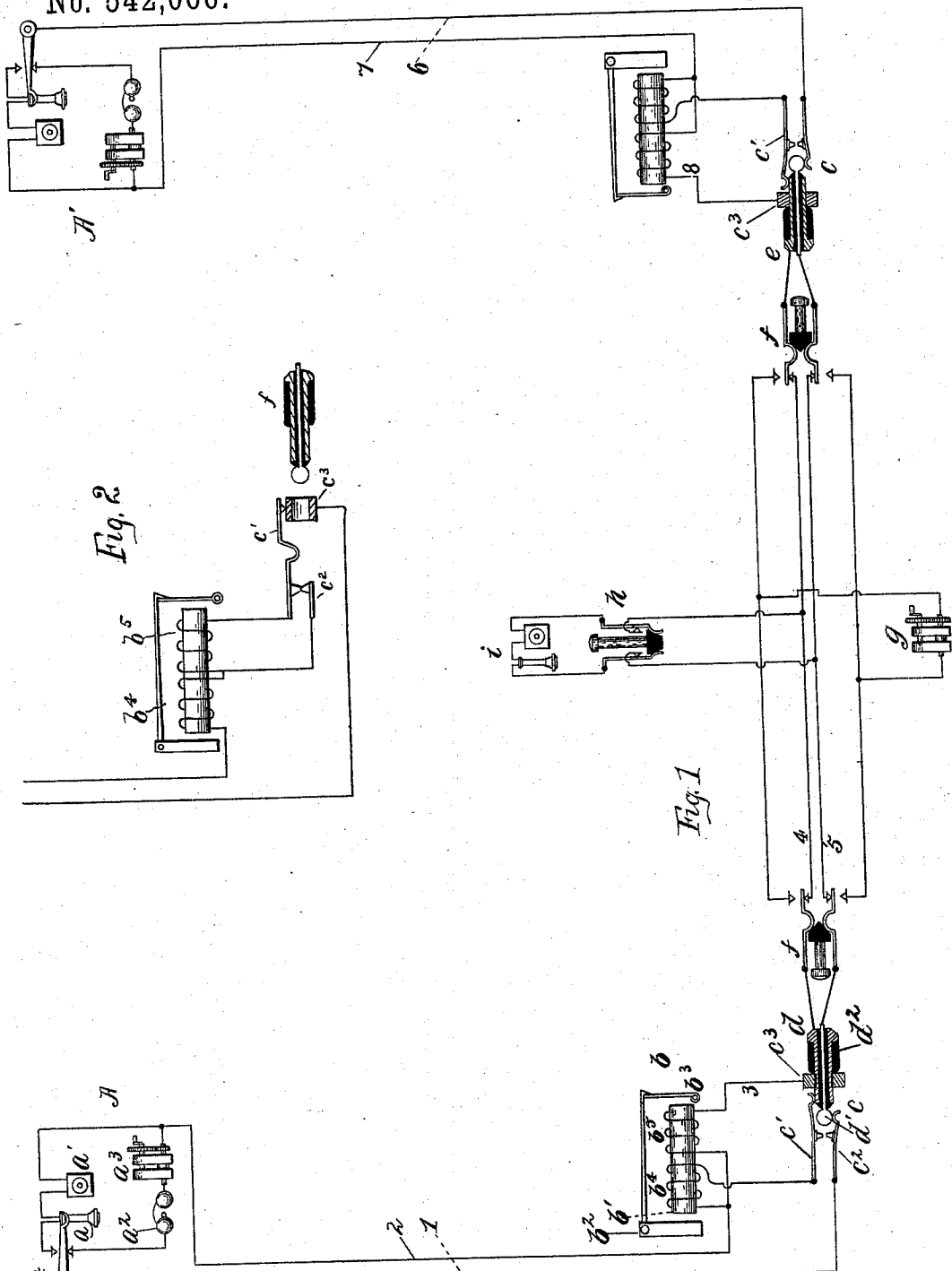


(No Model.)

C. E. SCRIBNER. ANNUNCIATOR CIRCUIT FOR TELEPHONE SWITCHBOARDS.

No. 542,066.

Patented July 2, 1895.



Witnesses:

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ANNUNCIATOR-CIRCUIT FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 542,066, dated July 2, 1895.

Application filed November 12, 1894. Serial No. 528,528. (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 Annunciator - Circuits for Telephone-Switchboards, (Case No. 365,) 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 telephone-switchboards, particularly to the connection of the individual signaling annunciator with the line-circuit. Heretofore the line or individual annunciator has sometimes been included directly in the line-circuit between a sub-station and the point of connection of the line with another telephone-line, so as to be in the path of the telephonic current in the line; but it has been more common to place the annunciator in a separate branch of the line-circuit or to disconnect it altogether during the use of the line for the transmission of telephonic currents. The inclusion of the electromagnet of the annunciator in the line-circuit of course resulted in great impedance to the rapidly-alternating telephonic current, and was consequently detrimental to telephonic transmission.

In my invention I have aimed to provide a mode of constructing the annunciator and connecting it with the line-circuit by which the annunciator may be permitted to remain connected in the circuit during conversation, but shall offer no impedance to the telephonic currents. To this end I have constructed an annunciator having equal differential windings upon its magnet. These windings are both connected with the line-circuit so that both may be brought into the path of the telephonic current in the line; but normally the passage of current through one of the helices is prevented by suitable auxiliary circuit connections to interrupt the circuit through it or to divert the current from it. In an especially simple form of my invention, for example, these windings are placed in different parallel branches on one side of the line-circuit, one of the branches being permanently closed and the other being normally

open at a pair of contact-pieces in the spring-jack or connection terminal of the line. When connection is established with the telephone-line by means of the usual connecting-plug, these contact-pieces are closed together, thus completing the second branch. The two annunciator-helices then receive equal portions of the telephonic current, which act differentially upon the magnet-core and hence encounter no impedance in the coils.

In many cases it is permissible to include a single annunciator in the united circuit of two lines for the purpose of receiving the signal for disconnection. The second annunciator—that of the called subscriber—is, however, useless and frequently undesirable for this purpose, and its impedance cannot, therefore, be tolerated in the line-circuit. In my system, in order that the line-annunciator of the calling subscriber may be left in the circuit to respond to the signal for disconnection, I construct that plug which is intended to be used in making connection with the calling line in order to answer the signal, in such form that it shall fail to complete the normally open branch of the line-annunciator, so that but one coil of that annunciator remains in the circuit. The annunciator is thus capable of responding to signaling currents in the line.

I have illustrated my invention in the accompanying drawings.

In Figure 1 of the drawings two sub-stations A and A' are represented, each connected by a line-circuit with an annunciator and a terminal spring-jack in the switchboard at a central station, the lines being united through a plug-circuit of ordinary character. Fig. 2 represents an alternative mode of connecting the annunciator-coils in the line-circuit and a form of spring-jack appropriate to these modified circuit connections.

Referring to Fig. 1, the telephonic and signaling appliances at the sub-stations comprise the usual apparatus—a telephone a , a microphone a' , and a signal-bell a^2 and generator a^3 , together with an automatic switch-hook a^4 , adapted to switch the telephone or the signaling apparatus alternately into connection with the line. The circuit extends through line-wires, as 1 2, to the central sta-

tion, where it includes an annunciator b and is connected with a terminal spring-jack c . The annunciator comprises an electromagnetic core b' adapted to act upon an armature b^2 , which is provided with a catch engaging a pivoted shutter b^3 , which, when released by the catch, falls outward and displays a suitable number or other indication. The annunciator-core b' is provided with two helices b^4 and b^5 , which are of equal resistance and wound in opposite directions upon the core. The spring-jack c comprises two springs c' and c^2 and a metallic thimble or ring c^3 . The springs c' c^2 are provided with contact-anvils which close together in the normal position of the spring-jack. The line-wire 1 is connected with the spring c^2 of the spring-jack, while wire 2 is connected through the helix b^4 of annunciator b with the spring c' . The remaining helix b^5 of the annunciator is connected by conductor 3 with the ring c^3 of the spring-jack. Ordinarily the line-circuit 1 2 is complete through a path which may be traced through spring c^2 , spring c' , and annunciator-helix b^4 , the circuit through helix b^5 being open.

The switchboard is furnished with the usual connecting-plugs d and e for uniting the spring-jacks of different lines. The answering plug d , which is designed to be used in making connection with telephone-lines in response to initial call-signals, has a central tip d' , adapted to make contact with spring c^2 of the spring-jack into which it may be inserted, and a sleeve d^2 , which makes connection with spring c' , the tip and sleeve being of such size as to separate the contact-pieces of springs c' c^2 from each other when the plug is thrust between the springs. The sleeve d^2 is insulated by means of a ring of suitable insulating material upon it at the point where it passes through the thimble c^3 when inserted in the spring-jack. The plug e is of essentially similar construction, differing only in that the insulating-ring on the sleeve is omitted and the latter makes contact with ring c^3 , thus crossing together the ring and the spring c' when the plug is inserted into the spring-jack. The tips d' of the plugs are connected together through a conductor 4 and the sleeves d^2 by another conductor 5. These conductors include the switch-contacts of two calling-keys ff' of usual form, either of which is adapted to disconnect the corresponding plug from its mate and to connect its terminals with the poles of a generator g of signaling current. Conductors 4 and 5 are also connected with the switch-contacts of a listening-key h , by which the operator may connect her telephone set i with the plug-circuit. In the normal position of the apparatus the plugs are withdrawn from the spring-jacks and the springs c c^2 of these latter are closed together.

A subscriber—as, for example, subscriber at station A—desiring a connection with another subscriber, turns his signaling generator a^3 and thus transmits an electric current

in the circuit 1 2 through the helix b^4 of the annunciator and springs c' c^2 of the spring-jack c . Since only one helix of the annunciator is thus excited the annunciator is operated and gives the signal to the attendant at the switchboard. The latter then inserts the answering plug d in the spring-jack of the line calling, and, having received the order for the line with which connection is desired, inserts plug e into the spring-jack c of that line—for example, to station A'. The line circuit 1 2 from station A is thus extended through conductors 4 5 of the plug-circuit to the line-wires 6 7 to station A'. The operator then throws the calling key f' into position to connect the generator g with plug e , whereby a signaling current is sent out upon line 6 7. It will be observed that this signaling current has a divided path from the sleeve of plug e to the line conductor 7, one circuit being through thimble c^3 , conductor 8, and the helix b^5 of the annunciator to the line conductor, and the other being through spring c' and helix b^4 of the annunciator to line conductor 7. The calling currents in the helices b^4 b^5 thus neutralize each other and the annunciator is not operated.

While the line is in use for conversation, the telephonic current divides in a similar way through the helices b^4 b^5 , one half going through one helix in a given direction and the other half through the other helix in the opposite direction, so that the current encounters no impedance in the annunciator.

When the signal for disconnection is given by the rotation of a signaling generator at either of the connected stations, this signaling current also finds the same divided path through the annunciator of line to station A', and hence does not operate this annunciator; but it has circuit through only the single helix b^4 of annunciator b of line A, so that the latter annunciator is operated as at first and by the fall of its shutter indicates to the attendant that the connection between the lines may be removed.

In Fig. 2 the two helices b^4 and b^5 of the annunciator are connected in series in the line-circuit, one of them being normally short-circuited by a spring c' of the spring-jack and its anvil c^2 , upon which it rests. The line-circuit, when the line is not in use, is then through coil b^4 to anvil c^2 , thence to spring c' and to thimble c^3 , which constitutes the other terminal of the line. When the plug f is inserted into the spring-jack, its tip makes connection with spring c' and separates it from its contact-anvil, while its sleeve registers with a thimble c^3 . The circuit from the line is now through coil b^4 and coil b^5 in series, thence to spring c' and thus to the circuit of the plug.

It is obvious from the description and illustration here given that by the mere omission of the insulating-piece on the answering plug d , both line-annunciators might be rendered

inert if desired, and the impedance of both thus eliminated from the circuit. Various other modifications might be made in my invention without departing from its essential features.

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

1. The combination with a telephone line, of an electromagnet provided with two equal differentially wound helices, one of said helices being included normally in the line circuit, and mechanism operated by the act of making connection with the line at the central station for including said second helix in circuit with the line, whereby said annunciator is rendered neutral.

2. The combination with a telephone line, of an annunciator provided with two equal differentially wound helices connected in different parallel branches of the line circuit, a springjack provided with a pair of contact terminals normally in contact to include one of said helices in the line circuit, a connecting plug, and contact terminals adapted to be actuated by the insertion of said plug in the springjack to include both of said helices in the line circuit, substantially as described.

3. The combination with two telephone lines, of switches and connecting plugs therefor at the central office, individual annunciators, one for each line, each annunciator having two equal differentially wound helices, one helix of each of said annunciators being included in the line circuit, and contacts associated with the switch of one of said lines

adapted when a plug is inserted in said switch to bring into the circuit the second helix of the annunciator connected with said switch, to render said annunciator neutral, while the annunciator of the other line is left in operative condition to serve as a clearing-out annunciator.

4. The combination with two telephone lines terminating in switches at the central station, of connecting plugs adapted to be inserted into said switches to loop the lines together for conversation, an annunciator for each of said lines, each of said annunciators being provided with two equal differentially wound helices, and contacts associated with said switches and operated by the insertion of the plugs therein for including in the line circuit both helices of one of said annunciators and one helix of the other annunciator, whereby the former will be rendered neutral and the latter may serve as a clearing-out annunciator, substantially as described.

5. The combination with a telephone line, of an annunciator having equal differentially wound helices, said helices being connected with the line circuit, and circuit connections and switch contacts in the springjack adapted to prevent the passage of current through one of said helices while the line is not in use for conversation, substantially as described.

In witness whereof I hereunto subscribe my name this 8th day of November, A. D. 1894.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,

LUCILE RUSSELL.