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Patented Jan. 17, 1899.

C. E. SCRIBNER.

LOCK-OUT MECHANISM FOR PARTY TELEPHONE LINES.

(Application filed June 21, 1897.)

(No Model.)

Fig. 1.

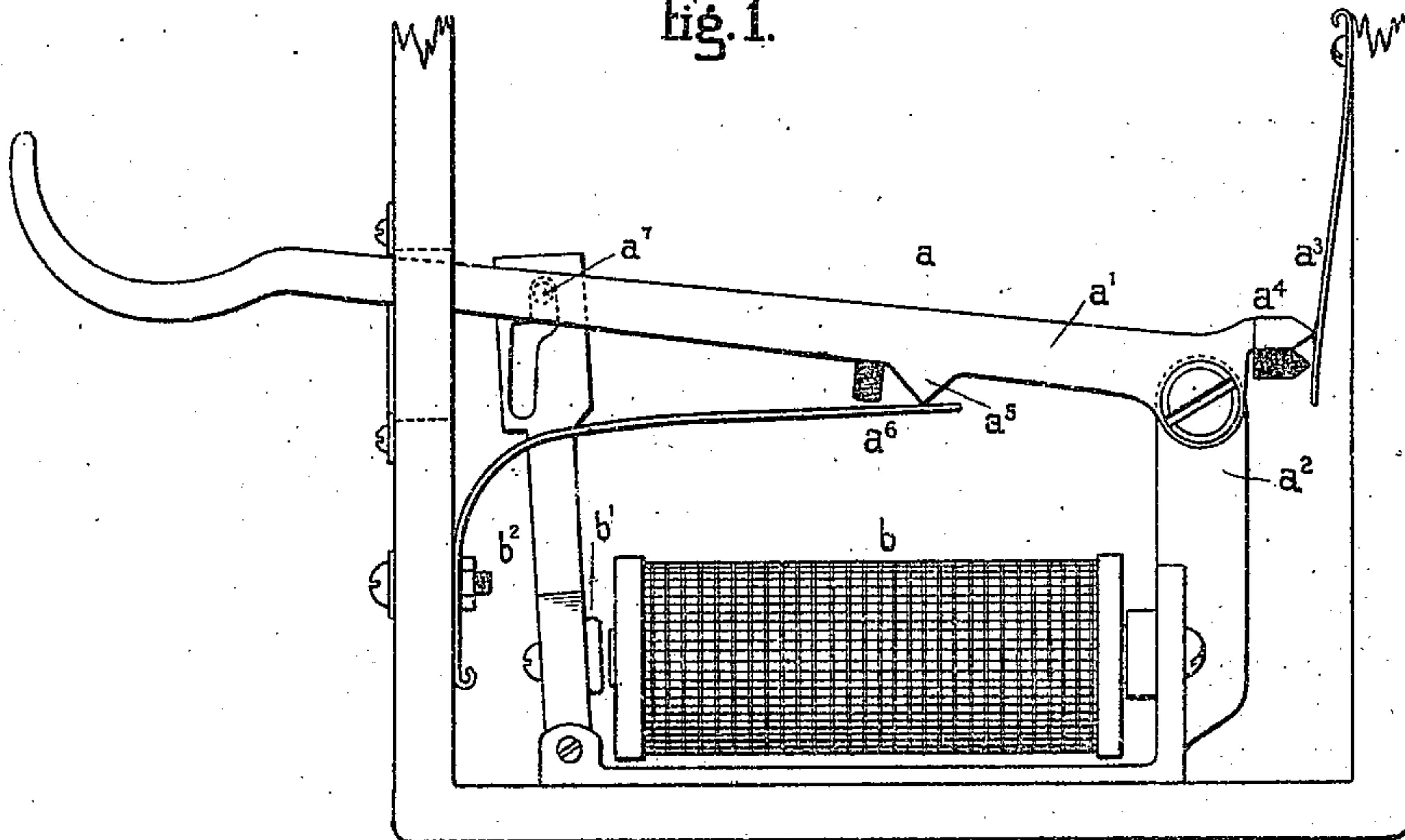


Fig. 2.

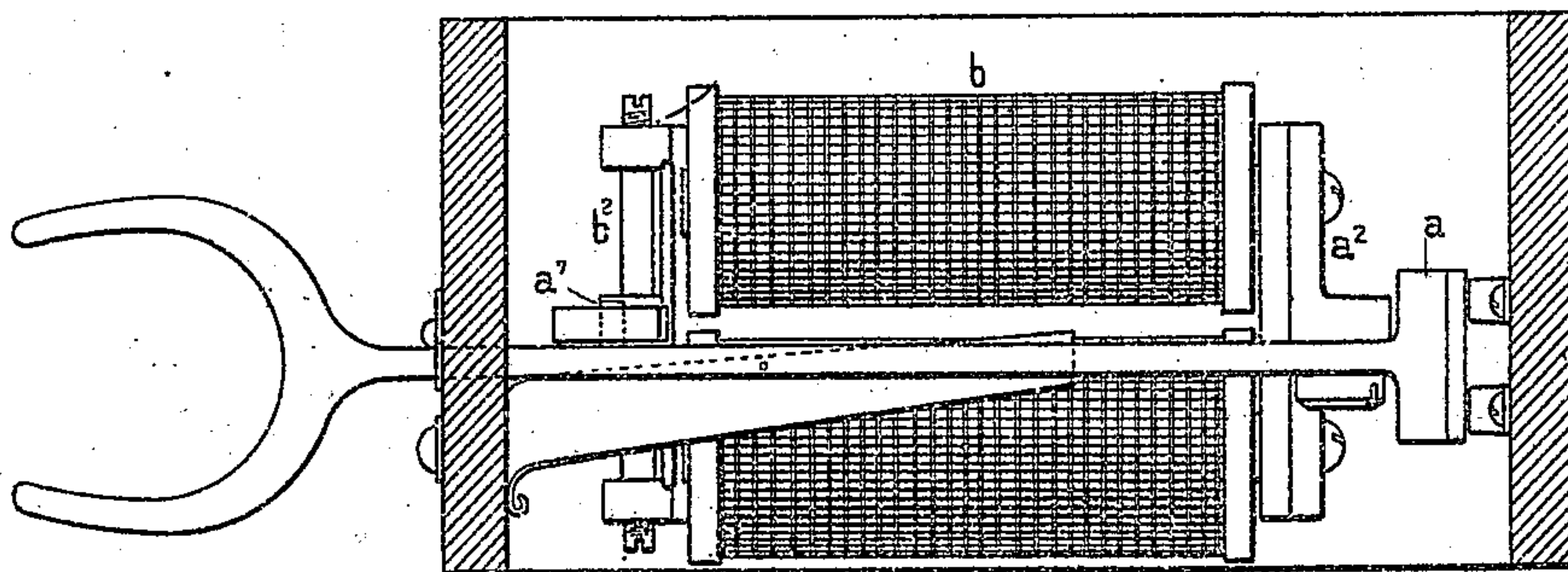
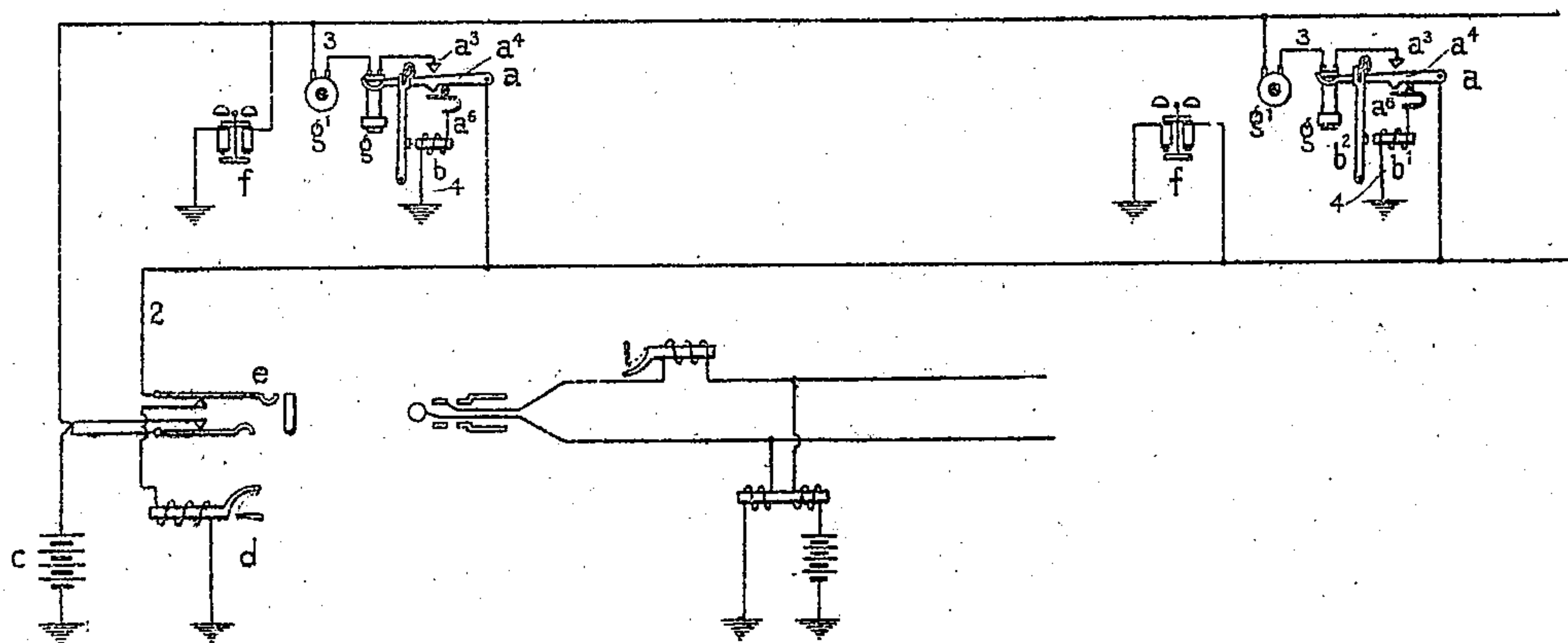


Fig. 3.



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UNITED STATES PATENT OFFICE.

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LOCK-OUT MECHANISM FOR PARTY TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 617,840, dated January 17, 1899.

Application filed June 21, 1897. Serial No. 641,668. (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 Lock-Out Mechanism for Party Telephone-Lines, (Case No. 450,) 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.

This invention concerns the mechanism placed at substations of party telephone-lines for preventing interference with the line at one station while the line is in use at another station. The improvement applies to such so-called "lock-out" devices in which the line is provided with means for creating current in its conductors continuously during the use of the line, together with a magnet at each station brought into connection with the line through the agency of the telephone-switch in taking the telephone for use, the magnet acting to break the circuit of the substation-telephone. In lock-out devices of this type difficulty has hitherto been experienced in attaining sufficient quickness of operation in the magnet during the change of position of the telephone-switch, the sluggishness of movement of the parts being due largely to the inertia of the armature.

The present invention aims to provide an arrangement of parts such that the movement of the armature prior to the application of current through the magnet controlling it is obviated, the armature being placed by suitable mechanical means in contact with its magnet-poles, so that the function of the magnet when traversed by current is merely to hold the armature in place when the latter is left free to move in case the magnet is excited by current in the line incident to its use.

The invention then consists in the combination with the conductor of a party telephone-line, a telephone-switch at each station, a magnet at each station controlling the connection of the telephone at the same station with the line conductor, and means for connecting this magnet with the line conductor in the movement of the telephone-switch, of a device actuated by the telephone-switch

when in its normal position for bringing the armature of the magnet into contact with its pole, and means at each station for producing current in the line conductor during the use of the telephone.

The invention is illustrated in the attached drawings and may be more clearly set forth in connection therewith.

Of the drawings, Figure 1 represents in side elevation a particular form of my improved lock-out device. Fig. 2 is a plan thereof; and Fig. 3 is a diagram showing the circuits of the party-line, the telephone, and the lock-out mechanism.

In the form of lock-out mechanism herein described the function of "locking out" the telephone at any substation is performed by a catch controlled by the lock-out magnet and engaging the lever of the telephone-switch to prevent the latter from rising and completing the circuit of the telephone.

In Figs. 1 and 2 the usual telephone-switch *a* is represented, comprising a lever *a'*, pivoted at one extremity of a suitable fixture *a²* and provided with the usual switch-contacts *a³a⁴* for completing the telephone-circuit. In addition to these switch-contacts the switch is provided also with a contact-point *a⁵*, which is adapted to impinge upon a spring *a⁶*, the same spring serving to impel the switch when relieved of the weight of the telephone as described in Patent No. 425,058, dated April 8, 1890. Associated with this switch-lever is an electromagnet *b*, provided with an armature *b'*, carried on lever *b²*, pivoted at its lower extremity, tending normally to fall away from the magnet. The upper extremity of lever *b²* carries a peculiarly-formed catch engaging a pin *a⁷* in the switch-lever *a'* and having two functions—namely, that of pressing the armature-lever forward to bring the armature into contact with the pole-pieces of the magnet when the switch is in its lower position and that of engaging the switch-lever when the armature-lever is attracted to prevent the rise of the switch-lever. To this end the lever *b²* is provided with a slot which throughout a portion of its length lies vertically in the lever. At a somewhat-higher point it is inclined toward the magnet, and at a still higher point it again extends nearly vertically.

At the upper end of the oblique portion of the slot a recess is formed which permits the metal of the lever to act as a catch for the pin a^7 , which travels in the slot. When the switch-lever is in its upper position, the pin a^7 lies near the upper extremity of the slot in lever b^2 and the armature b' is retracted from the magnet. If the switch-lever be forced downward, the pin a^7 , traveling in the slot, engages the oblique portion thereof and advances the armature into contact with the pole-pieces of the magnet. Simultaneously with the reaching of this position by the armature the pin enters upon the second vertical portion of the slot, so that the armature is retained in contact with its magnet as long as the telephone-switch lies in its lowest position. As the switch rises from this position it permits the armature to remain a moment in contact with its magnet, after which it rises through the oblique portion of the slot and, if the magnet be excited and retain the armature, it impinges upon the catch formed in the slot and is prevented from further movement. If, however, the magnet be inert, the lever falls backward, withdrawing the catch from engagement with pin a^7 and permitting the telephone-switch to finish its excursion. The spring a^6 is so adjusted with relation to its contact-anvil a^5 that these complete the electrical circuit which they control very early in the upward movement of the switch before the pin a^7 has left the lower vertical portion of the slot. The other switch-contacts $a^3 a^4$ are brought into connection with each other much later in the excursion of the switch after the pin a^7 has entered the upper vertical portion of the slot. The circuit controlled by contact-pieces $a^5 a^6$ is that through the magnet b , while the circuit controlled by contacts $a^3 a^4$ is that through the substation-telephone. From this the operation of the device will be apparent, namely: As the switch begins its upward movement it connects the magnet with the conductor of the telephone-line, after which, if the line be in use and current be present in it for exciting the magnet b , the magnet will retain its armature and cause the engagement of pin a^7 , preventing the further upward movement of the switch-lever. On the other hand, if when the contact-pieces $a^5 a^6$ become connected together no current is present in the line the magnet b will permit the retraction of its armature, and will thus allow the switch-lever to rise and complete the circuit of the substation-telephone.

A complete party line-circuit is represented in Fig. 3 extending to two substations and terminating at one extremity in switching and signaling apparatus of a telephone-switchboard. The line conductors 1 and 2 of this circuit are led at the central office through a battery c and a signaling instrument d , respectively, to earth. A spring-jack or connection-socket e constitutes the normally open terminal of the line in the switchboard. At

each substation a bell f is located in a ground branch from one of the line conductors, the branches being led from different line conductors for the purpose of maintaining the electrostatic balance of the line conductors. These bells may be of the usual type adapted for operation by alternating currents transmitted from the central office over the proper line conductor. Each substation is further equipped with a receiving-telephone g and a transmitting-telephone g' , serially included in a bridge 3 of the line-circuit controlled by the switch-contacts $a^3 a^4$ of a telephone-switch at the same station. The magnet b at each substation is placed in a ground branch 4 from line conductor 2, the completion of the ground branch being determined by the contact-pieces $a^5 a^6$ of the telephone-switch. If while the telephone-line is in its normal or idle condition the telephone at either substation be removed from its switch for use, the lever of the switch rising will close first the ground branch 4 and later the bridge 3 of the line-circuit, thus bringing the telephone into connection with the line for communication. In initiating a call for connection in the telephone-switchboard this act permits current to flow from battery c through the bridge 3 to line conductor 2 and thence through the signal d in the switchboard, thereby calling the attention of the operator. While the line is in this condition, the source c of current is connected with the line conductor 2, in readiness to actuate the lock-out mechanism at any other station at which an attempt is made to use the telephone, inasmuch as the upward movement of the switch-lever at a second substation immediately closes the ground branch 4 to the line conductor 2, whereby a current from battery c is permitted to flow through the bridge 4 at the substation where the telephone is in use to line conductor 2, thence through the ground branch 4 at the substation in question, exciting the magnet b and preventing the further movement of the switch-lever to close the telephone-bridge 3.

It will be understood that the upward movement of the switch-lever is ordinarily too rapid to prevent the full excitement of magnet b and the movement of the armature thereof in the time elapsing between the closing of switch-contacts 5 6 and switch-contacts 3 4; but the mechanical application of the armature to its magnet prior to the closing of the circuit through the magnet and the subsequent excitement of the magnet to hold its armature eliminate the time consumed in producing movement of the armature, together with a portion of the time required in charging the magnet, so that the appliance is much more quick and certain in operation than any device heretofore used for this purpose, and is correspondingly efficient.

I claim as my invention—

1. In a lock-out device for a telephone-sub-

station the combination with a telephone-line, means for producing current in the line during the use of the line, a telephone-switch at a substation, a magnet controlling the circuit of the telephone, and switch-contacts of the telephone-switch adapted to complete the connection of the magnet with the line in the movement of the switch, of mechanical means controlled by the switch adapted to bring the armature of said magnet into contact with its poles when the switch is in its normal position, substantially as described.

2. In a lock-out device for telephones the combination with a telephone-line and means for producing current in it during the use of the line, a telephone-switch to close the telephone-circuit, a catch adapted to prevent the full movement of the telephone-switch to close the telephone-circuit, and a magnet controlling the said catch, switch-contacts closed by the switch in its initial movement completing the connection of said magnet with the line, and a mechanical means controlled by the switch adapted to place the armature of said magnet in contact with its poles when the switch is in its normal position, substantially as described.

3. In a lock-out device the combination with a telephone-switch and switch-contacts in the telephone-circuit closed together thereby when the switch has moved throughout its range, other switch-contacts closed together

in the initial movement of the telephone-switch when released, a catch adapted to engage the lever of said switch and a magnet controlling the catch, the connection of said magnet with the line being controlled through the agency of said last-mentioned switch-contacts, and a cam controlled by the switch adapted to throw the armature into contact with the poles of its magnet, substantially as described.

4. The combination with a telephone-switch, a pivoted lever at right angles to the lever of the switch, an armature carried by the lever, and a magnet controlling the armature, a catch on the said armature-lever adapted to engage the switch-lever when the armature is attracted to limit the movement of the switch, a cam on the armature-lever adapted to engage a projection of the switch-lever when the latter is in its lowest position to throw the armature into contact with its magnet, and switch-contacts actuated in the initial movement of the switch closing the circuit of said magnet, substantially as described.

In witness whereof I hereunto subscribe my name this 5th day of May, A. D. 1897.

CHARLES E. SCRIBNER.

Witnesses:

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FRANK R. MCBERTY.