

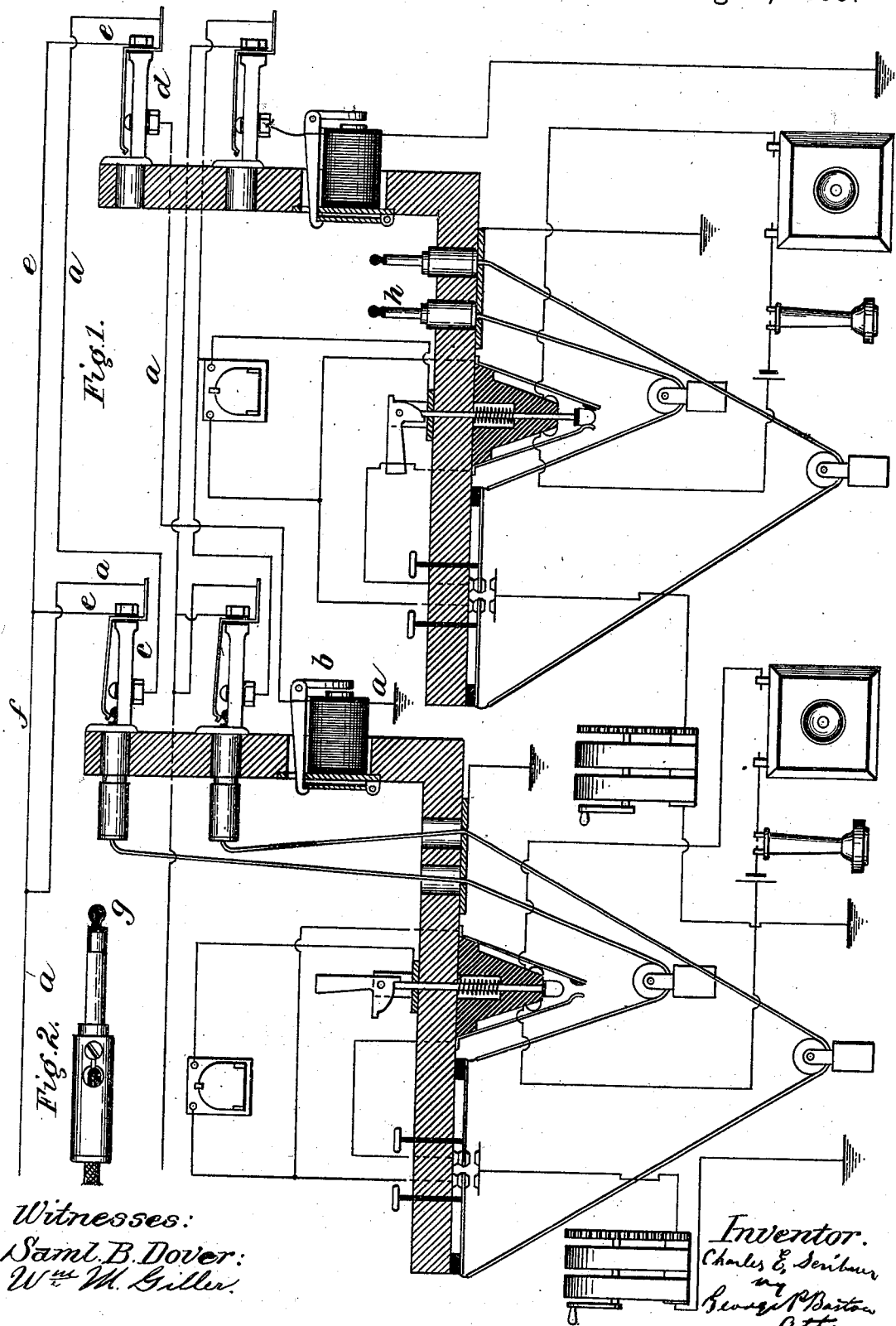
(No Model.)

C. E. SCRIBNER.

TEST CIRCUIT FOR MULTIPLE SWITCHBOARDS.

No. 502,768.

Patented Aug. 8, 1893.



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

Inventor.  
Charles E. Scribner  
by  
George P. Boston  
Att'y

# UNITED STATES PATENT OFFICE.

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

## TEST-CIRCUIT FOR MULTIPLE SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 502,768, dated August 8, 1893.

Application filed December 27, 1886. Serial No. 222,701. (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 Test-Circuits for Multiple-Switchboard Systems, (Case No. 123,) 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 board systems, and its object is to enable the operator at one board to determine whether a line called for is in use at any other board. The circuits are so arranged that connection may be made from any spring jack to line without including in the circuit the contact points of the different spring jack switches of the line.

My invention herein is an improvement upon the system of test circuits shown in my Patent No. 305,021, of September 9, 1884.

My invention consists in permanently connecting the test circuit of each line to its line and in providing switching apparatus whereby after connection is made with the insulated frame or portion of the spring jack, the connection of the branch of the line extending to the springs or levers of the spring jacks will be broken. This breaking of the branch of the circuit will cause a click in the telephone connected in circuit with a battery with the insulated frame. This click will be a signal that the line is free. If, however, a connection is already formed at any other of the spring jacks of the line, another break in the circuit will have no effect upon the current passing through the listening operator's telephone, and hearing no click he will know that the branch is broken and hence that the line is in use.

My invention may be applied to my system of circuits described in my said patent by simply making a connection between the frame of the switch on the first board and the telephone line and using a plug provided with an insulated point.

My invention will be readily understood by reference to the accompanying drawings, in which—

Figure 1 shows two telephone lines and their test circuits connected with spring jack switches upon two different multiple switch boards and the operator's outfit at each of the boards. Fig. 2 is a detailed view of the plug.

It will be observed that the circuit of line *a* may be traced through a switch on each of the boards and through an annunciator *b* to ground. The frames or insulated portions *c* *d* of the spring jacks of said line are connected together by wire *e* and a connection *f* is made between the frame *c* of the switch on the first board and the line *a*. It is this connection *f* that I have added to each circuit. The connecting plugs are provided with metallic shanks. Thus, as shown in Fig. 2, the cord connects with the metallic shank of the plug and the tip *g* is of hard rubber or other insulating material. When no plug is inserted in any switch of a line, a circuit may be traced from the frame of any one of the switches by branch *f* to the line and thence through all the switches of the line and the annunciator to ground. Thus, normally, when a line is not in use, a continuous circuit may be traced from the frame of any spring jack through the contacts of all the spring jacks of the line and the individual annunciator to ground. Circuit may also be traced by the line to the subscriber's station and to ground in the usual manner. It is, however, by determining whether the circuit from the frame of any given spring jack is continuous through all the spring jacks and to ground that the operator testing at the spring jack is enabled to determine whether the line is in use. If the circuit is continuous, he will know that the line is free. If broken, he will infer that the line is connected at some of the other spring jacks.

A telephone and battery may be looped in the circuit of each pair of cords by means of the loop key shown, or by any other suitable switch. When one plug of a pair is lifted and inserted in a spring jack, connection is made between the frame of the spring jack and the metallic shank of the plug, and then, as the plug is forced farther in, the rubber tip wedges the spring away from its contact point, thus breaking the circuit be-

tween the spring and said contact point. As, however, the wire *e* is connected to line, a circuit will be formed which may be traced from the ground at the subscriber's station  
 5 over the line in the usual manner, and thence, as shown, by branch *f* to the frame of the switch in which the plug is inserted, and thence to the shank of the plug and thence to the cord and thence through the pair of  
 10 cords and the telephone and battery included in circuit therewith, to the other plug of the pair, and when said plug is resting on its ground plate, from said plug to ground. When, however, the other plug of the pair is  
 15 inserted in any spring jack, the circuit will be traced to the line of the other spring jack and over said line to ground at the other subscriber's station.

We will suppose that the operator at the  
 20 second board wishes to test to determine whether line *a* is busy. He will take up one of his plugs—we will say plug *h*—and insert said plug in the switch of said line *a*. The shank of said plug *h* coming against the  
 25 frame *d* will first close the circuit of the cords to said frame and afterward, as the plug is inserted farther and the spring is lifted, a break will be made between said spring and its contact point. Now, when said break is  
 30 made, if no other break exists in the line, the operator listening at his telephone included in the circuit, will hear a click. If, however, the portion of the circuit including the spring jacks of the line is broken at any  
 35 other of the spring jacks of the line, another break will cause no variation in the strength of the current passing through the telephone and hence there will be no click, and the operator will know that the line is busy.

40 When an operator plugs into the spring-jack of a line called for, the metallic shank will, in all cases, come in contact with the metallic frame or tube of the springjack, and upon the making of this contact a click will  
 45 be heard in the operator's telephone. This click will be heard, no matter whether the line be in use or free. The plug, however, on being inserted farther, lifts the spring of the springjack from its contact, thus breaking  
 50 the circuit of the portion of the line which connects through the springs of the spring-jacks and the annunciator of the line to ground. This break will produce another click in the operator's telephone if the line be  
 55 not in use, as it will open a ground circuit connected with the operator's telephone. If, however, the line be in use, this ground circuit will have been already opened at the springjack on another board where the connection has been made. Therefore there will  
 60 be no second click in the telephone if the line is busy; that is to say, two clicks in succession indicate that the line is free; one click only heard in the telephone indicates that the  
 65 line is busy.

Having thus described my invention, I

claim as new and desire to secure by Letters Patent—

1. In a multiple switch board system of telephone exchange, a telephone line permanently connected with the insulated frames  
 70 of spring jack switches, one on each of the boards, and the circuit from said line through the contacts of all of said spring jacks to ground at the central office, in combination  
 75 with a telephone and test battery included in a normally open ground circuit, switching apparatus for first closing said circuit to the frame of a spring jack and then opening the  
 80 portion of the circuit including the springs of the switches; whereby it may be determined whether the line is in use or connected at any of the other boards.

2. In a multiple switch board system, the combination of spring jack switches, one  
 85 switch on each of the multiple boards, connections from the subscriber's line to the frame of each spring jack switch, a branch circuit through the springs and contact points of the jacks to ground, the operator's tele-  
 90 phone circuit including battery and switching apparatus for connecting the telephone circuit to the line and breaking the branch circuit to ground; whereby the operator can determine whether a line has been previously  
 95 connected at any other board.

3. In a multiple switchboard system the combination with telephone lines each extending to all the switchboards, of springjack  
 100 switches, one switch on each of the multiple boards for each of the telephone lines, connections from each subscriber's line to the frame of the springjack switches of the line, a branch circuit through the springs and contact points of the springjack switches of each  
 105 line to ground, the operator's telephone circuit including battery at each of the boards and a plug and its cord connected with a telephone at each board, the plugs being provided with a tip of insulating material and a  
 110 metallic shank whereby, on inserting the plug in any switch upon either of the boards, the operator listening at the telephone may determine whether or not the line of the springjack with which connection is made is  
 115 in use.

4. A line connected with two or more switches on different boards, a branch of the line being connected with normally open contact pieces of the springjack, another branch  
 120 of the line being connected through the circuit closing portion of each springjack to ground, a test plug connected to a telephone and test battery to ground, said test plug being constructed to first make contact with  
 125 the normally open contact piece of the springjack and immediately thereafter to break the circuit of the branch to ground; whereby the operator may determine on inserting a plug into any springjack switch of a line whether  
 130 the line is or is not in use.

5. A telephone line branched to two por-

tions of several springjacks, one branch connecting with the frames of the several springjacks, the other branch connecting through the circuit closing springs of said springjacks and to ground, a test plug connecting with a telephone and battery to ground, the said test plug being provided with a metallic shank to make contact with the frame of the springjack, and a tip of insulating material to lift the circuit closing spring of the springjack; whereby an operator may determine whether the branch circuit through the springjacks to ground is completed, to tell whether a line is in use.

15 6. A telephone line extending from a subscriber's station to a central office, said line extending in one branch to the insulated frames or test pieces of springjack switches,

one on each of the boards, and another branch of said line extending through the spring and contact of said switches to ground, in combination with a test plug connecting with a telephone and battery to ground, said plug being provided with a metallic portion, and a portion of insulating material; whereby, on inserting the plug in any springjack of the line, the operator listening at the telephone may determine whether the line is connected or in use at any other of the boards.

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.