

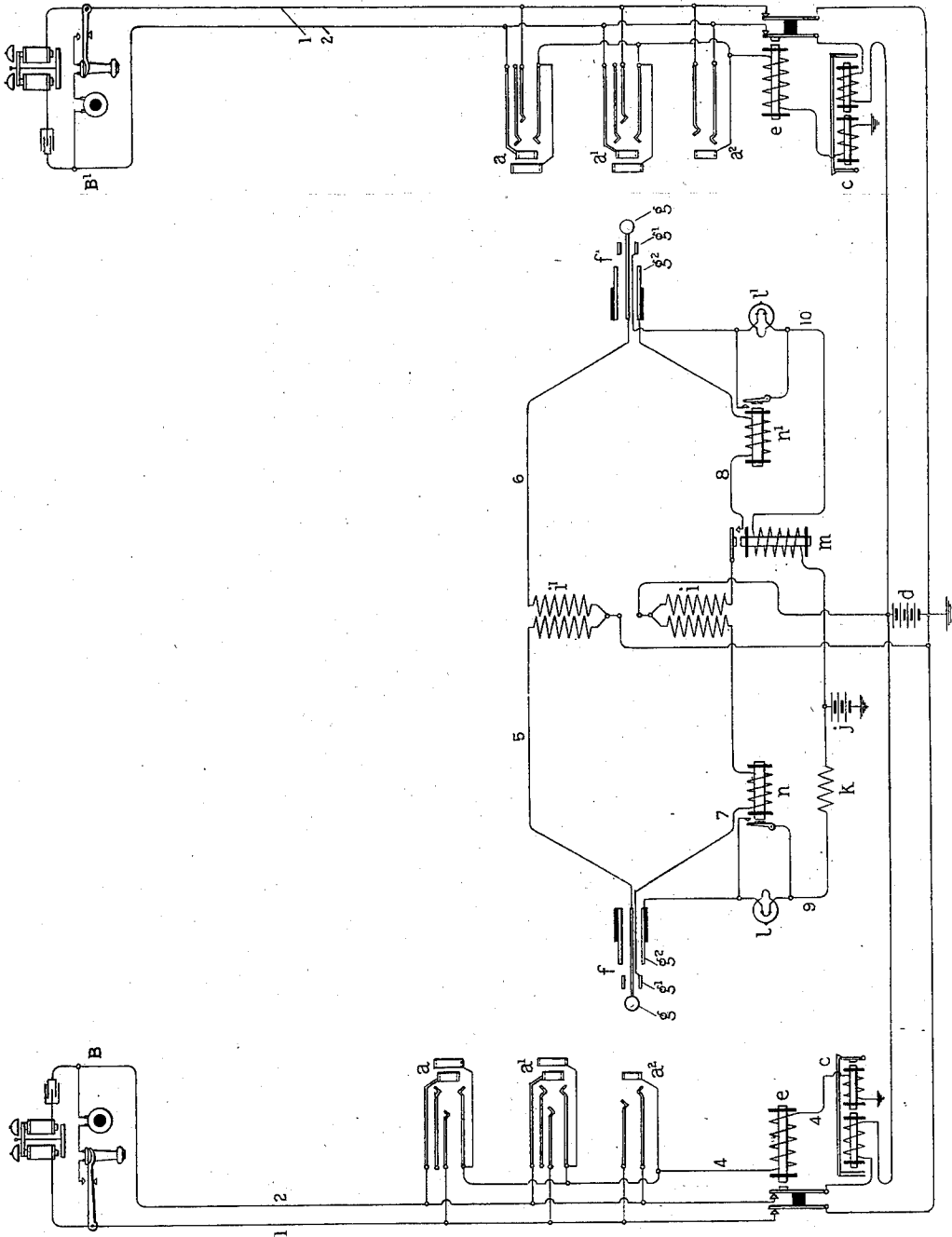
No. 654,924.

Patented July 31, 1900.

C. E. SCRIBNER.
SWITCHBOARD FOR TELEPHONE LINES.

(Application filed Dec. 26, 1899.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

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SWITCHBOARD FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 654,924, dated July 31, 1900.

Application filed December 26, 1899. Serial No. 741,573. (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 Switchboards for Telephone-Lines, (Case No. 480,) of which the following is a full, clear, concise, and exact description.

This invention concerns the operation of telephone-lines in connection with a central source of current, and aims to avoid as far as possible sudden variations of current in lines in the process of switching them consequent on the accidental formation of circuits in the switchboard such as produce troublesome noises in the telephones.

A great number of telephone-lines entering a large multiple switchboard are connected therein with spring-jacks of the type described in Patent No. 489,571, dated January 10, 1893, to W. R. Patterson and myself, and other somewhat-similar spring-jacks. These spring-jacks and the plugs which are designed for use with them admit of the formation of several accidental contacts between distinct circuits when the plug is inserted in the spring-jack, and if these parts are made the terminals of sources of current-supply in the manner commonly followed in constructing switchboards with automatically-operated signals and a central source of current therefor such accidental contacts produce in the lines being switched great variations of current, the effects of which are strongly audible in the telephone of the calling subscriber.

The invention herein to be described consists in the combination, with such spring-jacks and plugs not specially designed to prevent the formation of momentary circuits, of accessory appliances for preventing the troublesome effects of the contacts before mentioned, whereby I am enabled to apply in existing switchboards a central battery and to attain in connection therewith all the advantages of switchboards especially designed for employment with a centralized source of power.

In converting the so-called "bridging-board" equipped with spring-jacks of the form described in my patent before mentioned into a switchboard with a centralized

current-supply I have had in mind the desirability of changing as few parts as possible.

The invention consists in the combination, with the bridging spring-jacks forming the multiple terminals of the telephone-lines in different sections of the multiple switchboard, self-restoring line-annunciators associated therewith, and the calling plugs adapted for use in the multiple jacks, of an answering-jack for each line and an answering-plug for each pair of cords, the answering-jack and answering-plug being adapted to each other to avoid the formation of troublesome contacts, and a relay in connection with the calling plug of each pair of cords adapted to apply the common source of current thereto, and a local circuit for exciting the relay, with means for closing it only at the final instant of making connection with a line called for.

The invention is illustrated in the attached drawing, which drawing represents, diagrammatically, multiple spring-jacks, two for each line, of the form described in my Patent No. 489,571, before mentioned, and calling plugs adapted for use with them, line-annunciators such as are described in my Patent No. 634,095, dated October 3, 1899, (Case No. 252,) one for each line, and the usual and well-known circuit connections of the central-battery system for automatic signaling and supervision in lines and for the supply of the substation transmitting-telephones, together with the modified answering-jacks and answering-plugs and the special relay for applying the common source of current to the calling plug.

Multiple spring-jacks a , a' , and a^2 form the multiple terminals in different sections of the switchboard of lines 1 2 leading to substations B and B'. Each substation is provided with a call-bell, a transmitting and a receiving telephone, and a telephone-switch, the circuit being so arranged that the line, while being normally open with respect to continuous currents on account of an interposed condenser, becomes closed through the telephone when the receiving-telephone is taken for use. Each line has at some section of the switchboard a line-annunciator c , the actuating-magnet of which is connected in a branch leading from the line conductor 2 to one pole of the common source d of current. A branch from the

other line conductor leads directly to earth or to the other pole of the same source of current. The continuity of these branches is controlled by the cut-off relay *e*, which is included in the local circuit 4 leading to the local contact-pieces in the different multiple jacks. This portion of the local circuit includes also the restoring-magnet of the line-annunciator.

In applying the present invention a special answering-jack a^2 is provided for each line in the switchboard, which is specially constructed in connection with its plug to avoid accidental contacts, as before mentioned. Such a spring-jack is described in my Patent No. 596,625, dated January 4, 1898. Pairs of plugs f and f' are furnished for the use of the operator in uniting lines by means of the spring-jacks. Each plug has three contact-pieces g , g' , and g^2 , respectively. The plug f should be that specially adapted for the answering jack a^2 and described in the Patent No. 596,625. The plug f' may be any of the well-known forms adapted for use with the spring-jacks a and a' . The tips g of the two plugs of the pair are united by two conductors 5 and 6, which are joined after traversing, respectively, two windings of a repeating-coil i , their point of junction being connected to earth. The contact g' of plug f and the contact g^2 of plug f' are likewise united through two conductors 7 and 8, which similarly traverse two other windings of the same repeating-coil, their point of junction being connected with the free pole of battery d . Contact-piece g^2 of plug f forms the terminal of the wire or flexible conductor 9 leading to one pole of a local battery j . This conductor includes a resistance-coil k and a supervisory signal-lamp l . Contact-piece g' of plug f' forms the terminal of a similar conductor 10, which also leads to the same pole of battery j , and likewise includes a supervisory signal-lamp l' ; but this conductor traverses also the magnet-winding of a relay m . Currents through the supervisory lamps l and l' are controlled by the switch-contacts of two supervisory relays n and n' , which are located in the conductors 7 and 8, respectively, and which are hence responsive to currents in the telephone-lines with which they are temporarily associated, determined by the positions of the telephone-switches. The relay m is that before mentioned which controls the connection of the central source of current with the calling plug f' , its switch contact being adapted to interrupt the conductor 8 while the relay is inert. Each plug-circuit between plugs f and f' is connected also in practice with the listening-key for bringing the operator's telephone into connection with the plug-circuit and with calling keys for applying calling current through the plugs f' . Since these parts and their manner of association are well known in the art of telephony, they have been omitted from the drawings. In the apparatus thus organized the removal of the telephone at a substation permits the flow of current in the line from the central battery d , which, traversing the line-magnet of line-annunciator c , operates the annunciator and displays its indicator. The operator answers the call thus signaled by inserting the answering-plug f into the answering-jack a^2 of the calling line. In so inserting the plug the grounded tip makes contact with the grounded test-ring of the spring-jack, but with no other part until it reaches the shorter-line spring with which it is designed to make final connection. The contact-ring g' of the plug makes no connection with any part of the spring-jack, excepting the longer-line spring, when the plug is in place in the spring-jack. The sleeve g^2 makes connection with the ring-contact of the spring-jack before the line-contacts are made, and thus excites the cut-off relay e , severing the normal ground and battery branches of the line and then applying the same battery through the medium of conductors 5 and 7 of the plug-circuit. The severing of the normal battery connections of the line makes a very slight sound in the telephone of the waiting subscriber. The completion of the direct connection with the battery d makes a sharp click in the telephone, which is, however, obviously unavoidable. The completion of the local circuit 9 4 in the registering local contacts of spring-jack a^2 and plug f provides current for exciting the supervisory signal-lamp l ; but this lamp is immediately shunted by the switch-contacts of the relay n , which becomes excited by current from battery d flowing through conductors 5 and 7 and finding circuit through the closed path in the telephones at the substation. Having learned the order of the calling subscriber, the operator tests the multiple jack a or a' of the line called for. Obviously if this line were in use a battery j would be found applied to the test-rings of its spring-jack, which battery would produce a current in conductor 6 which would act inductively in the repeating-coil i to produce a sound in the operator's telephone indicating the condition of the line. If the line be found free for use, the operator inserts the plug f' fully into a multiple jack of the line called for. As the plug is inserted in the spring-jack the grounded tip first makes contact with a thimble of the spring-jack, which is connected with one line conductor of the line called for, then with the local springs, of which one is grounded, and finally with the shorter-line spring connected with the other line conductor of the line. The ring g' first makes contact with the thimble of the multiple spring-jack and then with the local spring-contacts of the jack. The sleeve g^2 makes contact with the thimble of the spring-jack, and thus with the line conductor, before the ring g' reaches its position between the local contacts. Now the effect of these contacts on the telephone of the calling subscriber may be considered. Of the contacts

which the tip makes only that with the thimble of the multiple jack closes a circuit containing the source of current, and the circuit formed by this contact is of comparatively-high resistance and produces no considerable disturbance in the telephone of the calling subscriber. The ring g' and the sleeve g^2 of the plug make contact simultaneously with the thimble of the spring-jack and tend to establish a short circuit of the batteries d and j ; but the circuit thus partially formed is broken at the switch-contacts of relay m . The relay m becomes excited only when the contact-ring g' takes its place in connection with the local contact-spring of the multiple jack, after which the conductor 8 is completed. When the plugs f and f' are placed in the spring-jacks, the normal branches of both lines thus united are opened by the cut-off relays e and e' , and the lines are united through the medium of the cord-circuit 5 6 and 7 8. The connection is supervised by means of lamp-signals l and l' , which are controlled by relays n and n' to indicate the condition of use or disuse of the station-telephones. Thus the telephone of the calling subscriber is protected against the effects of all accidental contacts in making connection with either the calling or the called line, notwithstanding the lack of adaptation of the multiple jacks to such an end. This result is attained without any material alteration to the greater portion of the switch-

board—namely, the multiple jacks, the cables thereto, and the line-annunciators.

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

The combination with telephone-lines and multiple jacks, one for each line on each section of a multiple switchboard, individual calling signals, one for each line, and an answering-jack for each line associated with its individual call signal, of an answering-plug and a calling plug united in a circuit for connecting lines together, and a source of current in a bridge of the plug-circuit, the answering-jack and answering-plug being adapted to each other to avoid the formation of accidental battery-currents in the insertion of the plug; a relay controlling the connection of the plug-circuit with the calling plug, and a local circuit closed in registering contacts of the calling plug and a multiple jack when the plug is in its place in the jack for exciting the said relay; whereby a call may be answered and a connection completed with the line called for without producing unnecessary variations in the current over the calling line, as described.

In witness whereof I hereunto subscribe my name this 2d day of October, A. D. 1899.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,
FLORENCE E. SUMMERS.