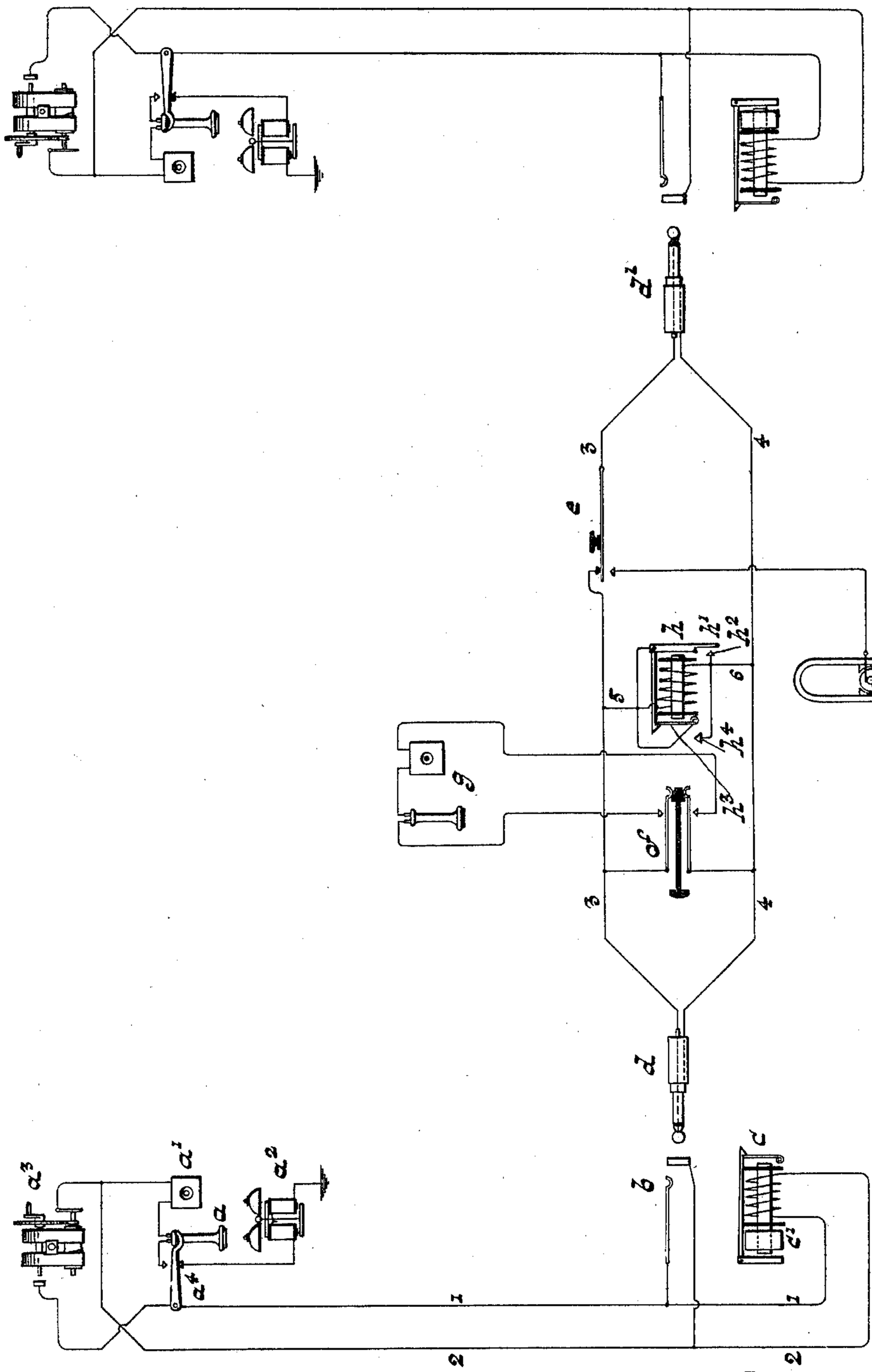
(No Model.)

F. R. McBERTY.

TELEPHONE SWITCHBOARD APPARATUS.

No. 592,431. Patented Oct. 26, 1897.



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TELEPHONE-SWITCHBOARD APPARATUS.

SPECIFICATION forming part of Letters Patent No. 592,431, dated October 26, 1897.

Application filed September 25, 1896. Serial No. 606,944. (No model.)

To all whom it may concern:

Be it known that I, FRANK R. McBERTY, a citizen of the United States, residing at Downer's Grove, in the county of Du Page and State of Illinois, have invented a certain new and useful Improvement in Telephone-Switchboard Apparatus, (Case No. 42,) 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 concerns the operation of signals of telephone-lines in telephone-switchboards; and it consists in means for preventing the operation of the line-annunciator by the clearing-out signal usually sent at the termination of conversation over two connected lines.

As is well known in exchange systems of the most common type each line is equipped with means at the substation for producing current in the line and with a line-annunciator in the switchboard responsive to such current, and in the switchboard are provided pairs of plugs and plug-circuits for uniting lines, and a clearing-out annunciator connected with the plug-circuit and thus adapted to become temporarily associated with two connected lines to respond to signaling-current. It is customary to transmit a signaling-current for the initial call-signal to operate the line-annunciator, and to transmit a further similar signal to indicate the termination of conversation, which latter signal should operate the clearing-out annunciator. It is generally desirable, and in switchboards of the multiple type is essential, that the line-annunciator shall fail to respond to this signal for disconnection, although still connected with the line-circuit.

The present invention consists in the employment of a line-annunciator slowly responsive to the signaling-current, a clearing-out annunciator or equivalent electromagnet constructed to respond more quickly to a signaling-current, and switch-contacts or other mechanism controlled by the quickly-responding magnet to render the line-annunciator inert or unresponsive. Several specific methods may be employed to effect this result; but to illustrate the invention generally I will describe in the present application a device in which the response of the clearing-out annunciator causes the instant short-circuiting of the line-annunciators and thus prevents their operation. In connection with a telephone-line provided at the substation with a generator of alternating signaling-currents I employ a line-annunciator which responds slowly or with a delayed action to signaling-current through it. An annunciator of the type known as the "tubular drop" may be caused to operate in this way by placing about its magnet-core a closed conducting-circuit, as a copper tube or cylinder. The clearing-out annunciator adapted for use in connection with said lines may be of similar type, but should have a light armature, and should be adjusted to respond very promptly to the current sent to give the signal for disconnection. Some movable part of this annunciator is adapted to close switch-contacts when the annunciator becomes excited. The switch-contacts are connected in a normally open bridge to the plug-circuit.

As long as no connection exists with a line thus equipped a signaling-current produced in the line by means of the generator will cause the operation of the line-annunciator. After connection has been established with the line by means of a plug-circuit in response to this initial signal a disconnection signal will immediately cause the operation of the clearing-out annunciator, which will close the short-circuiting bridge of the plug-circuit and thus divert the signaling-current from the magnet of the line-annunciator. In case of two lines united through the agency of the plug-circuit the current will thus be diverted from both the line-annunciators and the response of either will be prevented.

The invention is shown in the drawing accompanying this specification.

The appliances at the substation may comprise the usual receiving-telephone a, transmitting-telephone a', polarized call-bell a^2, generator of signaling-current a^3, and a switch a^4, constructed to alternately complete the line-circuit through the telephones and close the circuit through the bell to earth.

The line-circuit 1 2 extends from the substation apparatus to a spring-jack *b* in the telephone-switchboard of the central office and is prolonged to the terminals of the line-annunciator *c*, which is thus included in a permanently-closed bridge of the line-circuit. This annunciator consists of the electromagnet in the line-circuit, a pivoted armature for the electromagnet, a catch carried by the armature, and an indicating-shutter normally engaged by the catch and retained in an upright position. The core of the annunciator is surrounded at the extremity adjacent to the armature by a heavy ring *c'*, of copper, for the purpose of making the electromagnet sluggish in its response to alternating currents.

The operator at the switchboard is furnished with pairs of connecting-plugs *d* and *d'*, adapted for insertion into the spring-jacks. Like parts of the two plugs are connected together by conductors 3 and 4, which constitute the plug-circuit. The switch-contacts of the usual calling-key *e* are interposed in the plug-circuit, and a listening-key *f* is associated with it and arranged to connect the operator's telephone *g* in a branch of the plug-circuit when the key is depressed.

A clearing-out annunciator *h* has its magnet connected in a permanently-closed bridge of the plug-circuit. This magnet should, of course, be of high resistance and impedance. Its armature should be light and constructed for quick response to current through the magnet. The armature carries, in addition to the usual shutter-controlling catch, a contact-point *h'*, which is arranged to impinge upon contact-anvil h^2 when the armature is drawn toward the magnet to a sufficient extent to release the shutter. I have also provided in connection with the shutter a contact-point lying in the path of the shutter, on which the latter shall rest upon its release and fall. The frame of the annunciator, which is in electrical connection with both the armature-contact *h'* and the indicator h^3, is connected by a wire 5 with one conductor of the plug-circuit. Contact-anvils h^2 and h^4 are connected with the wire 6, leading to conductor 4 of the plug-circuit. These contact-points and conductors thus constitute a short-circuiting bridge of the plug-circuit normally open at two points.

In the normal or unconnected condition of the line the operation of the calling-generator a^3 at the substation produces in the line-circuit an alternating current which eventually causes the release and display of the indicator of annunciator *c*. The operator responds to this initial call-signal by inserting a plug *d* into the spring-jack *b* of the line, learns the subscriber's order for the correspondent line, and inserts the other plug *d'* into the spring-jack of that line. The clearing-out annunciator *h* is thus brought into a bridge of the united line-circuits.

At the termination of conversation one or both of the conversing subscribers will transmit a signal for disconnection by rotating his generator of signaling-current. A shunted portion of this signaling-current will traverse the magnets of the line-annunciator of each of the connected lines. A third portion will find path through the clearing-out annunciator *h*. The latter will respond to the current first, and in so doing will close the short circuit 5 6 of the plug-circuit 3 4, thereby diverting the entire signaling-current from the magnets of the different annunciators. The first movement of the armature of clearing-out annunciator *h* will close the contact-points *h' h²*, whereby the magnet of the clearing-out annunciator will be deënergized and the armature will be caused to fall back, but the initial movement of the same armature will have released the shutter h^3 and permitted it to fall upon the contact h^4, whereby a permanent bridge of the circuit will have been closed. Thereafter no portion of the signaling-current will traverse any of the annunciators.

It will be apparent that the prevention of the display of the line-annunciator by the clearing-out annunciator may be attained by any of several modifications of the essential feature of this invention—namely, causing the operation of the clearing-out annunciator to put into operation a device for rendering the line-annunciators inoperative.

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

1. The combination with a telephone-line having means for producing signaling-current in the line, of a line-annunciator connected therewith, a clearing-out annunciator also connected with the line, switch-contacts actuated by the clearing-out annunciator in its response, and circuits controlled by the switch adapted to render the line-annunciator inoperative; as described.

2. The combination with a telephone-line and means for producing current in the line, of a line-annunciator permanently connected with the line, a clearing-out annunciator, and means for temporarily connecting the clearing-out annunciator with the line, switch-contacts actuated by the clearing-out annunciator and a device controlled by the switch-contacts adapted to prevent the actuation of the line-annunciator; as described.

3. The combination with a telephone-line, means for producing current in the line and a line-annunciator permanently connected with the line, of a clearing-out annunciator and means for connecting it temporarily with the line, switch-contacts controlled by the clearing-out annunciator, and circuit connections controlled by the switch adapted to divert the current from the line-annunciator; as described.

4. The combination with the telephone-line, means for producing signaling-current in the line and a line-annunciator connected

with the line, the line-annunciator being adapted to respond sluggishly to the signaling-current, of a clearing-out annunciator constructed to respond quickly to the signaling-current, means for connecting the clearing-out annunciator to the line and circuit connections controlled by the clearing-out annunciator in its response, adapted to render the line-annunciator inoperative; as described.

In witness whereof I hereunto subscribe my name this 30th day of July, A. D. 1896.

FRANK R. McBERTY.

Witnesses:

ELLA EDLER,

MYSTA F. GREEN.