

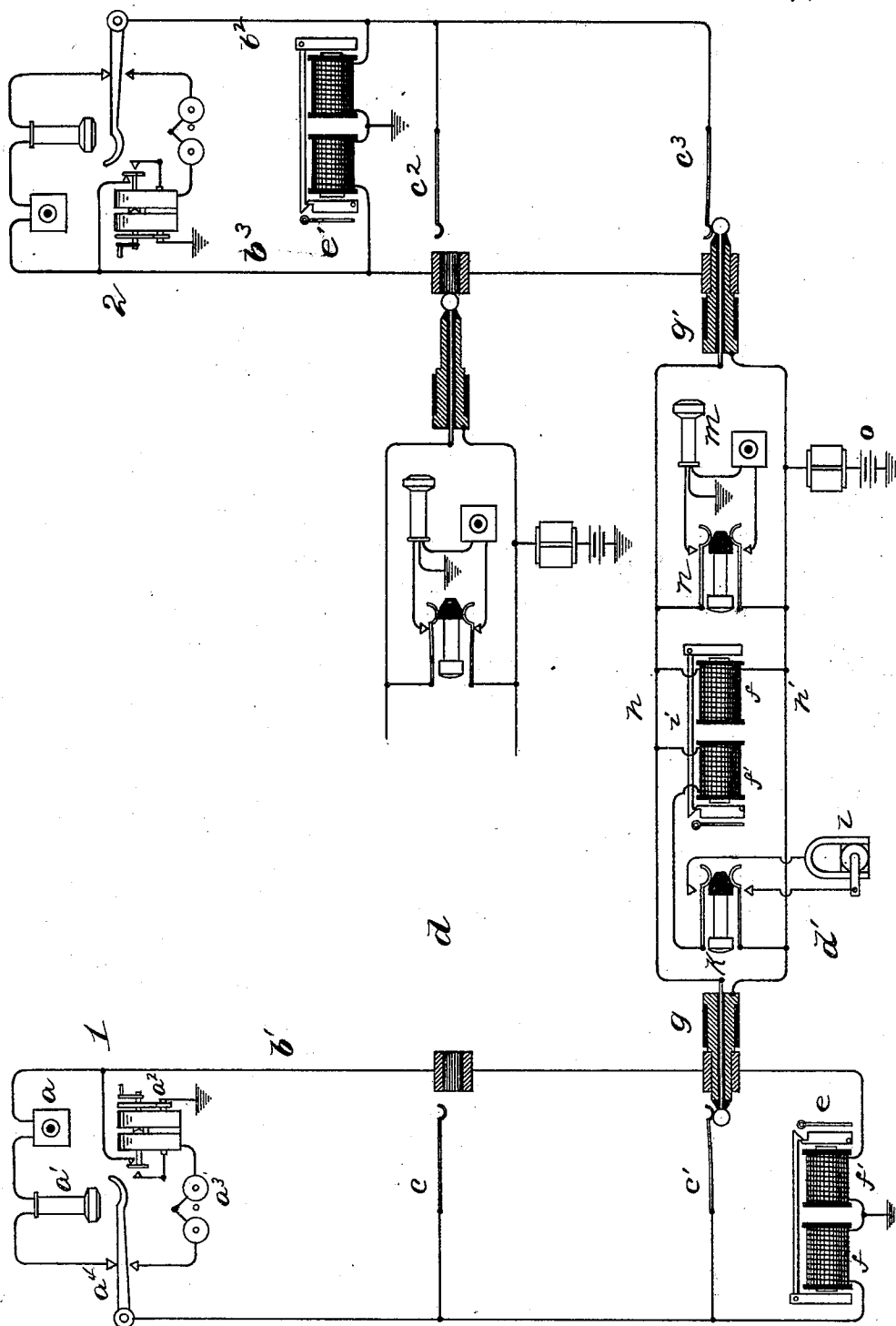
(No Model.)

C. E. SCRIBNER.

APPARATUS FOR TELEPHONE SWITCHBOARDS.

No. 512,399.

Patented Jan. 9, 1894.



WITNESSES

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 512,399, dated January 9, 1894.

Application filed April 26, 1893. Serial No. 471,979. (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-Switchboards, (Case No. 330,) 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 apparatus for restoring or resetting signal receiving annunciators of telephone switchboards; its primary object is to provide means for resetting the annunciators electrically by a momentary current controlled by a key actuated in the performance of some act involved in the establishment of connection between lines.

Hitherto in telephone exchange systems it has been common to employ self restoring annunciators comprising two electro-magnets, one of which, designated the operating coil, acts to display or actuate the indicator, while the other, the restoring coil, operates to replace the indicator to its normal position, the operating coil being ordinarily connected in the line circuit and the restoring coil being included in a local battery circuit adapted to be closed by the act of establishing connection with the line, and remaining closed during the continuance of the connection. In connection with the plug circuit by means of which lines are united for communication, a clearing-out annunciator is placed for receiving the signal for disconnection, the restoring magnet of the clearing-out annunciator being also in a local circuit adapted to be closed by the operator in the manipulation of the switching appliances.

In my invention I connect the operating coils of the different annunciators with the signaling circuit of the telephone line, and arrange the restoring coils of the annunciators in local circuits adapted to be closed incidentally in the operation of the ringing key by which the operator sends a call signal to a substation after the completion of a connection therewith. The local restoring circuit may, if desired, be a portion of the signaling circuit thus closed by the operator in calling,

in which case the signaling generator serves as the source of current for resetting the different annunciators.

A further object of my invention is to preserve permanently the continuity of the conductors of the plug circuit, avoiding the inclusion of contact points in the circuit to disconnect the clearing-out annunciator while a call signal is being sent in order to prevent its operation thereby. This object is attained by the construction which I have described, applied to the clearing-out annunciator, which in my invention is retained inoperative by the signaling current which is being transmitted to the substation.

My invention will be more fully understood by reference to the accompanying drawings, which is illustrative thereof.

In the drawings I have shown two telephone substations connected by lines with the usual springjacks and with annunciators upon a telephone switchboard, switching appliances being shown upon the switchboard in position of connecting the two lines together, the various circuits being arranged in accordance with my invention.

In the drawings, the substations 1 and 2 are represented as equipped with the usual apparatus, comprising a telephone transmitter a , a receiver a' , a generator a^2 of signaling current, and a bell a^3 adapted to respond to such currents, the telephonic and the signaling appliances being connected, respectively, with the contact points of a switch a^4 adapted to connect the telephone set or signaling instruments into circuit as the telephone is removed from or replaced upon the switch hook. The generator a^2 is provided with an automatic switch of well known construction, adapted to open the connection of the frame of the generator to one side of the line, when the generator is operated, and to close the circuit of the grounded armature to the frame instead. The apparatus of station 1 is connected by line wires b and b' with the different contact pieces, respectively, of springjacks c and c' , which are assumed to be located upon a multiple switchboard at a central office, the different springjacks c and c' being placed upon different sections d and d' of the multiple board. At one of the boards d' is a self-re-

storing signaling annunciator *e*, whose operating coil *f* is connected in a branch from one side *b* of the line to earth, and whose restoring coil *f'* is connected in another branch from the side *b'* of the line to earth. The apparatus of substation 2 is similarly connected by lines *b*² and *b*³ with like apparatus upon the switchboard, the springjacks *c*² and *c*³ of the line being arranged upon the sections *d* and *d'* of the switchboard, but the annunciator *e'* being placed upon the section *d* of the switchboard in order to be under the attendance of another operator.

The switching apparatus is shown complete at section *d* of the switchboard. This apparatus comprises a pair of loop connecting plugs *g* and *g'* whose like contact pieces are connected through conductors *h* and *h'*. When the two plugs are inserted into two springjacks of different lines, the limbs of the line circuits are thus continued through the contact pieces of their respective springjacks to the co-operating contacts of the loops plugs and to the conductors *h h'* of the plug circuit. Thus the two lines are united into a continuous electric circuit. The operating coil *f* of a self-restoring clearing-out annunciator *i* is connected in a permanent bridge connection between the different conductors *h* and *h'*. A calling key *k* is arranged with contact springs connected with the conductors *h h'* of the plug circuit, the branch from one of the springs including the restoring coil *f'* of the annunciator *i*. The corresponding contact anvils of the key are connected with the poles of a generator *l* of signaling current. An operator's telephone set *m* is furnished for the operator, connected with a key *n*, by which the telephone may be brought into connection with the plug circuit *h h'*. A battery *o* is shown connected with the conductor *h'* of the plug circuit, for testing purposes, a retardation coil being included between the battery and the plug circuit to prevent the shunting of telephonic current to earth.

I will now trace the operations involved in establishing such connection between the stations 1 and 2. The subscriber at station 1, who initiated the connection, by rotating his signal generator *a*¹ transmits a signaling current over the line *b* to the central office, where it finds circuit through the operating coil *f* of the annunciator *e*. The switch upon the generator *a*² opens the normally closed branch connection between the sides *b* and *b'* of the line at the substation so that no current passes through the line *b'*. The operating coil *f* is energized, and, the restoring coil *f'* being unmagnetized, the annunciator is operated and indicates the signal to the attendant at switchboard *d'*. The operator at once inserts a plug *g* into the springjack *c'* and depresses the plunger of her listening key *n*. Her telephone set is thus looped into a connection with the apparatus at the substation, and when the subscriber has removed his telephone from the switch hook he may give an oral order for

the connection desired to the operator at the central station. The operator having received the order tests the line called for to determine whether it is in use or not at the other section *d* of the switchboard. This she does by applying to the thimble or ring of the springjack *c*³ of line to station 2, the tip of the remaining plug *g'*, as the tip of a plug is shown applied to the test ring *c*² upon switchboard *d*. If the line thus tested be in use a grounded battery *o* is connected with the test rings through the medium of the plug circuit by which such connection already exists, and all the rings of the springjacks of that line are electrified to a difference of potential from the earth. When, under this condition, the tip of plug *g'* is applied to the ring a circuit from a test ring to earth is created through the conductor *h* of the plug circuit and a portion of the coil of the operator's telephone receiver *m*, and the current set up in this circuit causes a click or other characteristic sound in the telephone, which signifies the condition of the line to the operator making the test. Finding the line to station 2 not in use, the operator inserts the plug *g'* fully into the springjack *c*³, thus completing the connection between the two substations, after which she disconnects her telephone from the circuit. Finally she depresses the plunger of the ringing key *k*, looping the generator *l* into circuit with the conductors *h h'* of the plug circuit. The current from the generator to the conductor *h* traverses the restoring coil *f'* of the clearing-out annunciator *i*; this clearing-out annunciator may be assumed to be in position to display its indicator, having remained in that position since the disconnection signal of the last connection in which the plug circuit was employed. The magnet *f'* is now energized by the current traversing it and acts to restore the indicator of the annunciator, placing the annunciator in condition to respond to signaling current. Several circuits exist for the current of the generator *l* from the plug circuit *h h'*. One of these is through the operating coil of the clearing-out annunciator *i*; but the annunciator is not affected by this current since the restoring coil *f'* is at the same moment exercising its function of resetting the indicator. Another path is through the plug circuit to the plug *g'*, thence over the lines *b*² and *b*³ to substation 2 and through the signaling bell *a*³ at that station. The signaling bell is thus operated and calls the attention of the subscriber at station 2 to the existence of connection with his line. A portion of the current is shunted from the lines *b*² *b*³ through the two magnets *f* and *f'* of the individual annunciator *e'* of that line; but since both magnets of the annunciator are thus simultaneously energized the indicator of the annunciator is not operated and no signal is given. Another portion of the signaling current finds circuit to the plug *g* and thence to the conductors *b b'* extending to station 1. The current divides also at these

conductors, a portion passing through each of the coils f and f' of the annunciator e , and another portion passing through the line circuit to the station and through the bell or telephone thereat. The current finding circuit through the restoring magnet of annunciator e energizes that magnet and resets the displaced indicator of the annunciator. The current through the telephone or bell at the substation 1 indicates to the subscriber that the connection has been completed.

When the subscribers at the different substations have completed their conversation, either one may send a signal for disconnection. Assuming that subscriber at station 1 does this, the current from his signaling generator a^2 finds circuit over line b to the springjack c' at which the connection is made, from which point it has two paths. One of these is directly through the operating coil f of individual annunciator e to earth; the other is through the line spring of the jack to the tip of the plug g and thence to the conductor h ; from this conductor the current finds several paths to earth. One, of comparatively low resistance, may be traced through the operating coil f of the clearing-out annunciator i to the conductor h' , thence to the sleeve contact of the plug g and thence through the restoring coil f' of the individual annunciator e to earth. Current thus traverses both magnets of the individual annunciator e , whereby this annunciator is caused to remain inert or irresponsive. The operating coil only of the clearing-out annunciator is energized, however, and this annunciator responds to the signaling current and indicates the signal for disconnection. A further portion of the current escapes through both conductors h and h' to the line conductors b^2 b^3 of line to station 2 and from these lines through the two magnets of the individual annunciator e' and through the bell at substation 2; but the individual annunciator of this line is also not operated since both its magnets are energized. Thus neither of the individual annunciators displays its indicator, while the clearing-out annunciator is operated and signifies to the attendant that the connection between the lines is no longer desired. When the plugs g g' have been removed from the springjacks, the circuits are restored to the condition in which their annunciators are free to respond to call signals from their respective stations.

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

1. The combination with the two limbs of a telephone line extending from a substation to a central office, of a signal bell bridged between the limbs at a substation, a self-restoring annunciator at the central office having its two magnets in series in a bridge between the two limbs, and a source of signaling current connected in a bridge between the two limbs, whereby the signaling bell is operated while the annunciator is reset and prevented from displaying its indicator, substantially as described.

2. The combination with springjacks upon a multiple switchboard each comprising two insulated contacts, of conductors connecting the like contact points of the different springjacks together, a self-restoring annunciator having one of its magnets connected with each of said conductors, a connecting plug inserted into the springjack having one contact piece making connection with the restoring coil of the annunciator, a manually operated key adapted to connect a source of electric current with said contact piece of the plug, whereby the annunciator may be reset by momentarily operating the key while connection exists with the line, substantially as described.

3. The combination with a connecting plug, of the operating magnet of an annunciator connected therewith, said annunciator being provided with a retaining or restoring electromagnet adapted, when energized, to prevent the actuation of the indicator of the annunciator, a generator of signal current, a key for connecting the source of signaling current with the connecting plug, and means for energizing the retaining or restoring magnet of the annunciator simultaneously with the sending of signaling current to prevent the operation of the clearing-out annunciator thereby, substantially as described.

4. The combination with two connecting plugs, of continuous conductors connecting the like parts of the two plugs together, a self-restoring annunciator having its operating coil connected with the plug circuit, a generator of signaling current, a key for connecting the same with the plug circuit, the restoring or retaining coil of the self-restoring annunciator being included in the normally open circuit of the generator, substantially as described.

In witness whereof I hereunto subscribe my name this 22d day of March, A. D. 1893.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,
LUCILE RUSSELL.