spring of switch *f*, and thence by line *e* to station 1, and thence by wire *a* through switches *b c* and annunciator *d* to ground at the central office. The annunciator *d* would thus be left in the circuit and serve as a clearing-out annunciator. In case plug *i* were thus inserted in the switch of a metallic circuit the two metallic circuits would be united together in a metallic circuit to form a circuit which could be traced from ground at the central office through annunciator *d*, and thence over wire *a* through station 1 to plug *i*, and from plug *i*, when inserted, through the station of the called subscriber, and back to the plug and ground connection of the called subscriber's line at the central office.

It should be noted that the plug of the calling subscriber's line is inserted in the switch of the subscriber called, and that the annunciator of the calling subscriber is left in the

circuit while the annunciator of the called subscriber, whether the line be metallic or ground, is disconnected from the circuit by the insertion of the plug.

In order to test a line wanted, it is only necessary to insert the loop-plug connected with the telephone into the key-board spring-jack of any line and apply the tip of the connecting-plug of the line into whose spring-jack the loop-plug has been inserted to the test-piece of the spring-jack of the line which is being tested. Thus the loop-plug connected with the telephone is shown inserted in the key-board spring-jack *p*, while the test-plug *r* is shown with its tip touching the test-piece or frame of spring-jack switch *e*. If in use, the ordinary click will be heard in the telephone, and if the test-wire is open no circuit will be closed through the telephone, and hence no click will be heard, and this will indicate that the line is free.

Any two multiple circuits terminating at the same board may be united in metallic circuit without any ground-connection at any point by simply reciprocally inserting the respective plugs of the two circuits in the spring-jack switches, respectively, of said circuits. In this case both annunciators will be cut out and the operator will have to throw in his telephone to clear out the connection. I therefore preferably group the metallic circuits of an exchange as far as possible upon the same switch-board. For example, in an exchange of a thousand subscribers there might be two hundred metallic circuits. The annunciators of all these metallic circuits and their terminal cords and plugs would preferably be placed at a single board, and when any two of these were connected together in metallic circuit with both annunciators removed the very best results would be obtained.

For the purpose of testing a metallic circuit, the plug of a metallic circuit may be inserted in the spring-jack of the same line. For example, plug *i* might be inserted in switch *b*, in which case we would have a simple metallic circuit between the subscriber's station and the central office. The test could be made by looping the telephone into circuit.

My invention is designed especially for multiple switch-board systems, yet it is evident that certain features thereof might be used in connection with a single switch-board. I therefore do not limit my invention to multiple switch-board systems.

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

1. The combination, with two or more multiple switch-boards, of metallic circuits, each metallic circuit being normally connected through a spring-jack switch on each of the boards, and an annunciator to ground at the central office, and the other side of said metallic circuit being connected through a table listening-key or spring-jack and a flexible cord and plug to ground, a loop-plug, with its

cord, including a telephone at each board, and switching devices whereby two metallic circuits may be connected together by inserting the plug which forms the terminal of one line in a spring-jack switch of the other line, while the annunciator of the line whose plug is inserted is left in circuit as clearing-out annunciator.

2. The combination, with two or more multiple switch-boards, of metallic circuits, each metallic circuit being normally connected through a spring-jack switch on each of the boards and an annunciator to ground at the central office, and the other side of said metallic circuit being connected at the central office with a flexible cord and terminal plug normally resting upon a ground-connection, a loop-plug with its cord, including a telephone at each board, and switching devices whereby two metallic circuits may be connected together by inserting the plug which forms a terminal of one line in a spring-jack switch of the other line, while the annunciator of the line whose plug is inserted is left in circuit as clearing-out annunciator.

3. In a metallic-circuit telephone system, the combination, with one end of the circuit connected through a switch upon the switch-board, of the other end of the same circuit connected to a flexible cord and plug upon the same switch-board, whereby connections may be made with either or both ends of the said metallic circuit upon the same board.

4. In a telephone-exchange system, a circuit normally connected to ground at the central office and through an annunciator and switch to the subscriber's station and back to the central office, in combination with a flexible cord and plug included in said circuit and a ground-connection for said plug, said plug, when lifted and inserted in the switch of the line, completing a metallic circuit between the central office and subscriber's station and removing both ground-connections.

In witness whereof I hereunto subscribe my name this 16th day of November, A.D. 1886.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE P. BARTON,
WM. M. GILLER.