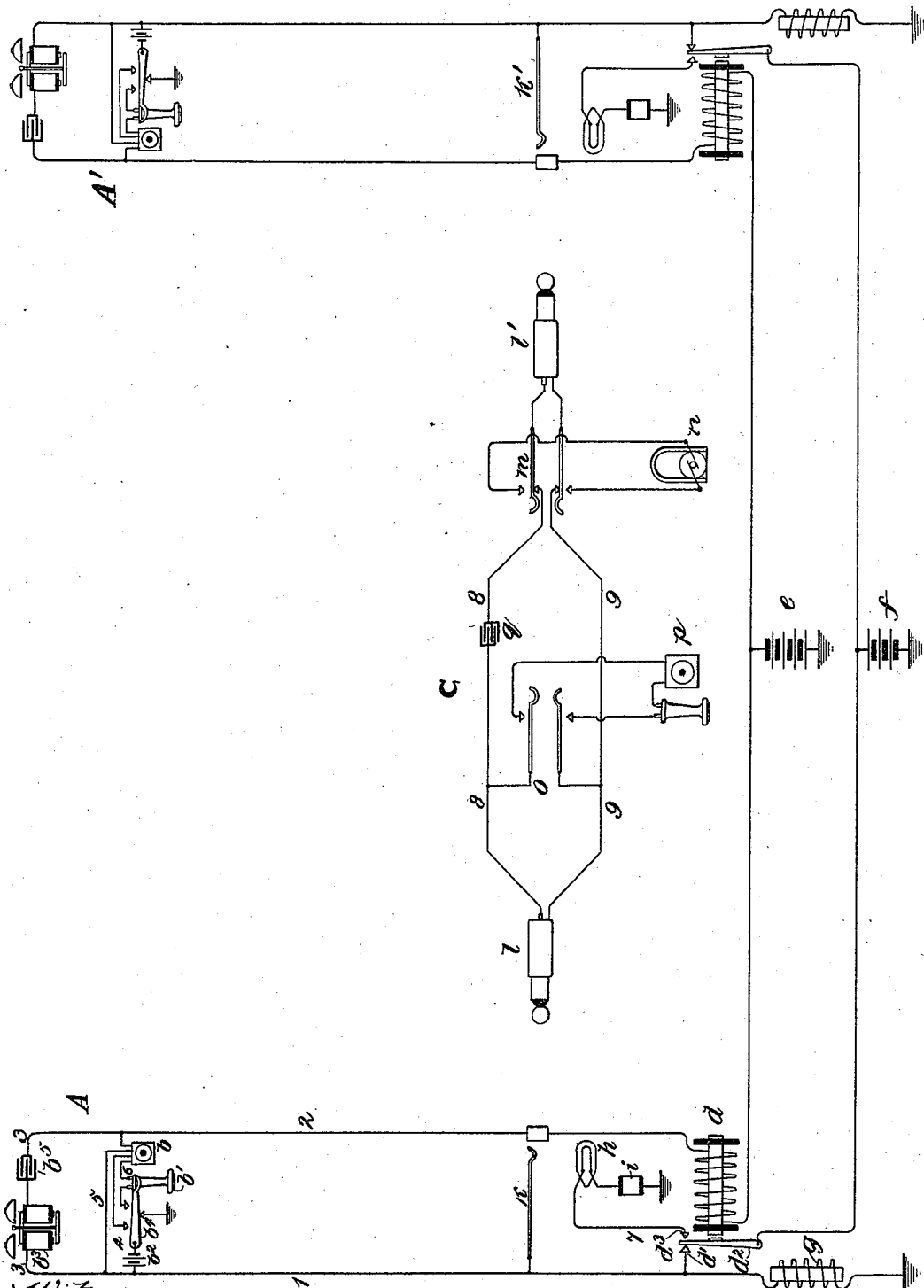


(No Model.)

C. E. SCRIBNER.
APPARATUS FOR TELEPHONE LINES.

No. 557,154.

Patented Mar. 31, 1896.



Witnesses:
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 557,154, dated March 31, 1896.

Application filed August 17, 1895. Serial No. 559,627. (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 Apparatus for Telephone-Lines, (Case No. 398,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention applies to telephone-lines whose substations are provided with local storage batteries which are charged by a constantly-flowing current from a source of supply at a central station common to the different lines. It has been usual in the case of such lines to place the common source of current supply in branches from the line-circuits, impedance-coils, or, in some instances, signaling instruments of high impedance, being interposed in the conductor leading to the source of supply for the purpose of preventing the escape of telephonic current from one circuit to another. Obviously the interpolation of this apparatus, which is necessarily of rather high resistance, in the conductor between the source of supply and the battery to be charged necessitates a higher electromotive force in the source of supply than would otherwise be required, and involves a constant waste of energy in overcoming the resistance of the interposed instruments. My invention aims to avoid this waste of energy, and attains this end by automatically cutting out the whole or a large part of the resistance of the impedance-coil or signaling instrument during the time when the line is not in use, bringing these devices into position to exercise their functions only during the use of the line for telephonic communication; or, in other words, for automatically maintaining a direct connection between the battery to be charged and the source of current supply during the disuse of the telephone-line, interrupting this connection and restoring the usual circuit arrangement during the use of the line.

I place in the line-circuit a relay whose switch-contacts control the direct connection of the source of supply with the conductor

extending to the battery to be charged at the substation, and provide means for exciting this relay during the use of the line and causing it to interrupt this connection. In the case of metallic circuits the local storage battery at the substation may be connected in a ground branch from one conductor of the line-circuit. The relay may be included in a ground branch from the other conductor at the central station, together with the source of current, means being provided for completing a circuit of this latter line-wire at the substation only during the use of the line. The switch-contacts of the relay may then control the direct connection of that line-wire which forms the terminal of the local storage battery with the central source of current-supply.

In some telephone-switchboards each line is connected with a relay which, by means of a local circuit, controls the display of a subsidiary signal in the switchboard. A source of current is arranged in the circuit with this relay at the central station, and a switch is provided at the substation for permitting the flow of current from the source through the relay during the use of the line. My present invention is readily adapted to telephone-lines thus equipped. The signal-controlling relay is furnished with a normal resting-anvil, in addition to its alternate contact-anvil, which with its registering contact may control the connection of the other line conductor with the central source of charging-current.

In a system thus organized the relay connects the source of charging-current directly to the line conductor whose circuit is completed at the substation through the local storage battery as long as the substation-telephone is not in use. When this instrument is brought into use, the relay becomes excited and interrupts the direct connection between the line conductor and the source of charging-current and closes the local circuit to display the subsidiary signal. This last-described form of my invention is illustrated diagrammatically in the accompanying drawing.

The substation A, as shown therein, is furnished with the usual transmitting-telephone b , receiving-telephone b' , battery b^2 , signal-

bell b^3 , and an automatic telephone-switch b^4 for changing the circuit connections when the telephone is brought into use.

Two line conductors 1 and 2 extend from this apparatus at the substation to different appliances in the telephone-switchboard at the central station C. The bell b^3 at the substation is included, together with condenser b^5 , in a permanently-closed conductor 3 uniting conductors 1 and 2. The local storage-battery b^2 is included in a conductor 4 extending from line conductor 1 to the lever of switch b^4 . This switch has a normal resting-contact which is connected directly to earth, and has also two contact-pieces against which it closes when relieved from the weight of the receiving-telephone, one of which constitutes the terminal of a wire 5 extending from conductor 1 and including the primary helix of the induction-coil of transmitter b . The other contact-anvil is the terminal of a conductor 6, which includes the secondary helix of the same induction-coil and the receiving-telephone b' .

At the central station line conductor 2 is led through the magnet-helix of a relay d and through a battery e to earth. Line conductor 1 is normally completed through the resting-anvil d' and lever d^2 of this relay and through a battery f to earth. A permanent ground through an impedance-coil g of high resistance is connected with line 1 for signaling purposes. An alternate contact-anvil d^3 of the relay constitutes the terminal of a circuit 7 including a signal-lamp h in the switchboard and a resistance-coil i . A terminal spring-jack or connection-socket k is provided in the switchboard near the lamp, its two contact-pieces being connected with the two line conductors 1 and 2, respectively.

The usual plugs l and l' are furnished the operator at the switchboard for uniting different lines. These plugs form the terminals of a plug-circuit 8 9, which includes the usual calling-key m for connecting a generator n with a line for signaling to the substation and a listening-key o for connecting the operator's telephone p with the plug-circuit. A condenser q is included in conductor 8, which unites the tips of the plug.

While the line is not in use, the circuit from battery e through line conductor 2 is interrupted at the substation, being open at the terminal of wire 6, including the telephones, and at the condenser in bridge 3. Hence the relay d is inert and permits its armature-lever d^2 to rest upon the anvil d' . Circuit from battery f is then complete over line conductor 1 to the substation, and there through the local storage battery b^2 and switch-hook b^4 to earth. The strength of battery f should be so adjusted to the resistance of the line as to send constantly over this circuit the proper charging-current for maintaining battery b^2 in a fully-charged condition. In practice it is found that two one-hundredths of an ampere flowing during twenty-three hours of the day—assuming that the

telephone is in use one hour of each day—is ample. It will be observed that in this charging-circuit there is no other resistance than that of the line conductor, so that the charging of battery b^2 is effected with the greatest possible economy of charging-battery f at the central station.

When the subscriber at station A desires to have his line connected with another of the exchange, he removes his receiving-telephone from its switch-hook, which rises and disconnects the ground branch from the line conductors, closes the local circuit 4 5, including battery b^2 and the primary helix of the induction-coil, and closes also the conductor 6 through the telephones. The closing of this latter circuit completes a path for current from battery e through the magnet-helix of relay d , wires 6 and 4 at the substation, line conductor 1, and impedance-coil g to earth. The relay d , being excited, separates the lever d^2 from its anvil d' and closes the lever against its alternate anvil d^3 . Battery f is thus disconnected from line conductor 1, and its circuit is closed through the signal-lamp h , which indicates the call to the attendant. The operator may answer the signal in the usual way, inserting plug l into spring-jack k and connecting her telephone with the plug-circuit 8 9 by means of key o , and after having received the order orally from the subscriber she may establish the required connection by inserting the plug l' into the spring-jack k' of the correspondent line, signaling to the substation A' by means of key m .

From the moment the subscriber's telephone is removed from its switch-hook the ground connection of the circuit at the substation is interrupted, and the direct ground connection at the central station is also removed. Line conductor 1 still remains grounded through the high-resistance impedance-coil g and line conductor 2 through the relay d , which also should be of high impedance, and battery e . The impedance in these ground branches, however, prevents the escape of telephonic current to earth. Thus by means of this invention I attain the greatest economy of energy supplied by the common source f of charging-current for charging the different batteries b^2 at the substations. At the same time, during the use of the line, the freedom of the line-circuit from injurious earth connections or from direct connection with any common sources of current at the central station is insured.

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

1. The combination with a telephone-line, of a local storage battery at the substation thereof, a central source of charging-current connected therewith, a switch at the central station controlling the connection of the said source of current with the local storage battery, and means for controlling the switch from the substation, as described.

2. The combination with a telephone-line, of a local storage battery at the substation thereof, a source of charging-current at the central station connected with the local storage battery, a relay controlling the connection of said source of current with the storage battery, and means for exciting the relay controlled at the substation, as described.

3. The combination with a telephone-line, of a local storage battery at the substation thereof, a line conductor connected therewith leading to a source of charging-current at the central station, a relay having its contact-points included in the line conductor at the central station, a circuit including the relay normally open at the substation, and means for closing the relay-circuit, as described.

4. The combination with a metallic telephone-line circuit, of a local storage battery in a ground branch from one line conductor at the substation, and a source of charging-current in a ground branch from the same line conductor at the central station, a relay controlling contact-points adapted to disconnect the said charging-battery from the line conductor, included in the other line conduc-

tor together with a source of current, a telephone-switch at the substation and switch-contacts thereon for closing the relay-circuit during the use of the telephone, as described.

5. The combination with a metallic telephone-line circuit, of a local storage battery in a ground branch from one line conductor at the substation, a source of charging-current in a ground branch from the same conductor at the central station, a relay together with a source of current in the other line conductor, said relay having switch-contacts controlling the continuity of the first-mentioned line conductor, switch-contacts controlling the continuity of a local circuit including a subsidiary signal in a switchboard, and a telephone-switch at the substation adapted to complete the circuit through the relay during the use of the telephone, as described.

In witness whereof I hereunto subscribe my name this 12th day of July, A. D. 1895.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,

MYRTA F. GREEN.