

(No Model.)

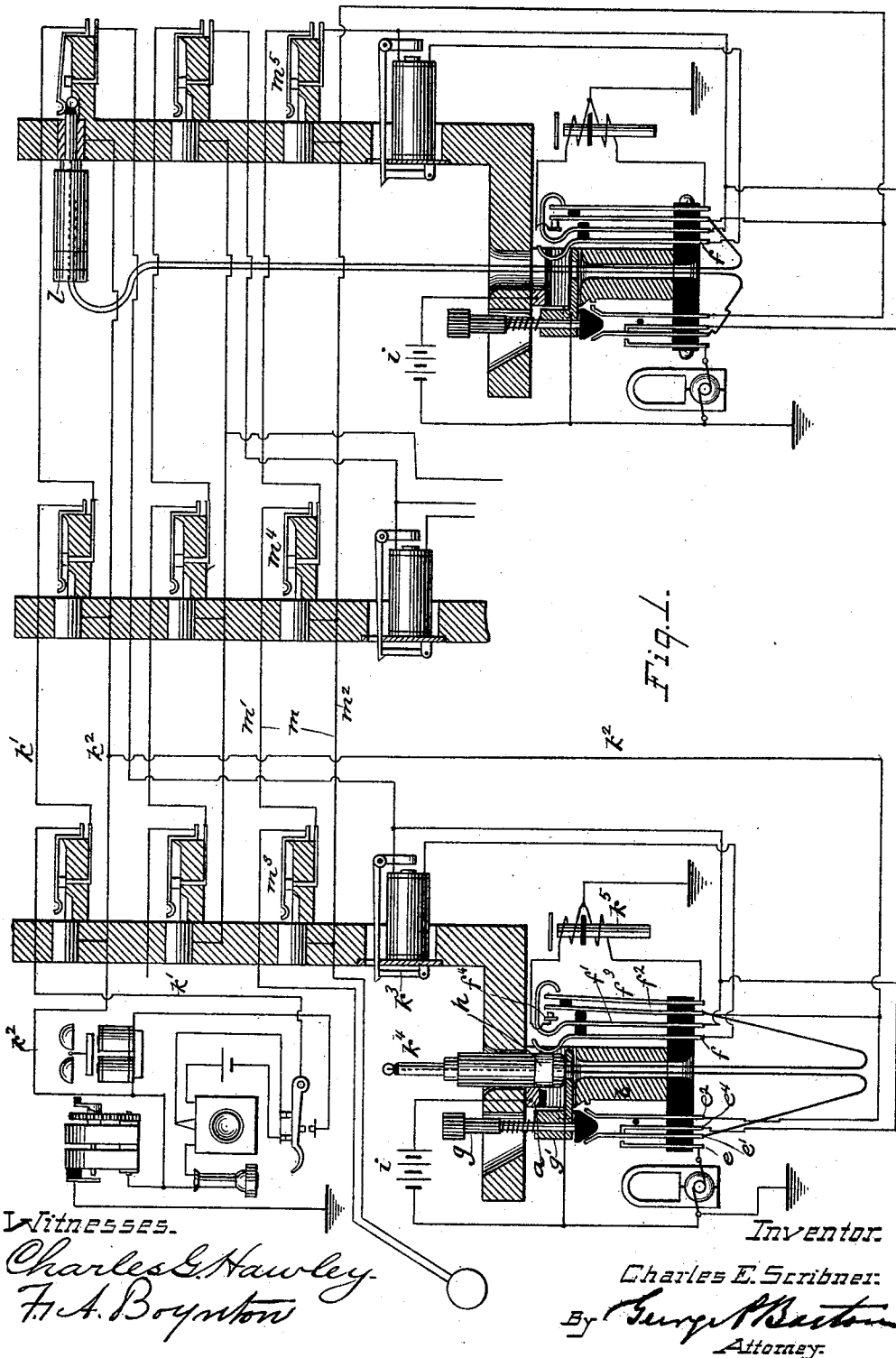
C. E. SCRIBNER.

2 Sheets—Sheet 1.

MULTIPLE SWITCHBOARD TESTING APPARATUS.

No. 496,906.

Patented May 9, 1893.



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2 Sheets—Sheet 2.

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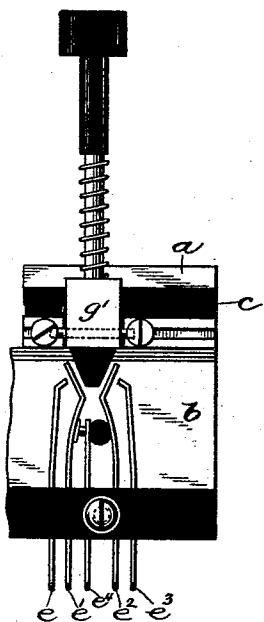


Fig. 2.

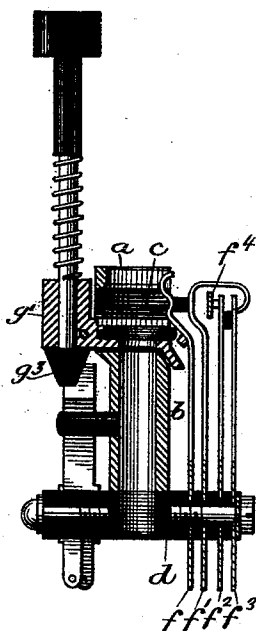


Fig. 3.

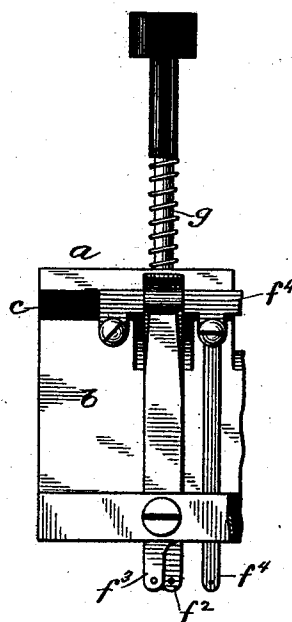


Fig. 4.

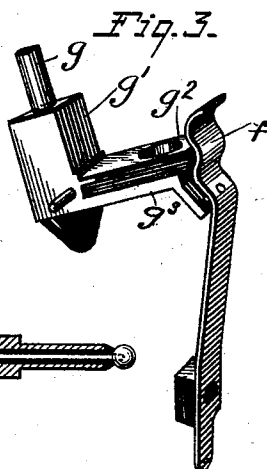


Fig. 5.



Fig. 6.

Witnesses.

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UNITED STATES PATENT OFFICE.

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MULTIPLE-SWITCHBOARD TESTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 496,906, dated May 9, 1893.

Application filed March 1, 1890. Serial No. 342,277. (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-Switchboard Testing Apparatus, (Case No. 222,) 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 switching apparatus designed more especially for use at the switch boards of a telephone exchange having metallic circuits connected with multiple switch boards; the special switching apparatus consisting of the means for changing the circuits of a telephone line at the central office may be appropriately termed the cord switch.

The cord switch herein shown possesses certain novel features which constitute the principal part of my invention herein.

In my application, Serial No. 339,597, filed February 7, 1890, (Case No. 225,) for multiple switch board apparatus, I have described and claimed a cord switch in which certain of the functions performed by my cord switch herein are accomplished. I therefore limit this patent to specific combinations set forth in the claims.

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

Figure 1 is a diagram showing three metallic circuits connected with three multiple switch boards at the central office, together with the cord switches of two of the lines, one at the first board, and the other at the last board, the subscriber's outfit being shown in detail at one station. Fig. 2 is a front elevation of the cord switch. Fig. 3 is a side elevation thereof. Fig. 4 is a rear elevation of the same. Fig. 5 is a detailed elevation showing the manner of tilting the plunger to throw on a ground branch containing the annunciator when the plug is lifted from the socket. Fig. 6 is a detailed sectional view of the terminal loop plug of a line.

Like parts are indicated by similar letters

and numerals of reference throughout the different figures.

It will be understood that the telephone lines are distributed or grouped at the different boards so that the work may be properly distributed. Thus suppose there were a thousand lines in the exchange and five multiple switch boards, or a multiple switch board having five duplicate sections; two hundred of these lines would be assigned to each board, and hence there would be two hundred cord switches at each board, one for each line terminating thereat. These cord switches are conveniently built up in strips. Thus the metallic or brass portions *a* and *b* of the frame of a strip may be insulated from one another by a strip of rubber *c*; the base *d* of this frame may be of insulating material and is of sufficient width to support the springs and contacts of the different cord switches on the different sides of the frame; that is to say the springs *e e' e² e³* and contact *e⁴*, are supported upon one side of this base, while the springs *f f' f² f³* and the contact *f⁴* are supported upon the other side thereof. It will be observed that the plunger *g* is mounted upon a pivoted metallic guide *g'*, this guide being pivoted to the metallic portion *b* of the frame; this metallic guide is provided with an arm consisting of two parts, one portion *g²* of the arm being preferably of insulating material or some substance that will have little friction with the metallic spring *f* when brought against the same, the other portion *g³* thereof being of metal and adapted to be brought into electrical connection with the spring *f* when the guide is tilted; it matters not in which position the guide *g'* may have been placed. Whenever the plunger is forced down the head thereof being forced between the free ends of springs *e' e²* said springs will be spread farther apart, the spring *e'* being disconnected from contact *e⁴* and closed to spring *e* while spring *e²* is at the same time and by the same movement closed upon contact spring *e³*. This contact spring *e³* in the particular system described herein has no function except to act as a yielding stop for the spring *e²*. In Fig. 1, I have not shown said spring *e³*.

The frame is provided with a socket and cord hole for each of the cord switches; the loop plugs are provided with rings or metallic pieces *h* entirely insulated from the strands of the cord and from the tip and sleeve thereof; this ring *h* when the plug is inserted in its socket comes against the spring *f* and against the upper metallic portion *a* only of the frame. Now it will be observed that when my cord switch is used in connection with the circuits shown in Fig. 1 this portion *a* is connected through a test battery *i* to ground while the portion *b* of this frame is connected directly to ground. Therefore when the plug of a cord switch is resting in its socket the spring *f* thereof will be connected through the medium of the ring or metallic piece *h* of the plug to the strip or metallic portion *a* of the frame and thence through the battery *i* to ground. When the plug is lifted from its socket this spring *f* will be disconnected from the battery and also from the ground; when, however, the contact arm *g*³ is brought against the spring *f* said spring *f* will be connected to the ground through the medium of said arm *g*³ and the portion *b* of the frame.

I will now describe my invention in connection with the circuits shown in Fig. 1. The telephone line *k* extends in two branches *k'* *k*² from station 1 to the central office, the limb *k'* passing through the springs and contacts of the switches of the line and from the contact of the switch on the last board to the tip of the terminal plug of the line; a branch extends as shown through the individual annunciator *k*³ and thence to spring *f* of the switch on the first board, and thence when the plug *k*⁴ is in its socket as shown the circuit may be traced through the ring *h* to metallic piece *a* of the frame and thence through test battery *i* to ground. The subscriber at station 1 in order to call up the central office simply turns the generator, the generator being included in a normally open ground branch which branch is automatically closed when the generator is turned, and the telephone at the station being on the automatic telephone switch the circuit formed will be from the ground branch through the generator and bell at station 1 and thence over limb *k'* as traced through the annunciator *k*³; the annunciator *k*³ will thus be thrown down and the subscriber having taken down his telephone will be looped into the circuit. The operator at board 1 seeing the shutter of annunciator *k*³ fall raises the plug *k*⁴, thus bringing her telephone *k*⁵ into circuit at the same time taking off the connection of spring *f* with the test battery *i* and ground. The operator's telephone *k*⁵ and the subscriber's telephone are thus looped together in metallic circuit; the operator while holding plug *k*⁴ receives the order for the connection desired. We will assume in the first instance that the plug *l* at board 3 is resting in its socket and that the line called for is line *m*; this line *m* we will consider as consisting of two limbs

m' *m*² corresponding in circuit respectively to limbs *k'* *k*² of line *k*. The test is made by touching the tip of plug *k*⁴ to the test ring of switch *m*³; now if battery circuit is thus formed through half the winding of telephone *k*⁵ a click will be heard in the telephone which will be notice that the line tested is free; if no click is heard it will be notice that the line is busy.

I will now trace the circuit. Beginning at ground at board 1 the circuit may be traced from ground through the telephone to spring *f*³ and the plug being removed, thence to spring *f'* and thence to contact *e*⁴ and thence to spring *e'* and thence to the strand of the cord connecting with the tip of plug *k*⁴, from the tip of said plug to the frame of switch *m*³ and thence over branch or limb *m*² through the subscriber's station thereon and thence back over limb *m'* to spring *f* of the cord switch at board 3 and thence through the medium of the ring or plug *l*, which plug is assumed to be in its socket, to the battery *i* and ground; thus when the plug *l* is resting in its socket battery circuit will be formed through the telephone *k*⁵ when the test is made. If, however, the plug *l* is removed from its socket this circuit would be open at plate *a* of the cord switch at board 3; moreover, if a plug had been inserted in any switch of line *m*, as for example switch *m*⁴ or *m*⁵, it is evident that the limb *m'* would be open to the battery *i* at the switch where the plug was inserted and hence there would be no battery closed through telephone *k*⁵.

It will be observed that the generator at the subscriber's station is normally in an open ground branch, this branch being automatically closed to the limb of the circuit passing through the springs and contacts of the switches and including the individual annunciator of the line whenever the generator is operated. The generator can never be looped into the metallic circuit and hence no automatic shunt around the same is required.

When the plunger of the cord switch of any line is depressed the operator's calling generator is looped into the circuit with the bell at the subscriber's station thereon. After the operator has completed the connection between the two lines she brings the plunger of the switch of the calling subscriber forward to the position shown in Fig. 5. In this position the branch containing the calling subscriber's individual annunciator is closed to ground while at the same time the operator's telephone is disconnected.

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

1. The cord switch having the two insulated portions of the frame *a* and *b*, the portion *a* being connected to ground through battery and the portion *b* being connected directly to ground and the spring *f*, in combination with the metallic piece adapted to be inserted in the socket of the switch to form

a medium of connection between said spring and the battery, substantially as described.

2. A series or strip of cord switches having a common frame, the frame having two insulated metallic pieces *a* and *b* and a base of insulating material projecting on opposite sides the frame upon which base the sets of springs of the different switches are mounted, said frame being provided with a different socket and opening for each switch, substantially as and for the purpose specified.

3. In a telephone exchange system, the combination with a telephone line provided with a terminal loop plug at the central office, and a branch at the central office containing an annunciator, of the spring jack switch of a corresponding telephone line into which the loop plug is adapted to be inserted, a cord switch having a socket for said plug, and contacts operated by the lifting of the plug from its socket to bring the operator's telephone into the circuit of the line, and a pivoted arm or lever adapted to be tilted to disconnect the telephone and at the same time close directly to ground the branch from the telephone line which contains the annunciator thereof, substantially as and for the purpose specified.

4. A metallic circuit extending from a subscriber's station through switches on different switch boards at the central office, one of said branch circuits being normally connected through a branch containing an individual annunciator to ground at the central office and the other branch thereof being normally open at the central office, in combination with a generator included in a normally open ground branch at the subscriber's station, the grounded branch at the central office which includes the individual annunciator including also the metallic portion *h* of the terminal plug of the line, said metallic portion *h* being insulated from the cord contacts on the plug,

and means for closing said ground branch, whereby a ground circuit may be formed between the subscriber's station and the central office including the subscriber's generator and the individual annunciator, substantially as and for the purpose specified.

5. A telephone line connected in metallic circuit with multiple switch boards, the two branches or limbs of said line extending by the strands of the flexible cord to the terminals of a loop plug, a cord switch and a branch containing the individual annunciator of the line connected through the medium of a metallic piece or portion of said plug to the metallic piece *a* of a strip of cord switches, said strip being connected to ground through a battery, in combination with the spring jack switch of another telephone line into which the loop plug is adapted to be inserted, whereby the two lines may be connected together while the battery is disconnected therefrom on lifting the loop plug from its socket to make connection with the other line.

6. A telephone line extending from a subscriber's station in metallic circuit to switches at the central office on different switch boards, a branch from one of the limbs of said metallic circuit to a spring *f* of a switch, said switch having two insulated metallic portions *a* and *b*, the portion *a* being connected through a battery to ground and the portion *b* being connected directly to ground, in combination with means for electrically connecting said spring at the will of the operator with either said portion *a* or said portion *b* of the switch, substantially as and for the purpose specified.

In witness whereof I hereunto subscribe my name this 8th day of February, A. D. 1890.

CHARLES E. SCRIBNER.

Witnesses:

C. G. HAWLEY,
ELLA EDLER.