

(No Model.)

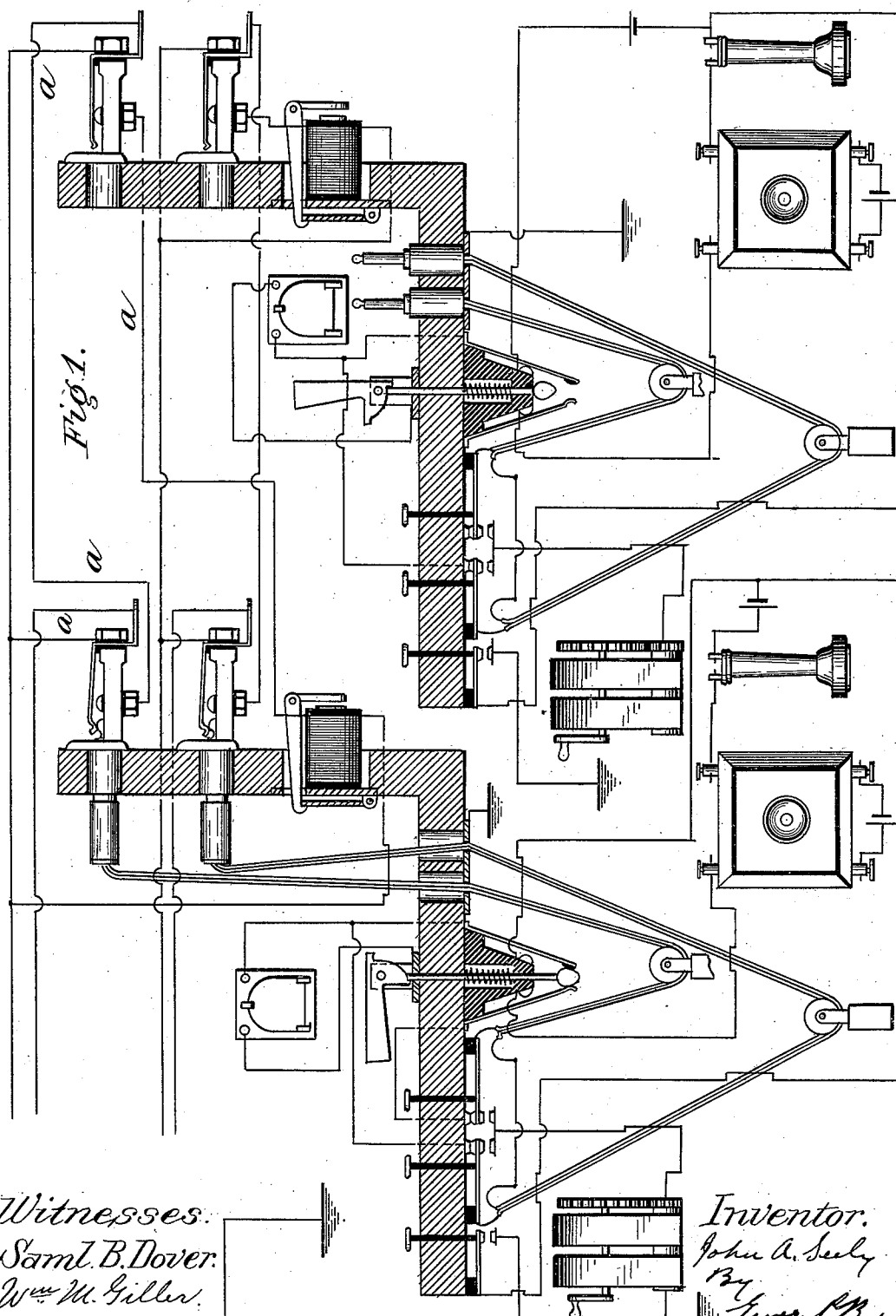
2 Sheets—Sheet 1.

J. A. SEELY.

METALLIC CIRCUIT FOR MULTIPLE SWITCH BOARDS.

No. 357,539.

Patented Feb. 8, 1887.



Witnesses:
Saml. B. Dover.
Wm. M. Miller.

Inventor.
John A. Seely
By
George P. Burton
Att'y

(No Model.)

2 Sheets—Sheet 2.

J. A. SEELY.

METALLIC CIRCUIT FOR MULTIPLE SWITCH BOARDS.

No. 357,539.

Patented Feb. 8, 1887.

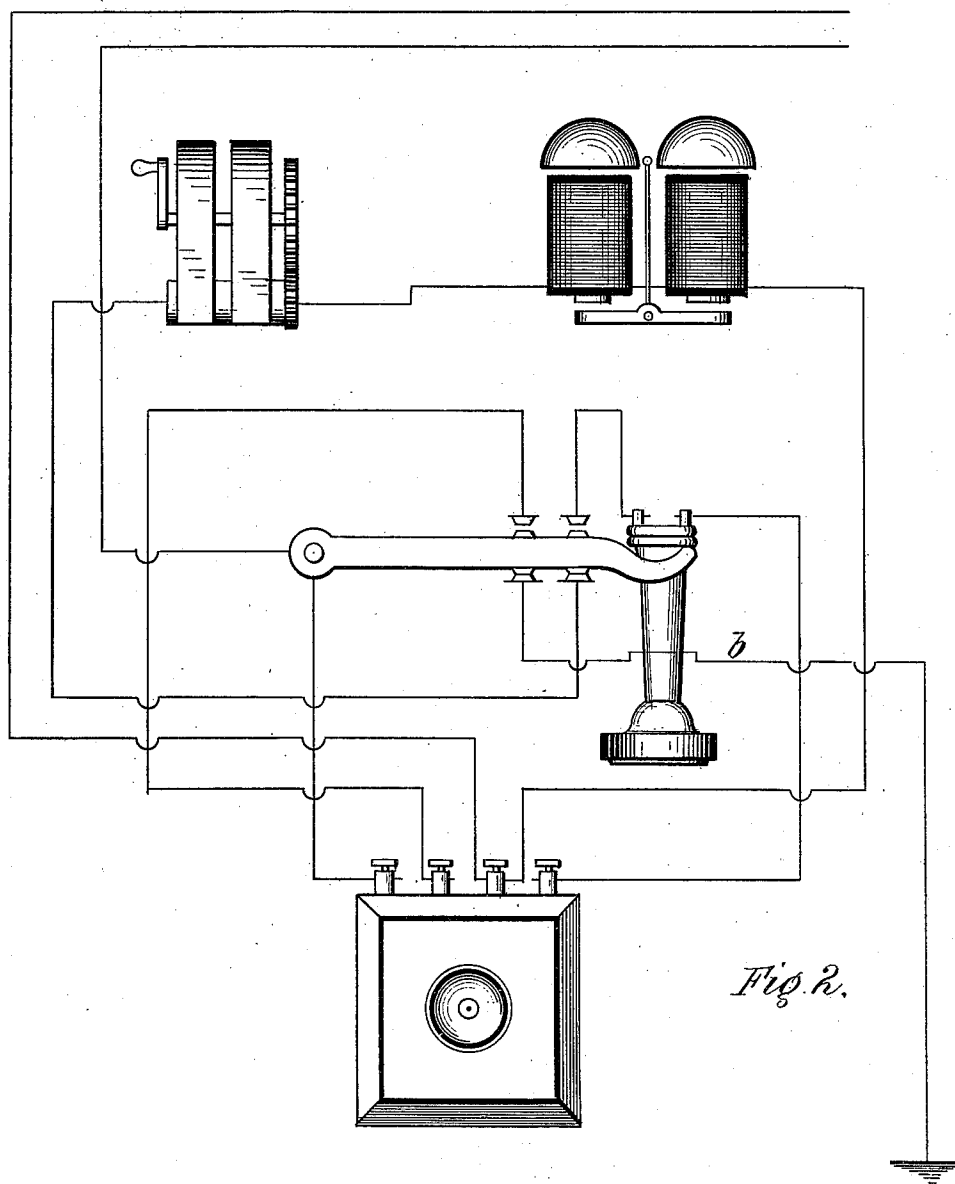


Fig. 2.

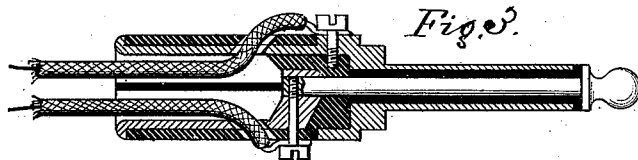


Fig. 3.

Witnesses:
Saml. B. Dover.
Wm. M. Gillin.

Inventor.
John A. Seely
By George P. Barton
Att'y

UNITED STATES PATENT OFFICE.

JOHN A. SEELY, OF NEW YORK, N. Y., ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

METALLIC CIRCUIT FOR MULTIPLE SWITCH-BOARDS.

SPECIFICATION forming part of Letters Patent No. 357,539, dated February 8, 1887.

Application filed November 15, 1886. Serial No. 218,949. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. SEELY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Metallic Circuits for Multiple Switch-Boards, (Case 4,) 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 metallic circuits for multiple switch-boards of a telephone-exchange; and its object is to provide for testing at any of the switch-boards to determine whether any given line is in use. The spring-jack which I use may be of the form shown in Letters Patent No. 305,021, granted to C. E. Scribner October 9, 1884.

My invention consists in connecting one branch of the metallic circuit through a lever and its contact-point of a single switch on each of the switch-boards, and thence through an annunciator, and thence with the insulated frames or test-pieces of each of said switches, and thence to the subscriber's switch-lever, and thence through the subscriber's generator and bell included in the circuit of the other branch, and in providing a branch connection to ground at the subscriber's station, which is closed when the subscriber's telephone is hung upon his switch-lever.

When the half connection or branch is closed from the metallic circuit to ground at the subscriber's station, it is evident that if the circuit, including a telephone and battery, be closed to one of the test plates or rings of the line upon one of the switch-boards the battery will find circuit to the ground at the subscriber's station, and thus the operator by the click in his telephone will know that the subscriber's telephone is hung up, and hence that the line is free. When the subscriber removes his telephone from his switch, the ground-branch is disconnected, and the branch containing his bell and generator is opened, while the telephone is looped into the circuit. In such case, there being no ground upon the metallic circuit, when a test is made at the central office no circuit will be found to ground, and hence no current through the telephone, and the operator not hearing any click in his telephone will know that the line is not con-

nected with ground at the subscriber's station, and hence will know that the line is in use.

The key-board system which I use consists of looped plugs and pairs of double-stranded cords and switching apparatus, in connection with the calling-generator and operator's telephone. This apparatus contains certain novel features which I have described and claimed in another application, and therefore will not describe the same in detail herein.

In the drawings, which are illustrative of my invention, Figure 1 is a diagram showing two metallic circuits connected, respectively, with their switches and individual annunciators on two multiple switch-boards, the multiple switch-boards being shown in sections. Fig. 2 is a diagram illustrative of the circuits of a metallic circuit at a subscriber's station. Fig. 3 is a detailed view of the loop-plug.

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

I will trace the metallic circuit *a* as illustrated in Figs. 1 and 2. Beginning at the upper spring-jack upon the first board, the line *a* may be traced normally to the switch-lever of said switch, thence to the contact-point against which said lever normally rests, and in like manner through the spring-jack on the next board, thence through the subscriber's individual shutter, and thence the line is branched to the metallic frames of each of said switches, and thence to the subscriber's station, where it is permanently connected with the subscriber's telephone switch-lever. From thence, when the telephone is hung upon the switch, the circuit may be traced through the generator and bell and back to the central office, thus completing the metallic circuit. When the telephone is hung upon the switch, as shown, at the subscriber's station, the ground-branch *b* is closed to the telephone-switch. Thus a ground-connection is formed at each subscriber's station for each metallic circuit as long as the telephone of any given station remains upon the switch-lever. The subscriber on turning his generator will send current over the metallic circuit and throw down his shutter, thus notifying the operator at the central office of his call.

The different branches or sides of the metallic circuit may be two of many wires included in the same cable. The branches or different

sides of the same metallic circuit preferably consist of insulated wires twisted together, so that they may be in close proximity to one another in the cable. Current sent over the metallic circuit thus formed has little or no injurious inductive effect upon other wires included in the same cable, as is well known. The operator on seeing the shutter fall inserts a loop-plug in the switch of the calling-subscriber, and looping in his telephone finds out what connection is wanted. He thereupon applies the tip of the plug to the test-ring of the subscriber wanted, to find out whether the line wanted is busy. If he hears a click in his telephone as he taps the point of the plug against the test-ring, he infers that the line is free, and thereupon inserts the plug in the spring-jack and throws current to line of the subscriber wanted. Two subscribers are thus readily looped together in a metallic circuit, and when thus connected their calling-annunciators will not be included in the circuit, but will be in open branches, the branches being open at the switches of the lines in which the plugs are inserted.

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

1. A metallic circuit connected through its switches on two or more multiple switch-boards and through an annunciator, and

thence to the insulated frames or test-pieces of said switches and to the subscriber's telephone-switch, and thence through the subscriber's generator and bell back to the central office, in combination with a branch connection to ground at the subscriber's station, which is closed when the telephone is hung upon the switch, and testing apparatus at the different switch-boards, whereby it may be determined whether the subscriber's telephone is hung upon the switch, substantially as described.

2. A telephone-line connected in a metallic circuit through a switch on each of the multiple switch-boards and thence through an annunciator and a branch connection to the insulated frames or test-pieces of said switches, in combination with a loop-plug inserted in one of said switches, whereby the portion of the line including the individual annunciator is opened and the different branches or sides of the line connected with the different points of the loop-plug, substantially as shown and described.

In witness whereof I hereunto subscribe my name this 6th day of November, A. D. 1886.

JOHN A. SEELY.

Witnesses:

H. B. THAYER,
A. L. SALT.