

No. 632,067.

Patented Aug. 29, 1899.

C. E. SCRIBNER.  
MULTIPLE SWITCHBOARD SYSTEM.

(Application filed Nov. 14, 1891. Renewed Nov. 16, 1896.)

(No Model.)

2 Sheets—Sheet 1.

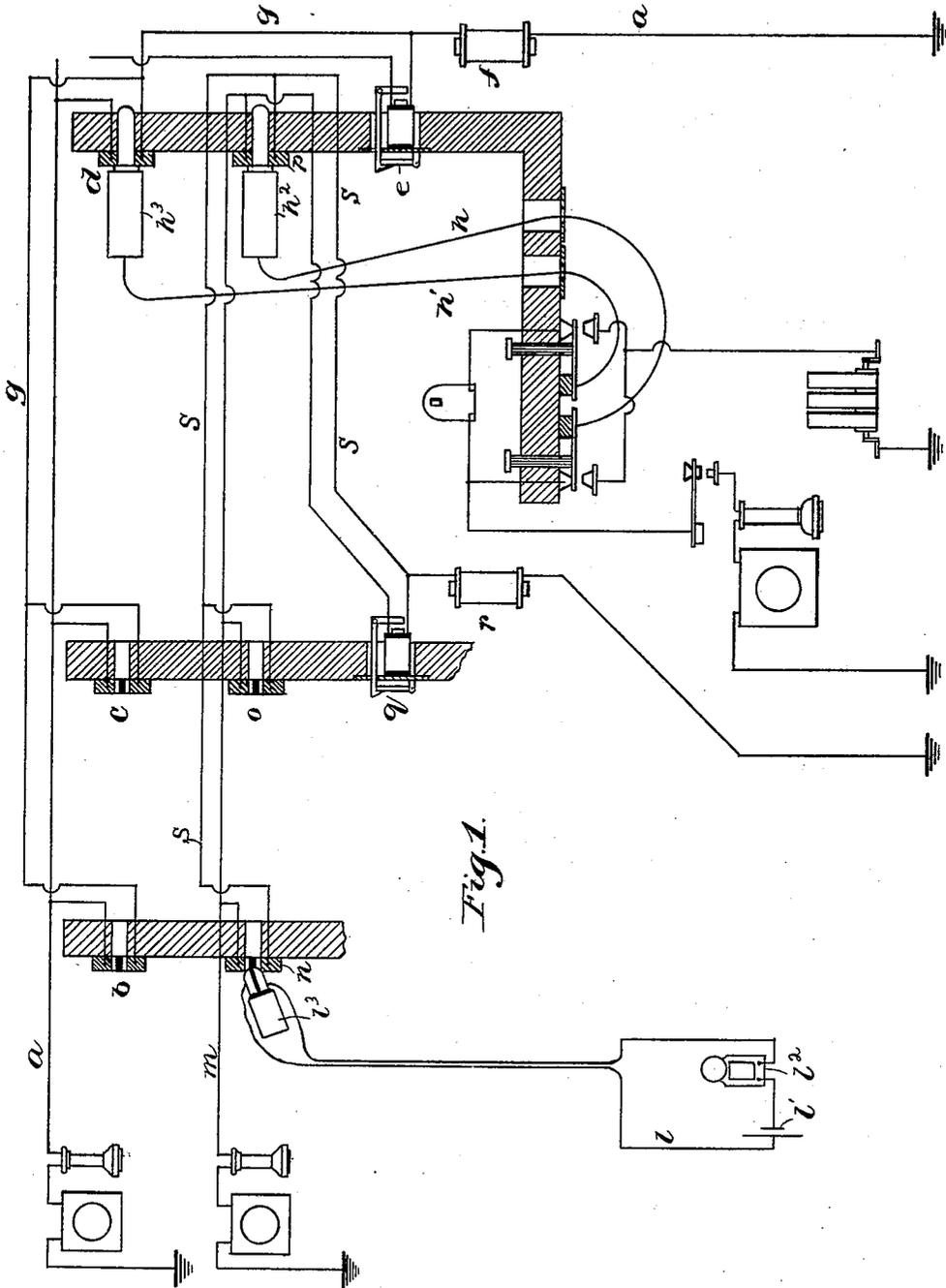


Fig. 1.

Witnesses:  
George L. Cragg.  
Frank R. McBerty.

Inventor  
Charles E. Scribner.  
by Barton & Brown  
Attys.

No. 632,067.

Patented Aug. 29, 1899.

C. E. SCRIBNER.

MULTIPLE SWITCHBOARD SYSTEM.

(Application filed Nov. 14, 1891. Renewed Nov. 16, 1896.)

(No Model.)

2 Sheets—Sheet 2.

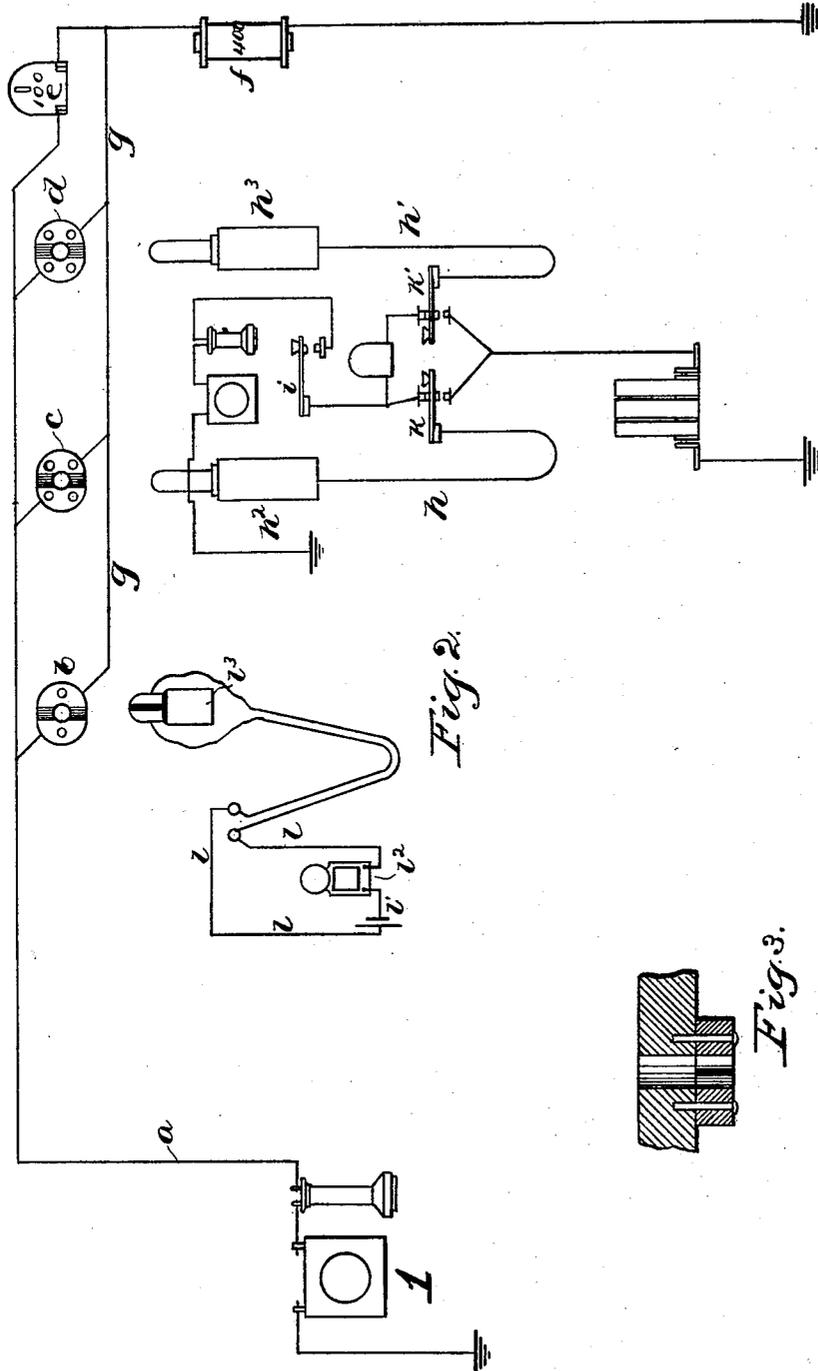


Fig. 2.

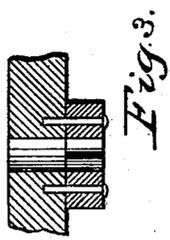


Fig. 3.

Witnesses:

George L. Cragg.  
Frank R. McHenry.

Inventor:  
Charles E. Scribner  
by Barton & Brown  
Attys.

# UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS.

## MULTIPLE-SWITCHBOARD SYSTEM.

SPECIFICATION forming part of Letters Patent No. 632,067, dated August 29, 1899.

Application filed November 14, 1891. Renewed November 16, 1896. Serial No. 612,383. (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 Systems, (Case No. 174,) 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.

Heretofore it has been common to provide in telephone-exchange systems several terminals for each telephone-line in order that the terminals may be distributed in such manner as to afford room for a sufficient number of operators to do the work of connecting and disconnecting the lines as directed by the subscribers.

In Letters Patent No. 252,576, granted Leroy B. Firman January 17, 1882, is described and claimed two or more switchboards at the central office of a telephone-exchange system to each of which the same telephone-lines are connected, whereby any two of these lines may be connected together upon either of the multiple switchboards.

In my Patent No. 266,320, dated October 24, 1882, I have described and claimed means for determining at one switchboard whether a line wanted or called for is in use or connected at any other of the boards.

In my Patent No. 321,057, granted June 30, 1885, I have described and claimed multiple switchboards each provided with a single switch for each subscriber, the switches of each subscriber on the different boards being connected together and the switch of the last board being connected with the ground.

In my Patent No. 315,021, granted September 9, 1884, I have described and claimed the combination with telephone-lines of test-circuits (one test-circuit for each line) and switching apparatus whereby any test-circuit may be crossed or connected with its line, thereby protecting a line thus crossed from interruption.

Many variations and modifications of these inventions have been used and patented.

In my invention herein instead of using a single metallic socket or a spring-jack switch in case of grounded lines, as has been usual heretofore, I use for each terminal a socket

consisting of two insulated portions. Each line extends from ground to one portion of each of these terminals and passes thence through an annunciator of, say, one hundred ohms resistance and thence through a retardation-coil to ground. Between the retardation-coil and annunciator of each line is provided a branch connection which extends to the other side of each of the terminals of the line. The apparatus for connecting the lines consists of pairs of flexible cords provided with terminal plugs. A plug being inserted in any line-terminal electrically connects the two portions of the terminal through the medium of the plug, thus shunting out the resistance of the individual annunciator of the line. Thus normally there is a bridge or cross connection between the wire and the return-circuit of a telephone-line, including serially the annunciator of the line and a retardation or a resistance coil. When connection is made with the line, by inserting a plug in a socket of the line a path is closed from the line through the registering contact-pieces of the socket and the plug in the socket to the bridge at a point intermediate of the annunciator and impedance-coil, so that while a shunt or short circuit is formed for signaling currents about the annunciator the impedance-coil remains in a permanently-closed bridge of the line-circuit. This novel method of preventing the operation of the line-annunciator of a line by signaling-current sent subsequently to the establishment of connection with the line, which consists in shunting the signaling-current from the annunciator by means of a by-path completed in the socket, the bridge of the circuit remaining permanently closed, constitutes an important feature of the present invention. This feature may of course be applied either in single switchboards or in multiple switchboards. In either case the usual clearing-out annunciator and operator's listening-key are connected with the circuit of the plugs to afford other means by which connected subscribers may signal to the attendant. When this device is associated with lines in multiple switchboards, in which a socket of the line appears in each section of the switchboard, the like contact-pieces of the sockets are connected together by conductors, the circuit

formed for shunting the annunciator being the same as before. It becomes necessary in such a case, however, to provide means at one section of the switchboard whereby an operator there may test a line to determine whether it be already in use through a connection at another section of the switchboard. The means arranged for shunting the annunciator serves also in the organization of a new test system, which constitutes a second feature of the present invention. To this end I provide apparatus by means of which I am enabled to determine whether or not the resistance of the individual annunciator is shunted out of the circuit. This testing apparatus consists, preferably, in a circuit containing a battery and buzzer proportioned with respect to electromotive force and ampere-windings, respectively, so that the buzzer will not respond when connected with the circuit of a line so as to include the resistance of the individual annunciator, but so that the bell or buzzer will respond when the resistance of the annunciator is shunted or removed from the circuit.

In the drawings which are illustrative of my invention, Figure 1 is a diagram showing two telephone-lines each connected with three different terminals distributed on different switchboards and through an annunciator and a retardation-coil to ground with the keyboard apparatus at the last board and the testing apparatus at the first board in position to test one of the lines. Fig. 2 is a diagram illustrative of the circuits of one telephone-line and the keyboard apparatus and testing apparatus more in detail. Fig. 3 is a detailed view of the preferable form of my terminal.

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

In Fig. 2 the telephone-line *a* is shown passing from ground at subscriber's station *l* to the central office, where it is connected with one side of three different terminals *b c d*, and thence through an annunciator *e* of, say, one hundred ohms resistance, and thence through a retardation-coil *f* of, say, four hundred ohms resistance to ground. Between the annunciator *e* and the retardation-coil *f* is provided a branch circuit *g*, which extends to the other sides of said terminals *d c b*. The switchman's apparatus consists of a pair of cords *h h'*, provided with ordinary terminal plugs *h<sup>2</sup> h<sup>3</sup>* with a clearing-out annunciator included in circuit therewith. By means of a key *i* the telephone may be branched onto the circuit of said cords. The usual calling-keys *k k'* are also shown. The testing apparatus consists of a circuit *l*, containing a battery *l'* of moderate size, and a buzzer *l<sup>2</sup>*, its coil being provided with a few windings of coarse wire. The circuit *l* is connected by means of the strands of a flexible cord with different terminals of the test-plug *l<sup>3</sup>*.

As shown more clearly in Fig. 3, it will be seen that the terminal which I preferably use

consists simply of a divided tube or ring, the different halves of the tube being insulated. When a connecting-plug is inserted in any socket—as, for example, in socket *d*—the two halves of the ring will be connected together, and thus the annunciator *e* will be shunted out of circuit. I make no provision for disconnecting the line from ground since the retardation-coil *f* of each circuit is of sufficient resistance to enable two subscribers to successfully talk with one another when their lines are connected together by a pair of cords and terminal plugs, or in any other suitable manner between any two terminals of the two lines.

Assuming that line *a* is free at each of the sockets *b c d*, and suppose test-plug *l<sup>3</sup>* is inserted in socket *b*, it being understood that one terminal of plug *l<sup>3</sup>* comes against one portion or side of the socket, while the other terminal of said plug comes against the other portion of the socket. Battery *l'* and buzzer *l<sup>2</sup>* will thus be short-circuited by branch *g* through annunciator *e* and thence back to terminal *b*. The resistance of annunciator *e* being, say, one hundred ohms, the buzzer *l<sup>2</sup>* will not respond and the operator will know that the line is free. Suppose a plug were inserted, say, in switch *d* when the test were made, the circuit of battery *l'* through the buzzer *l<sup>2</sup>* would then pass from one side of socket *b* over branch *g* as far as socket *d* and thence through the medium of the plug inserted in socket *d* to line *a*, and thence back to the other side of the socket *b*, thus finding a circuit without substantial resistance. In this case the buzzer *l<sup>2</sup>* will respond and the operator will know that the line is in use.

The line *a* is shown in Fig. 1 connected, as heretofore described, with sockets *b c d*, annunciator *e*, and retardation-coil *f*. The branch *g* extends also to the other sides of the sockets *d c b* from a point on the line *a* between the annunciator *e* and the retardation-coil *f*. Line *m* is shown connected in a similar manner with one side of each of the sockets *n o p* and thence through an annunciator *q* and a retardation-coil *r*, also of, say, four hundred ohms resistance, to ground. The branch *s* extends from a point between the annunciator *q* and retardation-coil *r* to the other sides of switches *n o p*. Lines *a* and *m* are shown connected together through the cords *h h'*, the terminal plugs *h<sup>2</sup> h<sup>3</sup>* being inserted in spring-jack switches *p d* upon the last board, as shown. The annunciators *q e* of the lines are thus each shunted out of circuit, annunciator *q* by the plug *h<sup>2</sup>* and annunciator *e* by the plug *h<sup>3</sup>*. At switch *n* the plug *l<sup>3</sup>* is shown inserted so as to loop the battery *l'* and buzzer *l<sup>2</sup>* into the circuit formed by the branch *s* and the portion of the line *m* between the socket *n* and the socket *p*. As the resistance of annunciator *q* is shunted out of circuit the buzzer *l<sup>2</sup>* will respond. If plug *h<sup>2</sup>* were removed, the resistance of annunciator would be brought into circuit and

the buzzer <sup>l2</sup> would not respond when test-plug <sup>l3</sup> should be applied to switch *n*, as shown.

My invention admits of various modifications which would readily suggest themselves to those skilled in the art. I therefore do not limit myself to the constructions shown.

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

10 Patent—

1. A telephone-line extending from ground at a subscriber's station to the central office, two or more multiple switchboards at the central office and a divided terminal or ring on each board, the telephone-line being connected with one side or portion of each of said terminals, and thence through an annunciator and a retardation-coil to ground, in combination with a wire branched from said line between the retardation-coil and annunciator to the opposite side of each of said terminals and a plug or connecting device, which, on being inserted in any socket of the line, forms connection therewith, and, at the same time, shunts out the annunciator, substantially as and for the purpose specified.

2. The combination with a battery and electromagnetic-indicating device included in the same circuit, of a telephone-line connected with one side of each of two or more double or divided terminals, and through an annunciator and thence by a branch to the other side of each of said terminals; whereby, on connecting the different terminals of the circuit containing the battery and indicating device with different sides of any one of the terminals or sockets of the line, the resistance of the annunciator is brought into circuit thereby preventing the electromagnetic-indicating device from responding, substantially as and for the purpose specified.

3. The combination, with a circuit connecting in two branches with different corresponding opposite parts or sides of two or more terminals or sockets, of an electromagnet included in the said circuit between the said terminals, a connecting device or plug for insertion in a terminal to connect the sides thereof together and shunt out the resistance of the electromagnet, and a testing device consisting of a battery and responsive-signal device in a local circuit having its terminals adapted to be connected with the different opposite parts of one of the circuit-terminals.

4. The combination, with telephone-lines of two or more switchboards, sockets or switch terminals, one socket or terminal for each line on each board, said sockets being divided or in two parts, and one branch of a given

line being connected with one side of the sockets thereof, and the other branch of the same line with the other sides of the sockets thereof, and annunciators for the different lines, the annunciator for each line being included between the sides or parts of the socket of its line, and means for connecting the different parts of any socket together, substantially as and for the purpose specified.

5. The combination, with a telephone-line, of two-part circuits or terminals therefor, on different switchboards, corresponding sides or parts of the different terminals being connected together in series, an annunciator included in the circuit of the line between the two series of opposite terminals, and a connecting device of lower resistance than that of the annunciator, whereby on connecting the two parts of any terminal together, current sent over the line will be diverted from the annunciator, substantially as and for the purpose specified.

6. The combination, with a telephone-line extending from earth at a substation to earth at a central station, line-terminals at the central station connected together in parallel and an indicating device and a retardation-coil included in the line, of circuits and contact-pieces adapted to short-circuit the indicating device when a connection is made to line, substantially as specified.

7. The combination with a telephone-line extending from a substation to a central station, of line-terminals at the central station upon different switchboards connected to the line, an electric indicating device and a self-induction coil normally in circuit with said line, contact-pieces and circuit connections adapted to short-circuit the indicating device and to leave the self-induction coil in circuit with said line when connection is made to a line-terminal; substantially as described.

8. The combination with a telephone-line, a socket therefor and a plug in the socket, of a permanently-closed bridge of the line comprising a portion divided into parallel branches, an impedance-coil in the undivided portion, a signal-indicator in one of the branches and registering switch-contacts in the socket closed together through the agency of the plug completing the other branch, whereby the signal-indicator is shunted while the impedance-coil is left in the circuit.

In witness whereof I hereunto subscribe my name this 9th day of November, A. D. 1891.  
CHARLES E. SCRIBNER.

Witnesses:

M. JEANE TALLETT,  
GEORGE L. CRAGG.

It is hereby certified that in Letters Patent No. 632,067, granted August 29, 1899, upon the application of Charles E. Scribner, of Chicago, Illinois, for an improvement in "Multiple-Switchboard Systems," an error appears in the printed specification requiring correction, as follows: On page 3, line 70, the word "circuits" should read *sockets*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 19th day of September, A. D., 1899.

[SEAL.]

WEBSTER DAVIS,  
*Assistant Secretary of the Interior.*

Countersigned:

C. H. DUELL,  
*Commissioner of Patents.*