

(No Model.)

2 Sheets—Sheet 1.

C. E. SCRIBNER.  
MULTIPLE SWITCH BOARD.

No. 427,917.

Patented May 13, 1890.

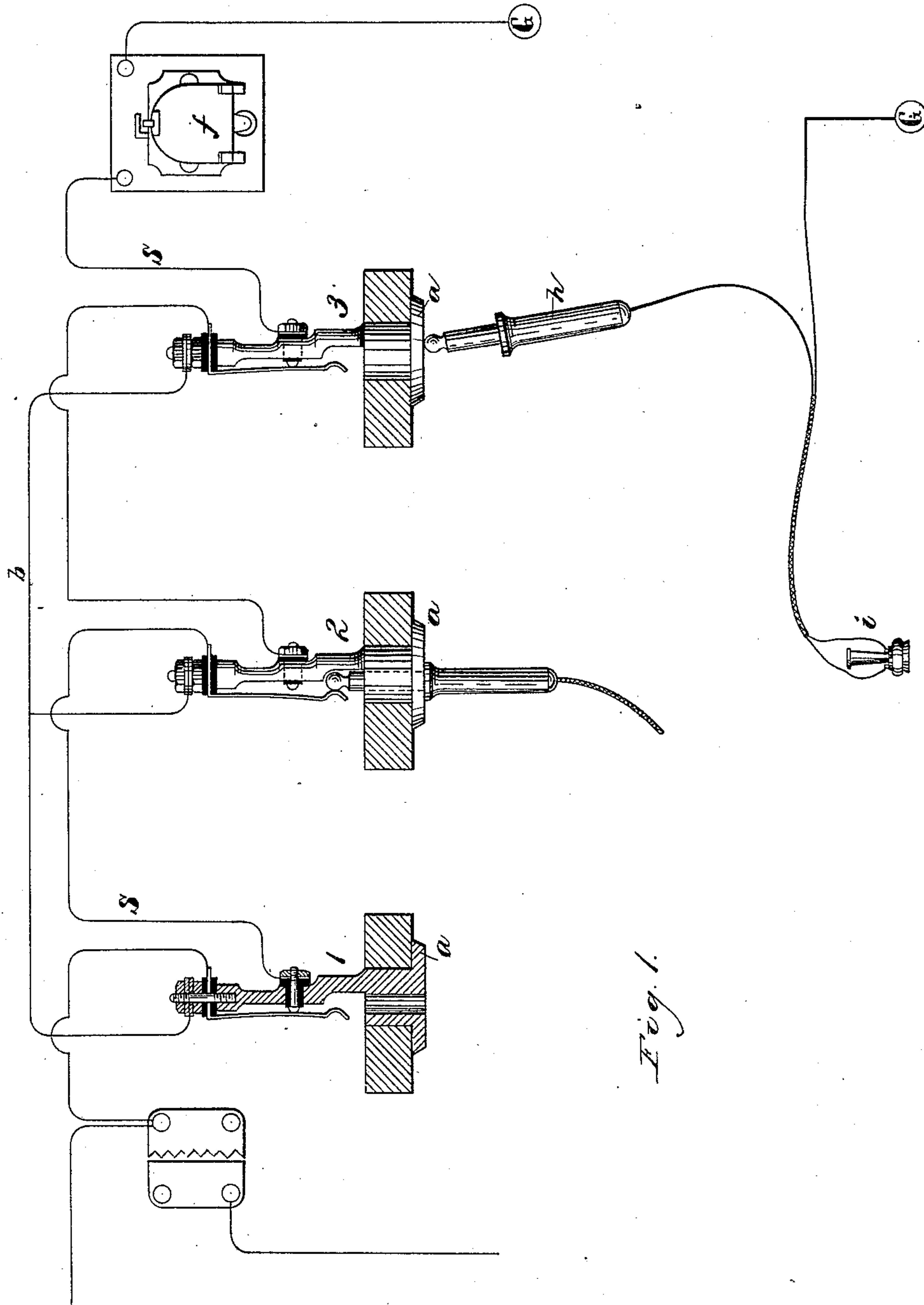


Fig. 1.

Witnesses.

Henry Frankfurter.  
Saml B. Doves.

Inventor.

Charles E. Scribner.  
per. George P. Barton  
Attorney.

(No Model.)

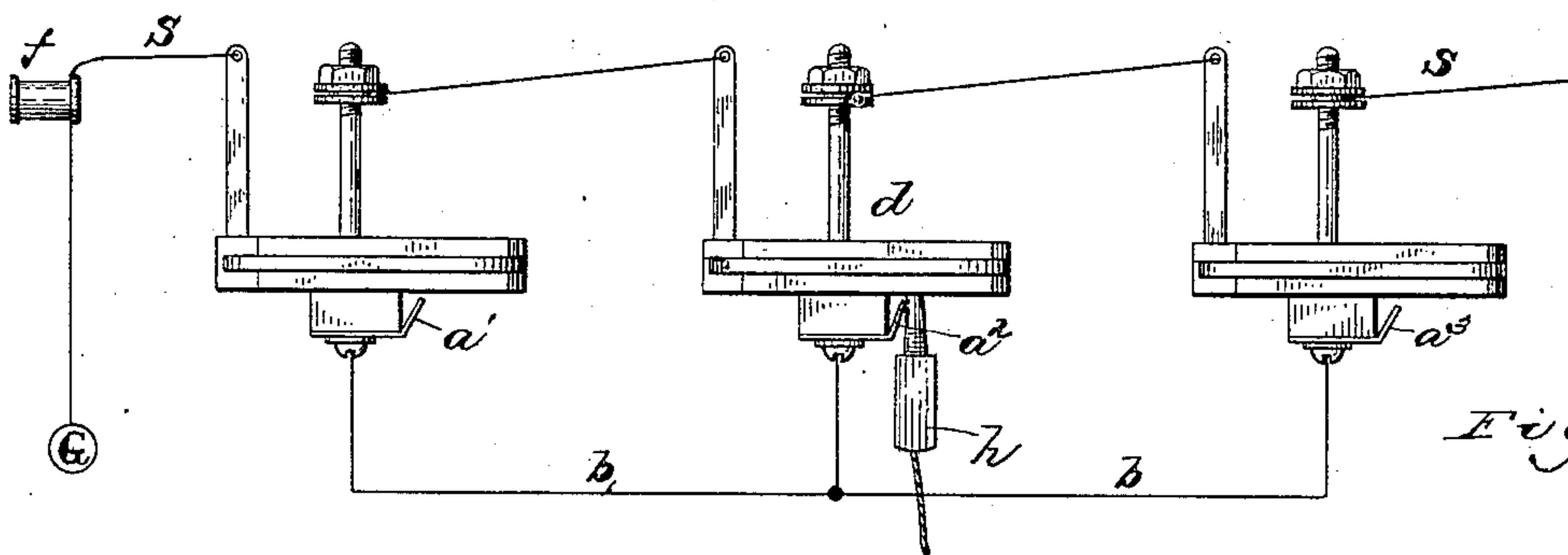
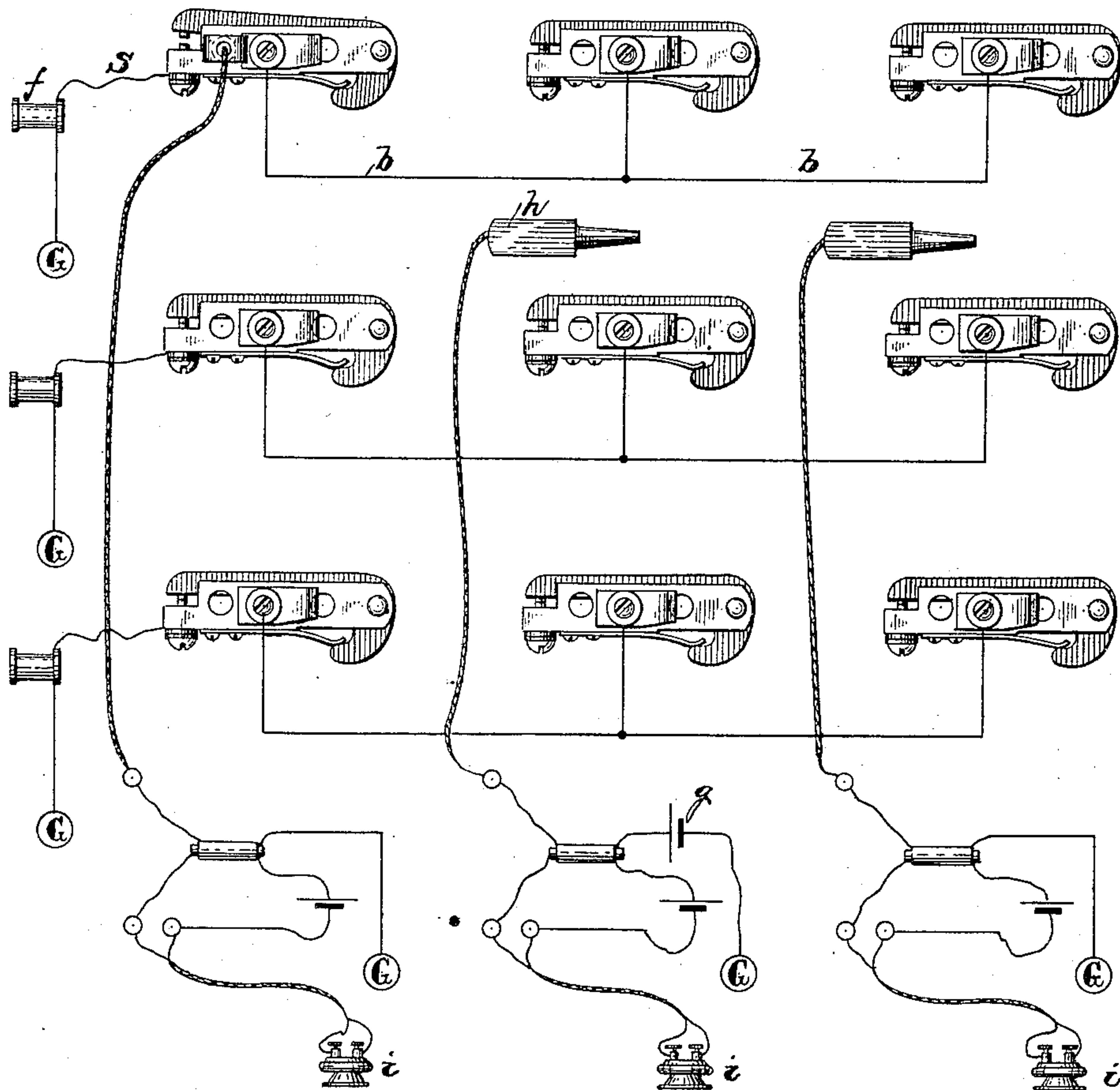
2 Sheets—Sheet 2.

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*Fig. 3.*



*Fig. 2.*

Witnesses.

Henry Frankforter.  
Sam. B. Doves.

Inventor.

Charles E. Scribner.  
per. Henry P. Barton  
Attorney.



# 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. 427,917, dated May 13, 1890.

Original application filed March 20, 1882, Serial No. 55,791. Divided and this application filed July 28, 1884. Serial No. 138,932.  
(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, (Case No. 86,) 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 test-circuits for multiple switch-boards of a telephone-exchange and apparatus for determining at one board whether a line called for is in use at any other of the boards.

Prior to my invention there were several systems of testing to determine whether a line called for at one multiple board was in use at any other of the boards. One system is described in my British patent, No. 4,903 of 1879.

My invention consists in normally-open test-circuits, one for each telephone-line, and means for crossing or connecting any given telephone-line with its test-circuit while the telephone-line is in use, as herein described and claimed. Each test-circuit is provided with a terminal on each of the boards. I preferably provide on each of the switches upon the switch-boards a metallic piece or part which is insulated from the other parts of the switch. These insulated metallic pieces serve as terminals for the test-circuits, and are so placed that when a connection is made with any switch the test terminal of said switch will at the same time be connected with the line of the switch, thus establishing a "cross" between the said line and its test-circuit. The terminals may, however, be distinct from the switches, and any other device may be used to establish a cross between the line and its test-circuit. At each of the multiple boards I provide a telephone in a circuit, which may be connected at will to any one of the terminals of the test-circuits. The switchman listening at the telephone is thus enabled to tell, as the circuit is closed and broken at a terminal, whether a cross exists between the line called for and its test-circuit. If there should be such a cross, he will hear sounds in his telephone, which will be a signal that the line

is in use. If no sound is heard while the circuit of the telephone is closed to the terminal of the test-circuit of a line, the switchman will know that the line is free. Any well-known apparatus may be used for receiving and answering the calls of the subscribers and connecting and disconnecting their lines.

My invention is illustrated in the accompanying drawings.

Figure 1 shows a single telephone-line and its test-circuits connected with the switches and terminals, respectively, on three multiple boards. In Fig. 2 I have shown a top view of three spring-jack switches, through which a telephone-line is connected and the test-circuit of said line connected with its different terminals, one terminal being on each switch. In Fig. 3 I have shown a front elevation of similar switches for three lines. Each of the switches of a given line is placed on a different board, and at each board I have shown a telephone included in a circuit and means for closing the circuit of the telephone at any given board at will to any one of the test-circuit terminals thereon.

As shown in Fig. 1, the telephone-line S is connected with three spring-jack switches 1, 2, and 3, each switch being on a different board. The frame *a* of each of these switches is insulated from both the line strip or lever and the ground-connection thereof. It will thus be seen that a given line has a spring-jack terminal on each of the multiple-boards and a test-circuit which connects with the insulated frame *a* of each of these spring-jacks. When a connection is made with a line at any one of the spring-jacks, a cross is established between the line and its test-circuit through the medium of the spring-jack. It is by testing for this cross that an operator at another board is enabled to determine whether the line is busy. This test is made by connecting the circuit of a telephone to the terminal *a* of the test-circuit of the line. I have shown a plug inserted in switch 2. The line S is thus cut off from ground and annunciator *f* and connected by the plug-point to the flexible cord. The metallic portion of the plug is also brought into contact with the frame *a* of the switch 2. This frame *a* forms one of the terminals of



the test-circuit  $b$ , and hence the cross is established, and all terminals  $a$  of the test-circuit are connected with the telephone-line  $S$ . At the last board I have shown a telephone  $i$  in a circuit connected to the terminal of the test-circuit upon said board by plug  $h$ . Enough current will thus be derived from the line  $S$  to pass through the telephone and indicate to the experienced listener that the cross is established, and hence that the line is in use at some other of the multiple boards.

In Fig. 2 the terminals  $a'$   $a^2$   $a^3$  of the test-circuit  $b$  consist of springs or plates insulated from the line and ground connections of the switches, as shown. At switch  $d$  of the second board I have shown a plug inserted which impinges against the terminal  $a^2$ , thus establishing the cross between the telephone-line and its test-circuit  $b$ .

In Fig. 3 I have shown at the second board a telephone included in circuit with battery  $g$ . By means of the plug  $h$  or any other suitable switching device the circuit of battery  $g$  may be closed at will to a terminal of any one of the test-circuits, and the switchman listening at the telephone will know whether a cross exists at any other board. If sounds are heard in the telephone, he will know that the line is in use, whether the sounds be from voice-currents, induction, or from other sources. Simple connecting-plates may be used instead of the spring-jack switches when the lines are not grounded at the central office.

This case is a division of my application,

Serial No. 55,791, filed March 20, 1882, upon which Letters Patent No. 305,021 were granted September 9, 1884, in which I have claimed the test-circuits for the different lines and a telephone and battery at each board in a normally-open circuit, as herein described, broadly. I disclaim, therefore, herein the use of the test-circuits and the telephone and battery in a circuit at each board, and limit myself to the method or apparatus herein described for testing without a battery in circuit with the telephone at each of the boards.

Having thus fully described my invention, I claim—

The combination, with the multiple switch-boards of a telephone-exchange, of test-circuits, one for each line, provided with a terminal on each of the multiple boards, switching apparatus for crossing any given telephone-line with its test-circuit, means for producing electric current upon said telephone-line, and a telephone in a normally-open circuit at one or more of the multiple boards, said normally-open circuit or circuits containing no source of electricity whereby a test may be made to determine whether any given line is in use at any of the boards.

In witness whereof I hereunto subscribe my name this 26th day of July, A. D. 1884.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE P. BARTON,  
HARRY O. STILLWELL.