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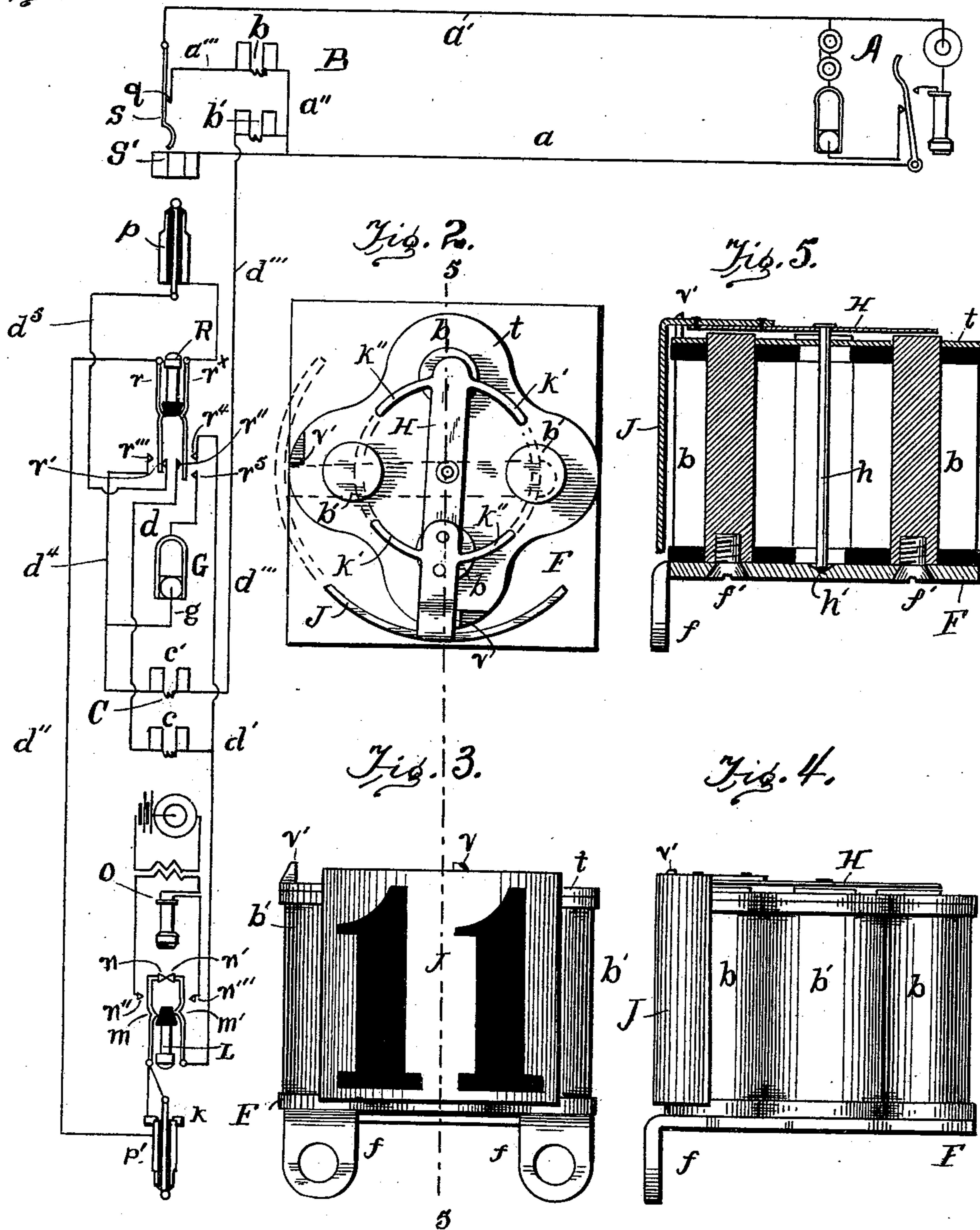
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TELEPHONE SWITCHBOARD SYSTEM AND ANNUNCIATOR.

(Application filed Apr. 27, 1898.)

(No Model.)

Fig. 1.



WITNESSES

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TELEPHONE-SWITCHBOARD SYSTEM AND ANNUNCIATOR.

SPECIFICATION forming part of Letters Patent No. 622,268, dated April 4, 1899.

Application filed April 27, 1898. Serial No. 678,950. (No model.)

To all whom it may concern:

Be it known that I, GEORGE BRANNER RODGERS, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented certain new and useful Improvements in Telephone-Switchboard Systems and Annunciators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to telephone-switchboards, and particularly to annunciators and the circuits acting in connection therewith. Heretofore annunciators have been employed in which a shutter at the central office automatically dropped when the particular substation to which the annunciator related sent in a call, the restoration of the annunciator being automatically accomplished, but against the action of gravity. Furthermore, in some systems an extra spring-contact has been introduced into the spring-jack to effect the restoration of the circuit to the annunciator, thus complicating the spring-jack, adding to its original cost, and increasing its liability to get out of order. A constant generator-circuit has been employed in some instances to restore the annunciators with the resultant annoyances due to induction-currents created thereby. Another disadvantageous circumstance in connection with the restoration of some annunciators lies in the fact that such restoration necessitates some extra motion on the part of the operator which would otherwise be unnecessary.

In my invention I have provided an annunciator and a mode of connecting it to the line-circuit whereby it is necessary to employ but one current on the switchboard to restore the annunciators and ring a called subscriber, avoiding the objections to a constant current from the generator on the spring-jack system. I accomplish the restoration of the annunciators through the action of this single current without any additional or extra parts in connection with the spring-jack and without requiring the operator to make any motion solely for restoration. Moreover, the annunciator does not in the act of restoration move against gravity. To these ends I have constructed an annunciator having a

pair of line or calling coils symmetrically but alternately arranged on a suitable base-piece, to which base-piece is centrally pivoted an armature free to swing from one pair of magnets to the other. Attached to the armature is a shutter bearing a number or other symbol, which shutter is turned into view of the operator by the action of the armature when a calling-current is sent through the line or calling coils and which is turned out of view when the position of the armature is changed by the passage of a current through the restoring-coils. Instead of placing an extra spring member in the spring-jack to switch in the restoring-current to the annunciator I provide a third or additional anvil in connection with the operator's ringing-button, so that in the act of ringing up the substation called for the operator automatically closes the circuit from the generator through the restoring-coils of the annunciator, and thus causes the armature with its attached symbol-bearing shutter to swing to restored position. At the same time I provide means whereby the operator's telephone may be put in connection with the calling-substation without the use of the usual listening-jack, the operator being required only to insert the plug in the spring-jack of the calling-substation and press the listening-button.

I have illustrated one form which my invention may assume in the accompanying drawings, forming part of this specification, in which—

Figure 1 is a diagrammatic view showing a calling-station connected by a line-circuit with an annunciator and a terminal spring-jack in the switchboard of the central station and a plug-circuit for uniting said calling-station with any other desired substation. Fig. 2 is a plan view of the annunciator; Fig. 3, a front elevation of Fig. 2 with the shutter in calling position. Fig. 4 is a side view of Fig. 3, and Fig. 5 is a vertical sectional view taken on the line 5 5 of Figs. 2 and 3.

Like letters refer to like parts throughout all the views.

Referring to Fig. 1, A is the instrument at the substation, the parts being shown in calling position, and B is the annunciator corresponding to the instrument A on the switchboard of the central office, b being the pair of

line or calling coils, and b' the pair of restoring-coils. S represents the spring member of the spring-jack, and p the plug of the plug-circuit for insertion into the spring-jack in response to initial-call signals, p' being the corresponding plug at the opposite end of the plug-circuit.

O represents the operator's instrument, and L the listening-button, by pressing which the operator's instrument may be included in the line-circuit.

C is the clearing-out annunciator, in which c indicates the clearing-coils, and c' the restoring-coils.

G represents the generator, and R the operator's ringing-button, by means of which the current from the generator G is switched onto the main line through the plug p' to ring the bell of the subscriber, into whose spring-jack the plug p' may be inserted, the current at the same time passing through the restoring-coils of the calling-subscriber's and the clearing-out annunciators. The spring-arms r r^x of the ringing-button R normally rest against the anvils r' r'' ; but the circuits from these two anvils are opened when the ringing-button R is pressed and the spring-arms r leave the said anvils. At the same time contact is made between the springs r and the anvils r''' r^4 r^5 , establishing their respective circuits. At the listening-button L the anvil-points n n' are normally in contact, permitting the current to pass without entering the operator's instrument O ; but upon pressing the button L the springs m m' contact with the anvils n'' n''' , compelling the current to pass through the operator's instrument O . When a call is sent in from substation A , the circuit is complete through the line a a' , calling-coils b , wire a'' , spring-jack member S , and line a' . Upon the operator inserting the plug p into the socket S' of the spring-jack the spring member S of the jack is lifted off of the anvil q , thereby cutting the calling-coils of the annunciator B out of circuit. The operator then presses the listening-button L , and circuit is closed from substation A through the line a , spring-jack socket S' , sleeve of plug p , spring r^x , anvil r'' , wire d , coils c , wire d' , spring m' , anvil n''' , operator's instrument O , anvil n'' , spring m , metallic socket k , which is in electrical connection with sleeve of plug p' , thence by wire d'' to spring r , to anvil r' , wire d^5 , stem of plug p , spring-jack member S , and line-wire a' to substation A . It will be noticed that in this circuit there is no impedance due to the line-annunciator B , as its coils are entirely eliminated from the circuit, and that but two movements upon the part of the operator are necessary to put her in communication with substation A —viz., inserting the plug p into the spring-jack and pressing the listening-button. Upon receiving from substation A directions as to the subscriber with whom he wishes to be connected the operator raises the plug p' from its socket k and inserts it into the spring-jack of the

subscriber whom she wishes to call. She then presses the ringing-button R , thereby throwing the springs r r^x out of contact with anvils r' r'' and causing spring r to contact with anvil r''' and the spring r^x to contact with anvils r^4 r^5 . Circuit is now closed from the generator G through anvil r^5 , spring r^x , sleeve of plug p , spring-jack socket S' , line a , wire a'' , restoring-coils b' , wire d''' , coils c' of clearing-out annunciator C , wires d^4 and g to generator G . This circuit is closed only when the ringing-button R is pressed, and the current thus passed through the restoring-coils b' c' of the line and clearing annunciators restores the annunciators to their non-indicating positions, as will be hereinafter more fully described. The pressure of the ringing-button not only closes a circuit from the generator through the restoring-coils b' c' of the annunciators, but also through the bell of the called station, as follows: generator G to anvil r^5 , spring r^x , anvil r^4 , wire d' , spring m' , anvils n' n , spring m , stem of plug p' , line-wires to called station, return over sleeve of plug p' , wire d'' , spring r , anvil r''' , wires d^4 and g to generator G . It will thus be seen that in the act of ringing up the called station the operator closes the circuit from the generator through the restoring-coils of the line and clearing-out annunciators, thus restoring the annunciators without any movement on her part other than those usually employed, and that the arrangement of the system is such that no constant current from the generator is on the system. I am thus enabled to avoid the annoying induction-currents experienced when a constant generator-current is employed, and I also accomplish the restoration of the annunciator without requiring the operator to make any additional motion for this purpose.

While the operation of the general system just described is not dependent upon the employment of any particular form of annunciator, I prefer to use an annunciator which I have devised and which is illustrated in Figs. 2, 3, 4, and 5, in which F indicates a base-plate suitably supported, as by ears f , by which it may be attached to the switchboard. Mounted upon this base F are the line-coils b and the restoring-coils b' , symmetrically arranged, so that a plane passing through the longitudinal axes of the restoring-coils will intersect, preferably at a right angle, a plane passing through the longitudinal axes of the line-coils. The soft-iron cores of all the coils are attached in any suitable manner, as by screws f' , to the base-plate F , and at the opposite end are united to a plate t . An armature H is mounted to turn in a plane at right angles to the longitudinal axes of the coils. The particular means employed in thus mounting the armature is immaterial, it being only essential that it act readily in response to the attraction of the respective coils. I have shown the armature H as attached to a pin or arbor h , passing through an open-

ing in the plate t and resting on its pointed end h' in a centrally-located depression in the base-plate F . The armature may be a plain bar, preferably of sufficient length to extend from core to core of the respective pairs of coils; but I have shown a form which I deem more desirable than the plain bar—that is, I attach to the plain bar and on each side thereof, near its ends, wings or arms $k' k''$, preferably bent or curved, so that when the armature H is resting over one pair of coils—as, for example, the line-coils b —the wings or arms $k' k''$ will extend toward and upon the opposite sides of the other coils, which in the example taken would be the restoring-coils b' . Attached to the armature H is a shutter J , which, as here shown, is at right angles to the plane of the armature and moves with the latter, describing an arc around the pin h as a center. Upon the shutter J is a symbol, which may be the number of the substation to which the annunciator corresponds, here shown as the number “11.” Suitable stops $v v'$ are arranged to limit the turning or swinging movements of the armature within an arc preferably a little less than ninety degrees, so that when the armature rests over one pair of coils the ends of two of the arms $k' k''$ on the same side of the armature will be at unequal distances from the core of the coil included between them. This will be seen by inspecting Fig. 2, where it is apparent that the stop v is so placed that the armature will be stopped thereby before it has quite reached a position at right angles to a line connecting the centers of the coils b' . The result is that the ends of the arms or wings k' are nearer to the coils b' than are the ends of the arms or wings k'' , and when the armature is turned to the position shown in dotted lines, Fig. 2, it is stopped by the stop v' , with the ends of the arms or wings k'' nearer the coils b than are the ends of the arms or wings k' . The result of this construction is that the armature always moves in the direction of the arm that lies nearest to the coil. Thus in Fig. 2 the armature will move in the direction to carry the shutter from full-line position J to the dotted-line position J' , because the ends of the arms k' are nearer the coils b' than are the ends of the arms k'' .

The operation of the annunciator is as follows: The armature H normally rests over the restoring-coils b' , with the shutter in the dotted-line position shown in Fig. 2, and when a call is sent in from the substation corresponding to the annunciator the current passes through the line-coils b , magnetizing their cores, and these attract the armature. The armature then turns from the dotted-line position J' to the full-line position J of Fig. 2 and carries the shutter to a position to display the symbol “11” to the operator. By the insertion of the plug p in the spring-jack the line-coils b are cut out, and hence deenergized, and when the operator presses the ringing-button R the circuit from the generator G is closed through

the restoring-coils b' , and the armature is shifted from indicating or full-line position of Figs. 2 and 3 to non-indicating or dotted-line position of Fig. 2. It is not essential to the operation of the annunciator that it be placed in a vertical position, as shown in the drawings, as it may, if desired, be placed horizontally or otherwise. One advantage attaching to the vertical position, however, is that in shifting the shutter from one position to another the coils never have to overcome the action of gravity, as is the case when shutters of the drop class are employed. It will be observed that the operations of the annunciator are accomplished without the use of a constant generator-current, without imposing any additional motions upon the operator for this purpose, and without complicating the spring-jack by extra springs or other additional members.

I wish it understood that my invention contemplates the use of either an alternating or direct current to accomplish the restoration of the annunciator, and while I have shown the annunciator as operated by a current from the same generator used in the plug-circuit to supply the ringing-current for a called station it is evident that the ringing-button might switch in current from any other source to restore the annunciator, and I therefore wish it distinctly understood that my invention includes such use of additional currents.

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

1. In a telephone-exchange system, the combination of a connecting plug-circuit, an annunciator, a generator in a normally open circuit including the restoring-electromagnet of the annunciator, and means for simultaneously severing the plug-circuit, switching the generator into connection with one portion thereof and closing the normally open circuit, substantially as described.

2. In a telephone-exchange system, the combination of a connecting plug-circuit, a generator, an annunciator, a normally open circuit including the generator and the annunciator, a ringing-button, and means operated by the ringing-button to sever the plug-circuit, to close said open circuit, and to connect the latter to a severed portion of the former, substantially as described.

3. In a telephone-exchange system a line-annunciator having an actuating and a restoring coil, a spring-jack, a plug-circuit, means conducting a calling-current through the actuating-coil alone when the plug-circuit is disconnected from the jack, a generator, a ringing-key, means opening the circuit through the actuating-coil upon the connection of the plug-circuit with the spring-jack, and means actuated by the ringing-key and closing the generator-circuit through the restoring-coil alone when said key is operated.

4. In a telephone-exchange system, the combination of a connecting plug-circuit, an an-

nunciator having line-coils included in a circuit with a substation and one member of a spring-jack, said circuit adapted to be opened when the plug is inserted in the jack, a generator, a circuit including the generator and restoring-coils of the annunciator, which circuit is normally open at two points one of which is closed by the insertion of the plug in the spring-jack, and means for closing said circuit at the other point, substantially as described.

5. In a telephone-exchange system, the combination of a connecting plug-circuit, a generator, an annunciator having a line or calling coil and a restoring-coil and a shutter-bearing armature pivoted to swing from one coil to the other, a normally open circuit including the generator, the restoring-coil of the annunciator, and means for simultaneously severing the plug-circuit, switching the generator into connection with one portion thereof and closing the normally open circuit.

6. In a telephone-exchange system, the combination of a connecting plug-circuit, a generator normally excluded from said circuit, a clearing-out annunciator, a line-annunciator, a normally open circuit including the generator and the restoring-coils of both said annunciators, a ringing-button, and means operated by the ringing-button to simultaneously sever the plug-circuit to switch the generator into connection with a severed portion thereof and to close said normally open circuit, substantially as described.

7. In a telephone-exchange system, a subscriber's line, a spring-jack, and annunciator therefor, an actuating and a restoring coil for the annunciator, a plug-circuit, a generator,

and a key for severing the plug-circuit and connecting the generator to the forward portion of the plug-circuit and to the restoring-coil of the annunciator, substantially as described.

8. An annunciator having a pair of line and a pair of restoring magnet-coils, said coils being alternately arranged so that a plane passed through the longitudinal axes of the line-coils would intersect a plane passed through the longitudinal axes of the restoring-coils, an armature normally over one pair of coils pivoted to swing from one pair of coils to the other, and arms on opposite sides of the armature extending toward one pair of magnet-coils when the armature rests over the other pair, and stops limiting the swing of the armature, substantially as described.

9. An annunciator having a pair of line and a pair of restoring coils, said coils being alternately arranged so that a plane passed through the longitudinal axes of the line-coils would intersect a plane passed through the longitudinal axes of the restoring-coils, an armature normally over one pair of coils pivoted to swing from one pair of coils to the other, arms on opposite sides of the armature and extending toward the magnet-coils of one pair when the armature rests over the other pair, and means stopping said armature so that said arms are nearer to one side of said coils than to the other, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE BRANNER RODGERS.

Witnesses:

JOHN D. CALDWELL,
JAS. H. WELCKER.