

No. 650,487.

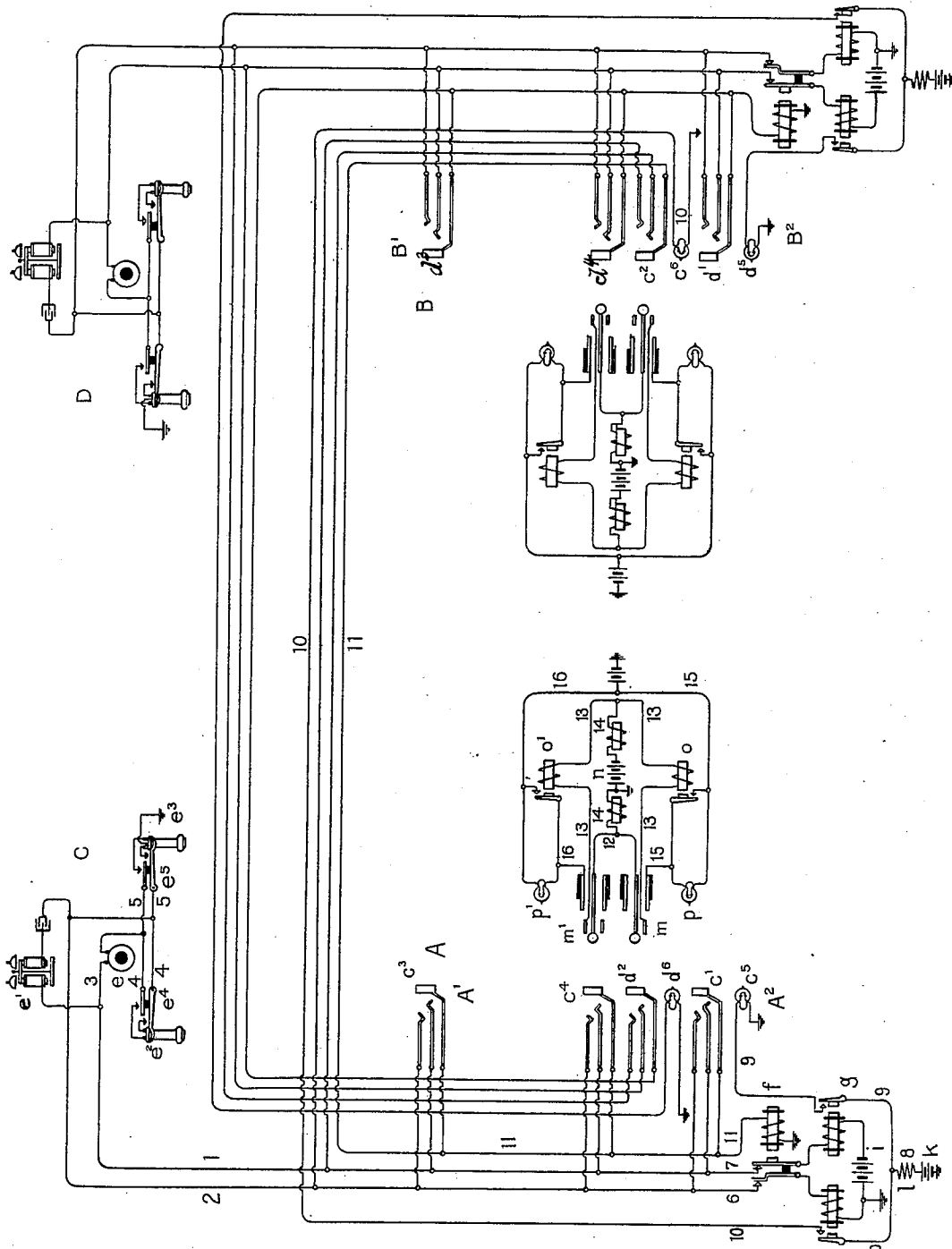
Patented May 29, 1900.

C. E. SCRIBNER.

CALLING APPLIANCE FOR TELEPHONE SWITCHBOARDS.

(Application filed Feb. 9, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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

CALLING APPLIANCE FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 650,487, dated May 29, 1900.

Application filed February 9, 1899. Serial No. 705,107. (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 Calling Appliances for Telephone-Switchboards, (Case No. 476,) of which the following is a full, clear, concise, and exact description.

10 This invention relates to calling signals for switchboards of the divided multiple type, wherein each subscriber's line is provided with an annunciator and answering-jack in each of two separate multiple switchboards and with a multiple jack in each section of one of the switchboards, the subscriber's station being equipped with call-controlling appliances by which the annunciator may be displayed on either of the switchboards.

20 My present invention provides for the automatic operation of the different calling signals in the switchboards and of supervisory signals temporarily associated with united lines in either of the switchboards; and it consists in several novel features co-operating to this end.

One of the novel features consists in the use of two telephones at the subscriber's station, each with a telephone-switch, with circuit connections, whereby one of the telephones controls a call-originating signal at one of the multiple switchboards and the other controls a similar signal at the other board.

35 Another feature consists in the combination, with any suitable means at the substation for closing either a bridge of the line or a ground branch from a conductor of the line at the option of the user, of two serially-connected signal-controlling relays in a bridge of the line, with a source of current at the central office and a ground branch from the bridge, whereby either or both relays may be rendered operative from the substation, and a device by which when one relay is operated one signal is displayed or when both are operated another signal is given.

45 A third feature consists in a specific form of the device above alluded to—namely, a circuit including a source of current and a

resistance divided into two parallel branches and two secondary signals, one in each of the branches, and switch-contacts of one of the relays controlling each of the multiple branches, one of the visible signals being adapted to shunt the other while being itself displayed.

The invention is illustrated in the attached drawing. This diagram represents two telephone-lines entering a telephone-exchange and associated therein with answering-jacks, line-signals, and multiple jacks on two different multiple switchboards A and B in accordance with the type. Thus the line from station C is led to the switch-contacts of an answering-jack c' in a section A^2 of the board A and to the like contact-pieces of another answering-jack c'' in a section B^2 of the board B, and thence to multiple jacks c^3 and c^4 , one on each section A' and A^2 of the multiple switchboard A. Individual line-signals c^5 and c^6 are associated with the answering-jacks c' and c'' in the different switchboards A and B and are made operative through the agency of circuits which will presently be described. Similarly the line from station D is connected with answering-jacks d' and d'' in each of the boards A and B and with signals d^5 and d^6 , associated with the answering-jacks, and is led to multiple jacks d^3 and d^4 in two different sections of the multiple switchboard B. By means of this arrangement of parts the user of the telephone at either station C or D by operating the proper signal c^5 or c^6 or d^5 or d^6 may initiate a call upon either of the multiple switchboards on which the line of the required correspondent terminates, the subscribers being instructed in advance as to which signal must be operated to obtain connection with subscribers of either class.

The telephone-substation is furnished with the usual transmitting-telephone e , call-bell e' , and with two receiving-telephones e^2 and e^3 , each with a telephone-switch e^4 and e^5 , respectively, on which it normally rests. The bell e' is connected permanently in a bridge of the line-circuit 1 2, together with a condenser. The transmitting-telephone e is connected in a conductor 3, which is, in effect, di-

vided into multiple branches 4 and 5. In the former of these branches the receiver e^2 is connected and in the latter the receiver e^3 , which is grounded at the center of its winding. The branch 4 is controlled by the telephone-switch e^4 of receiver e^2 . The branch 5 is controlled by the other telephone-switch e^5 , supporting the receiver e^3 . Thus if the receiver e^2 be taken for use, bridge 3 4 of the line is closed, which includes the transmitting-telephone e and the receiving-telephone e^2 . If the other receiver e^3 instead should be raised from its support for use, a grounded bridge 3 5 would be closed.

At the central office normal extensions 6 7 of the line-circuit are led through the switch-contacts of a cut-off relay f and through the magnet-windings of two relays g and h to the poles of a battery i , common to the different lines of the exchange. One pole of this battery—that which is connected with the relay h and line conductor 2—is grounded or otherwise connected with a return-conductor leading to the branch from the magnet-winding of the receiver e^3 . Two relays g and h of a line control the two signals c^5 and c^6 of the same line through the agency of a peculiar local circuit. This circuit consists of a main portion 8, which includes a battery k and a resistance-coil l and two multiple branches 9 and 10, of which one includes the signal-lamp c^5 and the switch-contacts of relay g and the other signal c^6 and the switch-contacts of relay h . The voltage and current-carrying capacity of each of the lamps c^5 and c^6 bear such a relation to the resistance of the coil l and the electromotive force of battery k that either signal will be lighted when its relay is operated, and the resistances and voltages of the lamps are so adjusted with relation to each other that the lamp c^6 shall shunt the lamp c^5 when both branches 9 and 10 are closed, the lamp c^6 remaining lighted, however. These conditions are attained by a battery k of twenty-five volts, a resistance-coil l of one hundred ohms, a lamp c^5 of fifteen volts taking one-tenth ampere, and a lamp c^6 of four volts taking two-tenths ampere. All the spring-jacks of one line are furnished with secondary contact-pieces, which are united in a normally-open portion 11 of a battery-circuit, which includes the exciting-magnet of the cut-off relay f . This circuit is placed in operative association with another circuit conductor to effect the excitement of the relay in the act of making connection with the line.

Each of the switchboards is furnished at each of its multiple sections with the usual cord-circuits 12 and 13, terminating in plugs m and m' . A source of current n is connected in a bridge 14 of the plug-circuit with an impedance-coil between the source of current and each of the conductors of the cord-circuit to permit the use of a common source of current, while maintaining the independence with respect to telephonic currents of the different cord-circuits.

In the portion of conductor 13 leading to each of the plugs the magnet-winding of a relay is included, the relays being designated o and o' . These relays control supervisory signals p and p' , associated with the different plugs m and m' , respectively, through the agency of shunts about the lamps, the lamps being in conductors 15 and 16, respectively, leading to contact-pieces of the plugs designed to register with the local contact-rings of the spring-jacks.

The plug-circuits are equipped with listening and ringing keys in the usual arrangements, these parts being omitted from the drawing for the sake of clearness.

A person about to use the telephone at either station—for example, station C—must first ascertain in which group the line of the party wanted is to be found. This he may learn in accordance with the usual method by reference to a list. If the call should be for another line entering the switchboard A, the calling subscriber would take the telephone e^3 for use. This would close a ground branch from the line conductor 1, which would permit the excitement of the relay g by current from the central source. The excitement of the relay would close the branch 9, including the signal-lamp c^5 , associated with the answering-jack c' in the switchboard A, and the lighting of the lamp would constitute a call to the operator in attendance. The operator would then answer the call, test the line called for, of which she would find a multiple terminal-jack in her section of the multiple switchboard, and would make the required connection, after which she would supervise the connection by means of signals p and p' , associated with the plugs m and m' .

If the station with which connection is required by subscriber at station C should be found in the group entering switchboard B, the user of the telephone at station C would take the telephone e^2 for use. This act would permit the switch e^4 to close a bridge of the line-circuit, which would complete a path for current from the central battery through relay g , line conductor 1, the bridge 3 4 at the substation, line conductor 2, and the relay h . Both relays g and h being thus excited would close both branches 9 and 10 of the local signaling-circuit. The closure of branch 10, however, would divert from the branch 9 such a proportion of the current from battery k as to maintain the dark condition of lamp c^5 , but to illuminate lamp c^6 . This lamp being associated with the answering-jack c^2 of the line in switchboard B would call for attention from the operator, who having received the order from the calling subscriber would make the connection with a multiple jack of the line to the called station in her section of the multiple switchboard B. The insertion of a plug to make connection with a line, whether calling or called for, closes a local circuit 15 11 or 16 11, including the magnet of the cut-off relay f , and thus severs the normal ground

connections of the line and brings about the demagnetization of either or both the line-relays g and h and the extinction of the lamps which they control.

5 It will be observed that the plugs and plug-circuits, with their associated mechanism, are alike in both the boards, so that the supervisory signals p and p' must be controlled at different times through the agency of tele-
 10 phone-switches e^4 and e^5 . If either relay o or o' is brought into association with a line calling by means of a telephone e^3 , the relay is actuated by current flowing from the ground-
 15 at the substation, while if the signal be associated with a line at the station of which a telephone e^2 is in use the supervisory signal is in the path of current flowing over line conductor 1, through the bridge 3 4 at the sub-
 20 station, and returning by way of line conductor 2 to the battery n at the central office. In either case the supervisory relay associated with the line is in the path of current which is determined by the telephone-switch of the
 25 telephone in use. The signals thus work uniformly under the varying conditions incident to the mode of calling.

I claim as new and desire to secure by Letters Patent—

30 1. The combination with a telephone-line and appliances associated therewith at a central station in different circuits, of several telephones at the substation and a telephone-switch for each telephone, and different circuit
 35 connections controlled by each of the switches adapted to coöperate with the circuits of the different appliances, respectively, at the central office to actuate the said appliances, as described.

40 2. The combination with a telephone-line, of two signal-controlling instruments associated therewith at a central office in different circuits of the line, two telephones at the sub-
 45 station and a telephone-switch for each, and circuit connections of each of the switches adapted to form an operative circuit including a different one of said signal-controlling
 appliances, as described.

50 3. The combination with a telephone-line entering a divided switchboard and associated with a call-indicating instrument in each of the switchboards, of a telephone at the sub-
 55 station for each of said call-signals and a telephone-switch therefor, and circuit connections of each switch adapted to form a complete circuit including one of said call-signals, as
 described.

60 4. The combination with a telephone-line entering a divided switchboard and having a visible signal at each of said switchboards, one of said signals being in a bridge of the
 65 at the substation, a bridge of the line controlled by one of the switches, and a ground branch from the line controlled by the other,

whereby the operation of either switch displays the corresponding signal, as described.

5. In combination, telephone-lines, each 70 connected with an answering-jack on one section of each of two divided boards, and with a multiple jack on each section of one of the boards, a signal-indicator associated with each
 75 of the answering-jacks, said signal-indicators being included in different circuits of the line, each with a source of current; switches at the substation, one for each of said signals, and
 80 circuit connections of each switch adapted to coöperate with the normal circuit of one of said signals to render the same operative; plugs and plug-circuits in each section of the
 switchboard for uniting lines, and a supervisory signal in each plug-circuit with a source
 85 of current, the circuit of the supervisory signals forming operative circuit combinations with the circuit connections controlled by
 each of the switches at the substation, whereby the supervisory signals are controlled in a
 90 uniform manner by the different telephone-switches, as described.

6. The combination with a telephone-line, of two signal-controlling magnets, means at the substation for closing circuit through one
 95 of said signal-controlling magnets to display its signal, means at the substation for closing circuit through both of said magnets, and a
 device actuated by the second magnet adapted to render the first-mentioned magnet in-
 100 operative to display its signal; whereby either of the signals may be alone displayed.

7. The combination with a telephone-line having an answering-jack and a line-signal at each of two switchboards, and a magnet as-
 105 sociated with the line controlling each of the line-signals, of a metallic circuit including both said magnets and a switch at the sub-
 station for closing the circuit, a different circuit including one of said magnets and a
 110 switch at the substation for closing that circuit, and means actuated by the said magnet when excited adapted to render said first-
 mentioned magnet inoperative to display its signal, as described.

8. The combination with a telephone-line 115 and two signal-controlling magnets connected with the line-circuit, and means for closing the circuit through one of the magnets or
 through both, of a local circuit including a source of current and a resistance-coil and
 120 divided into multiple branches, each of said branches being controlled by one of the relays, a signal-lamp in each of the branches, the lamp in one of the branches being adapt-
 125 ed to shunt the lamp in the other branch and to be lighted by the shunted current, as described.

In witness whereof I hereunto subscribe my name this 31st day of January, A. D. 1899.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,
 ELIZABETH SIBLEY.