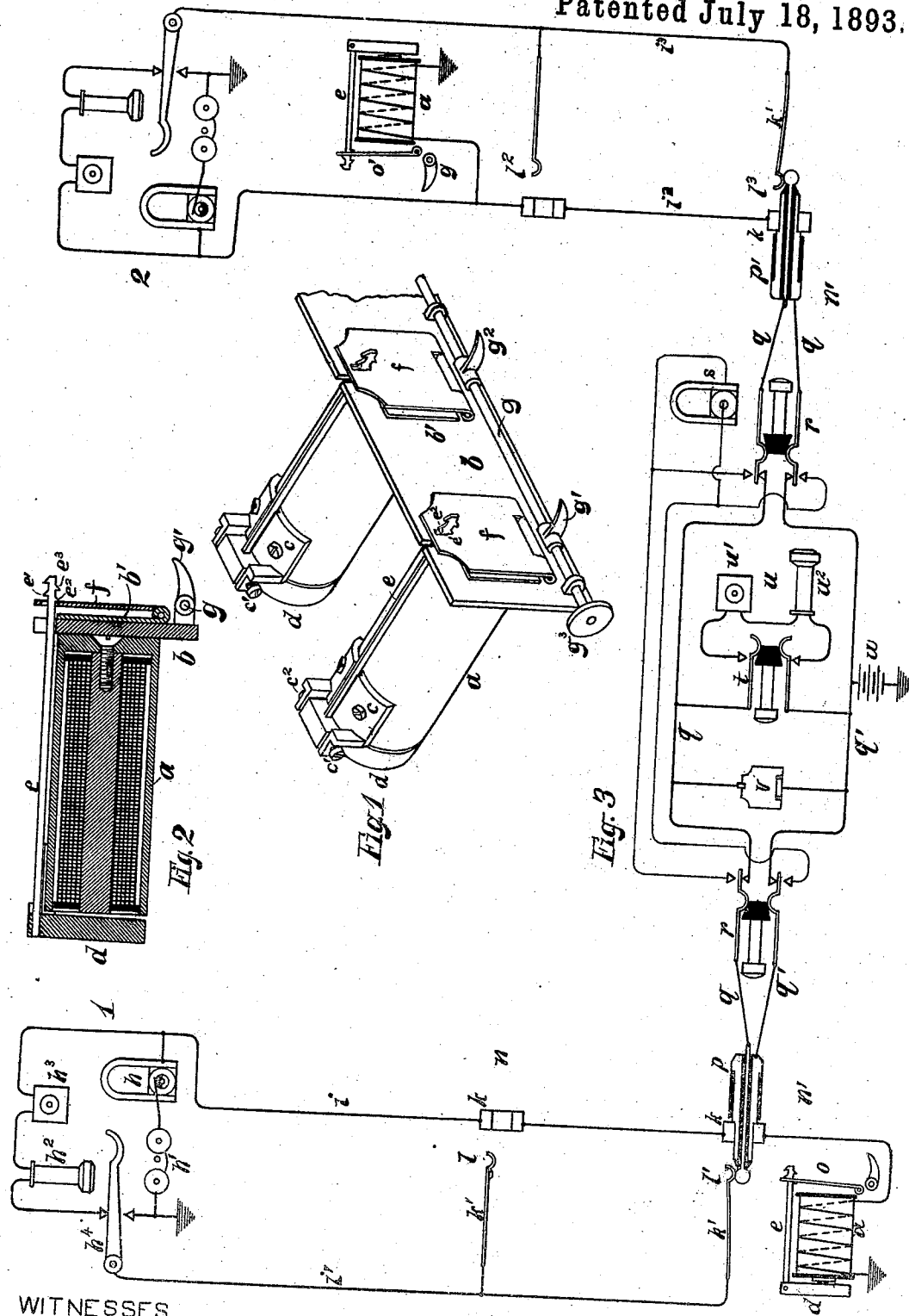


(No Model.)

C. E. SCRIBNER.
MULTIPLE SWITCHBOARD FOR TELEPHONE EXCHANGES.
No. 501,847.
Patented July 18, 1893.



WITNESSES

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CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

MULTIPLE SWITCHBOARD FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 501,847, dated July 18, 1893.

Application filed July 30, 1892. Serial No. 441,764. (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 Multiple Switchboards for Telephone-Exchanges (Case No. 308,) 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 circuits and apparatus for multiple switchboards of telephone exchanges, more particularly to that class of switchboards in which the spring jacks of a telephone line are connected in parallel with each other with the line, and in which the individual annunciator of the line is permanently connected therewith.

The object of my invention is to provide means for preventing the actuation of the individual annunciator by call signals sent over the line subsequently to the establishment of connection therewith, such as calling signals sent from the exchange to the substation.

In my improved exchange system I provide an individual annunciator which is adapted to be actuated by a succession of pulsations of current but to be retained inoperative by a continuous current, and in connection with the operator's cord outfit or connecting appliances, I provide a battery, or other source of electricity, and circuits so arranged that when connection is established with the line, the battery finds circuit through the individual annunciator and retains the same unresponsive to currents sent thereafter.

I have described and illustrated such an annunciator in my patent on "clearing-out annunciator, No. 383,015." The annunciator comprises an electro-magnet and a pivoted armature therefor and a pivoted shutter normally retained in a vertical position by a catch upon the extremity of an arm attached to the movable armature; said catch is constructed with several teeth arranged alternately upon the upper and under side of the arm, and engages with the upper or lower edge of an opening in the shutter through which it projects. Thus when the catch is in

either of its extreme positions, the shutter is prevented from falling, but if the armature be caused to vibrate several times, the armature falls outward by successive movements and displays a suitable signal to the attending operator.

For my invention herein I provide a calling device at the substation adapted to send pulsating or alternating currents; whereby a subscriber by operating his signal sending device, may release the indicator of his annunciator at the exchange, but, as I have before described, when the operator has made connection with the line by means of her connecting outfit, the circuit of a battery at the exchange is closed through the annunciator, continuously energizing the magnet thereof and preventing a fall of the shutter by the engagement therewith of another of the teeth or projections upon the arm. Each time that connection is thus made with the line, however, the battery causes the shutter of the annunciator to fall forward one step, whereby several successive connections with the line would entirely release the shutter. I therefore provide a resetting device in connection with the annunciators of the exchange whereby the shutters of the annunciators may be periodically reset such periods of resetting being made so frequent as to prevent the entire release of the shutter.

My invention is illustrated in the accompanying drawings.

Figure 1 of the drawings is an isometric perspective view of two annunciators mounted upon a common supporting strip or plate and provided with a resetting device. Fig. 2 is a vertical longitudinal central section of an annunciator. Fig. 3 is a diagram showing the circuits of the various apparatus employed in my invention.

I will indicate parts in the drawings by letters of reference, like parts being indicated by similar letters of reference.

Referring to Figs. 1 and 2, *a* is a tubular magnet secured by means of its closed end to a supporting plate *b*. At its rear portion is carried a bracket *c* provided with trunnions *c'* and *c''* on which is journaled an armature *d*. The armature *d* carries an arm *e* which projects forward to the front of the drop and

is provided at its forward extremity with several teeth e' and e^2 upon the upper and lower sides of the arm, a tooth on the lower side corresponding in position with a space upon the upper side. Upon the front plate b of the drop is secured a plate b' having at its lower edge a curved portion which constitutes a hinge or pivotal support for the shutter f . This shutter is provided with a rectangular opening near its upper edge through which the arm e projects. One tooth e^2 normally engages with the lower edge of the opening through the shutter f and prevents the shutter f from falling forward. When the armature d is attracted the tooth e^2 is raised out of engagement with the shutter and the shutter falls forward until it engages with the tooth e' on the upper side of the arm e , whereby it is again retained. When the magnet a becomes de-energized, the arm e again drops into its normal position, the shutter f falling against the tooth e^2 , however, and being retained thereby. Then in case the magnet a is again energized, the shutter is allowed to fall forward still farther, and by a sufficient number of intermittent magnetizations of the magnet a , the shutter may be entirely released when it will fall into a horizontal position and will disclose the number or name on the face of the plate b' to the attending operator. A rod g , journaled in suitable bearings on the plate b carries arms g' g^2 normally resting in a horizontal position but so disposed and formed that when the rod g is rotated toward the left the arms g' g^2 will engage with the corresponding shutters upon the different drops and will push the same back to their normal positions, thus resetting the annunciators. The head g^3 is provided at one extremity of the rod whereby the rod may be rotated from time to time to reset all of the annunciators of the strip.

Referring now to Fig. 3, I will describe the circuit connections of my improved exchange system. In Fig. 3 I have shown two substations each connected by a line circuit with spring jacks at the exchange, and with an individual annunciator thereat, and an operator's outfit, the latter being shown in the position of connecting the two substations.

The apparatus at the substation—for example, that of station 1 at the left of the drawings—comprises a calling generator h and signal bell h' in the branch from one side i of the line circuit, a telephone receiver h^2 , transmitter h^3 in another branch from the same side of the line, and a switch hook h^4 connected with the remaining side i' of the line circuit and adapted to switch the signal apparatus or the telephone apparatus alternately in the circuit between the two sides i i' of the line circuit. Calling generator h is adapted to send pulsating currents in a well known manner. A ground connection extends from that branch which contains the calling apparatus to earth in order that calling current may be sent to the exchange either

over a metallic circuit or a ground line of which side i constitutes the metallic portion. The lines i i' extend to the exchange whereat they are connected with the test rings k and line springs k' respectively, of two spring jacks l and l' which may be assumed to be situated upon two sections n and n' of a multiple switchboard. A connection extends from the side i of the line through the magnet a of an individual annunciator o at the board n' .

The apparatus at substation 2 and that at the exchange connected therewith are of similar character, the annunciator o' being located near the jack l^2 upon the board n , however, in order to be under the attendance of another operator. The operator's outfit is of the usual character. It comprises essentially a pair of loop plugs p p' each having two contact parts, the like parts of the two plugs being connected together through conductors q q' , ringing keys r r' included in the conductors q q' , each adapted to disconnect the contact pieces of one plug from those of the other and to connect them to the two poles of calling generator s . A listening key t is provided having its springs connected with the two conductors q q' ; its contact anvils form the terminals of an operator's telephone set u , so that by depressing the plunger of the key the operator is enabled to connect her telephone set in a bridge between the two sides of the cord circuit. A clearing-out drop v is also connected in a permanent bridge wire between the different sides of the cord circuit. One pole of a grounded battery w is permanently connected with the sleeve strand or conductor q' of the cord circuit.

A subscriber desiring to signal the exchange rotates his calling generator h thereby sending a pulsating current from earth at the substation—for example, substation 1—thence over the line i to the exchange where it finds circuit through the magnet a of the individual annunciator o and to earth. The pulsating current causes the armature of the annunciator o to be alternately attracted and released, thus allowing the shutter of the annunciator to fall outwardly by successive movements, as described, and indicating the signal to the operator at board n' . The operator, seeing the signal, inserts the plug p into spring jack l' of that line at her board, whereby the subscriber's line circuit is continued from the contact points k k' to the corresponding contact points of plug p , thence to the conductors q q' . When the subscriber has removed his telephone from the switch hook h^4 and the operator at the board n' has depressed the plunger of her listening key t , the operator and subscriber are enabled to communicate with each other and the subscriber gives to the operator the order for the desired connection,—say for connection with substation 2. When the plug was inserted into the spring jack l' , the circuit of the battery w was completed through the conductor q' to the

sleeve of the plug, thence to the test ring *k* of jack *l'*, thence through the annunciator *o* to earth. The armature *d* of the annunciator *o* is thus strongly attracted, raising the catch-arm to its highest limit of movement and thus engaging the tooth *e'* with the shutter and preventing the fall thereof. At the same time the test rings *k* of all of the other jacks of the line are electrified to a difference of potential from earth. The operator at board *n'* having received the order, proceeds to test the line called for to determine whether it is already in use or not, in the usual manner,—that is, by applying the tip of her remaining plug *p'* to the test ring *k* of the spring jack *l'* of line to station 2 at her board. If a connection already exists to that line at some other switchboard, the battery *w*, or a similar battery, is connected with the test rings, and at each application of the tip of the plug *p'* to the test ring, current will flow from the ring to the plug, thence through the conductor *q* and one-half of the operator's telephone receiver *w'* to earth, producing a click in the receiver which indicates to the operator that the line tested is in use. Suppose, however, that she finds the line to station 2 not in use. She then inserts the plug *p'* fully into jack *l'*. The two substations 1 and 2 are thus looped in a continuous metallic circuit which may be traced from the telephone set *h² h³* at substation 1, over the lines *i i'* to the different contact pieces of the spring jack *l'*, thence to the corresponding contact pieces of the plug *p*, thence to the conductors *q q'* of the cord circuit, thence to the corresponding portions of the plug *p'*, thence to the contact pieces *k k'* of the spring jack *l'* of line to station 2, thence over the lines *i² i³* to station 2 and through the telephone apparatus thereat. Upon the insertion of the plug *p'* into the spring jack *l'*, the circuit of the battery *w* is similarly completed through the annunciator *o'* locking it in position as before described with reference to annunciator *o*. The operator now by depressing the plunger of ringing key *r'* loops the calling generator *s* into circuit with line to station 2 and sends a call signal thereto, the calling current finding circuit over lines *i² i³* to the station and through the generator and signal bell thereat. When the subscribers have finished their conversation, one of them,—as for example, the one at station 1,—may send a clear-out or disconnection signal to the exchange by again rotating his generator *h*. The signaling current finds circuit over lines *i i'* to the exchange, thence to the conductors *q q'*, and thence through the clearing-out annunciator *v*, operating that annunciator and indicating the disconnection signal to the operator who made the connection. A portion of the signaling current escapes through the annunciator *o* to earth, but the armature of the annunciator *o* is already attracted to its fullest extent and held in that position by the force of the battery *w* whereby its operation by

signaling current is prevented. If one of the lines—for example, that to station 2—should be frequently called, each time that the battery *w* was connected with the circuit the shutter of the annunciator would be released and would fall outwardly one notch on the catch-arm *e* and would finally be entirely released. To prevent this the operator attending at board *n* rotates the rod *g* occasionally, resetting the shutter of the annunciator *o* each time.

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

1. The combination with an annunciator having an electro-magnet, a pivoted armature therefor, an indicator, and mechanism in connection with said armature and indicator adapted to actuate the indicator when the armature is vibrated between its extreme positions, of a circuit containing a source of pulsating currents, a source of continuous current and means for connecting said source of continuous current with the circuit, whereby the actuation of the indicator by pulsating currents may be prevented by connecting the source of continuous current with the said circuit, substantially as specified.

2. The combination with an annunciator having an electro-magnet, an indicator, and mechanism adapted to actuate said indicator, when said electro-magnet is intermittently energized by a pulsating current, but adapted to retain said indicator inoperative when the electro-magnet is continuously energized or de-energized, of a circuit containing said electro-magnet and a source of pulsating current, a source of continuous current, and means for connecting the same in said circuit, substantially as specified.

3. The combination with an annunciator having an electro-magnet, a pivoted armature therefor, an indicator, and a catch-arm carried by said armature having alternate teeth adapted to engage with said indicator when said armature is in either of its extreme positions, but to release the same when the armature is vibrated, of a conducting circuit including said electro-magnet and a source of pulsating current, a source of continuous current, and means for connecting said source of continuous current in circuit with said electro-magnet, substantially as described.

4. The combination with a telephone line circuit, of spring jacks connected therewith in multiple, an annunciator having an electro-magnet, a pivoted armature therefor, an indicator, and a catch-arm carried by said armature having alternate teeth adapted to engage with and to retain said indicator when the armature is in either of its extreme positions but to release the indicator when the armature is vibrated, a connecting plug adapted for insertion into a spring jack and having a conducting surface arranged to make contact with the corresponding contact piece of the spring jack, a cord circuit terminat-

ing in said plug, and a source of continuous current connected with said cord circuit, whereby the indicator of the annunciator may be operated by pulsating currents sent over the line when disconnected, but such operation is prevented when connection is made with the line, substantially as described.

5. The combination with a telephone line circuit of a grounded source of pulsating current connected therewith, spring jacks each having two contact pieces connected with the different sides respectively, of the line circuit, an annunciator in a ground branch from one side thereof having an electro-magnet, a pivoted armature therefor, an indicator, and a catch-arm provided with alternate teeth adapted to engage with and retain the said indicator when the armature is in either of its extreme positions, but to release the same when said armature is vibrated, a connecting plug for insertion into any spring jack, having contact pieces arranged to register with the corresponding contact pieces of a spring jack, and a source of continuous current in a ground branch from that contact piece of said plug which is arranged to connect with the side of the line circuit connected with said annunciator, substantially as described.

6. The combination with an annunciator having an electro-magnet, a pivoted armature therefor, an indicator, and a catch-arm provided with alternate teeth adapted to engage with and retain said indicator, when the armature is in either of its extreme positions but to release the indicator when the armature is vibrated, of a circuit including said electro-magnet and a source of pulsating cur-

rent, a source of continuous current, means for connecting said source of continuous current in said circuit, and means for periodically resetting said indicator, substantially as specified.

7. The combination with a telephone line circuit, of a grounded source of pulsating current connected with one side thereof, spring jacks each having two contact pieces connected with the different sides respectively of the line circuit, an annunciator in a ground branch having an electro-magnet, a pivoted armature therefor, an indicator, and a catch-arm carried by said armature, having alternate teeth adapted to engage with and retain said indicator when the armature is in either of its extreme positions, but to release the same when the armature is vibrated, a connecting plug for insertion into any spring jack, having contact pieces arranged to register with the corresponding contact pieces of a spring jack, a conducting circuit joining the different contact pieces of a plug, including a clearing-out annunciator, a source of current adapted to actuate said clearing-out annunciator, included in said line circuit, and a grounded source of continuous current connected with that contact piece of the connecting plug which connects with the side of the circuit containing the annunciator, substantially as specified.

In witness whereof I hereunto subscribe my name this 24th day of June, A. D. 1892.

CHARLES E. SCRIBNER.

Witnesses:

FRANK R. MCBERTY,
WALTER L. SMITH.