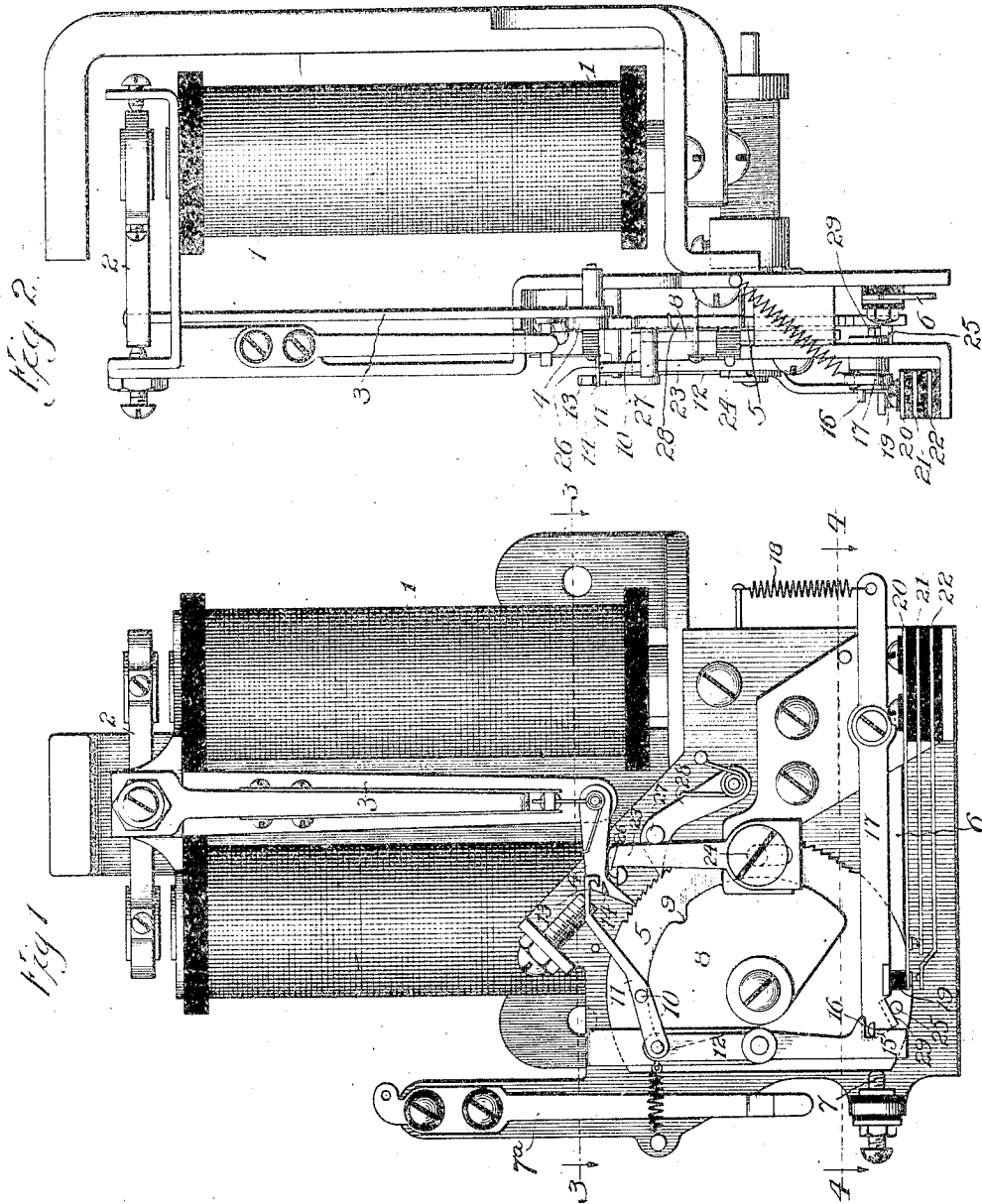


J. G. ROBERTS.
 LOCK-OUT SWITCH FOR PARTY TELEPHONE LINES.
 APPLICATION FILED JULY 26, 1906.

1,057,500.

Patented Apr. 1, 1913.

3 SHEETS-SHEET 1.



Witnesses:

For. C. Dawson,
 Alfred H. Moore

Inventor:

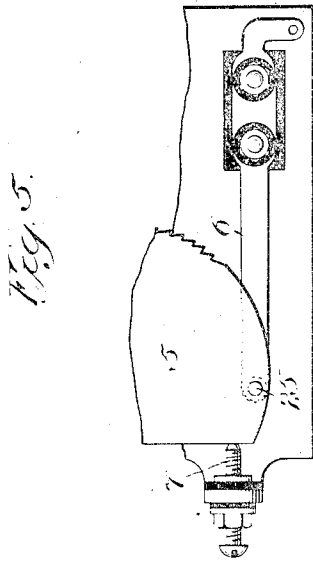
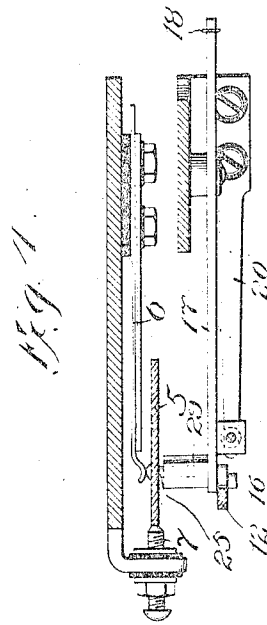
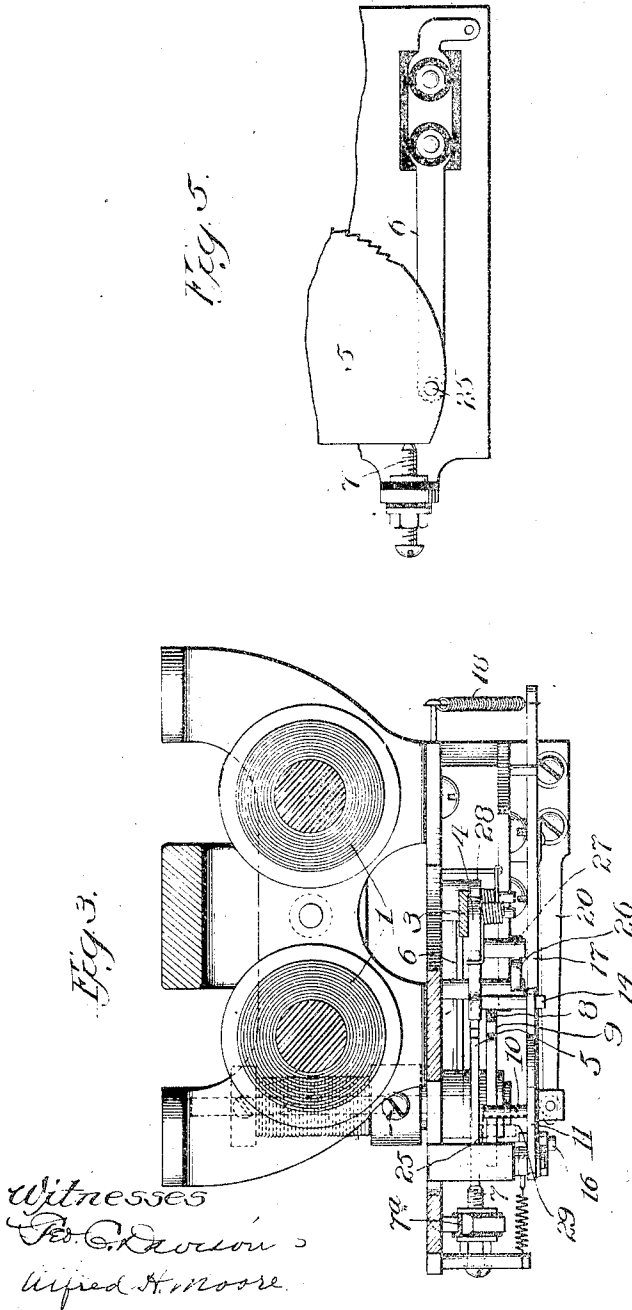
John G. Roberts;

By Norton Tanner, Solicitor
 Atty.

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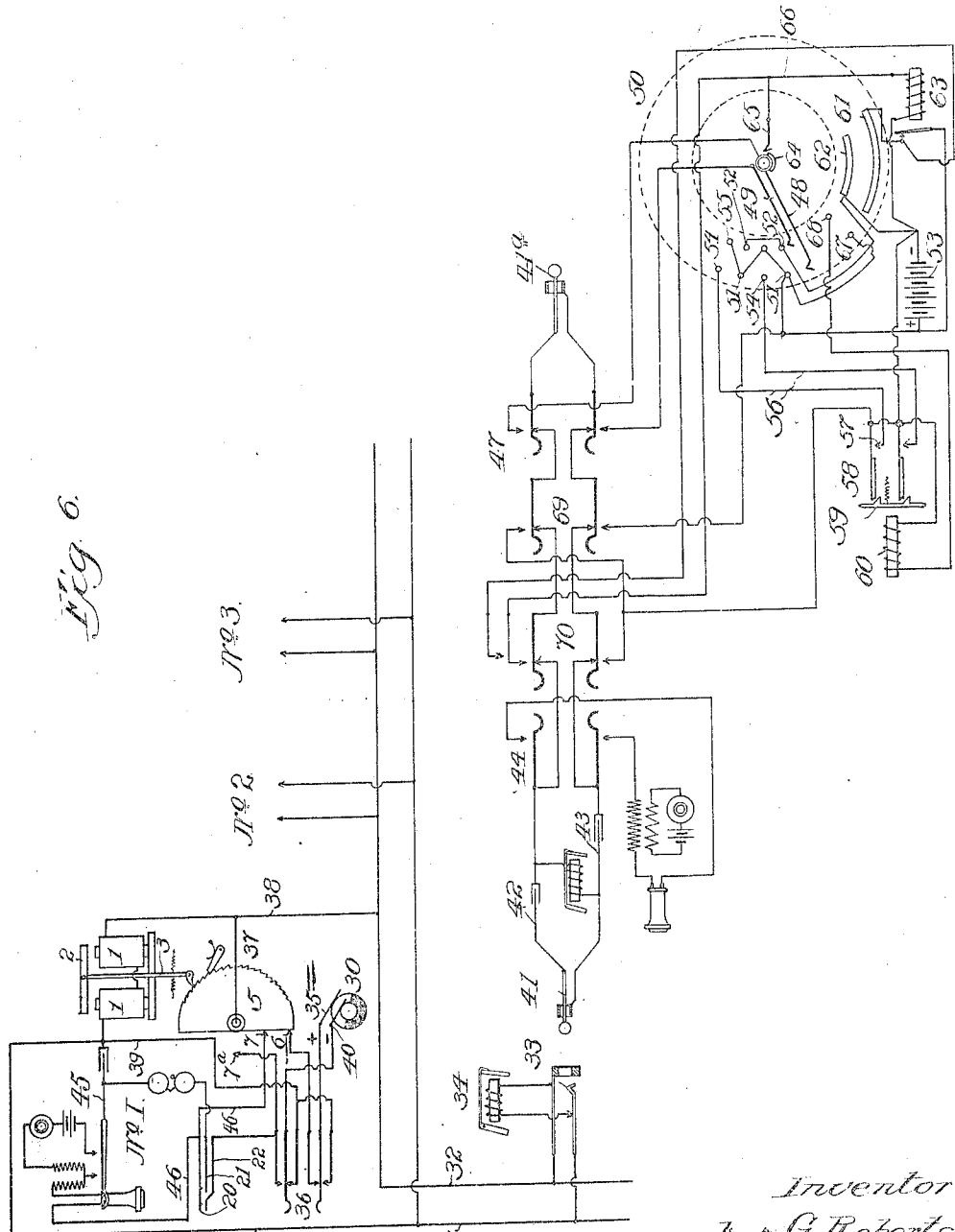
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3 SHEETS-SHEET 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

JOHN G. ROBERTS, OF CHICAGO, ILLINOIS, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

LOCK-OUT SWITCH FOR PARTY TELEPHONE-LINES.

1,057,500.

Specification of Letters Patent.

Patented Apr. 1, 1913.

Application filed July 26, 1906. Serial No. 327,333.

To all whom it may concern:

Be it known that I, JOHN G. ROBERTS, 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 Switches for Party Telephone-Lines, of which the following is a full, clear, concise, and exact description.

My invention relates to a lock-out switch for party telephone lines, and has for its object to provide an improved and simplified device whereby any two or more stations of a party line may be connected for conversation to the exclusion of other stations on the line.

Generally speaking, my invention contemplates a switching device comprising an electromagnet adapted to advance a ratchet, together with contact mechanism adapted to be operated and locked by mechanical means actuated by said magnet after the ratchet has been advanced a predetermined distance, the contact mechanism being automatically released when the ratchet is returned to normal position.

The switch of my invention, as preferably constructed, is provided with a polarized electromagnet adapted when supplied with current of predetermined direction to advance a ratchet, which, as it leaves normal position, opens the talking circuit of the station where the same is located. When the ratchet has been advanced a number of steps corresponding to the station where it is located, mechanical means are placed in condition to be operated by the magnet when given an impulse of current of the opposite direction to release a spring-actuated arm, which closes and locks switch springs to complete the talking circuit of the station in question. The ratchet may be then advanced to the end of its movement, and at the termination of conversation, by applying to the magnet an impulse of current of the same direction as that last referred to, the ratchet is released, and returns to normal position, restoring the said arm to normal condition and opening the switch

springs, and also closing the normally existing talking circuit.

I will describe my invention more particularly by reference to the accompanying drawings, wherein—

Figure 1 is a front elevation of a locking switch embodying my invention; Fig. 2 is a side elevation thereof; Fig. 3 is a plan sectional view on line 3—3 of Fig. 1; Fig. 4 is a plan sectional view on line 4—4 of Fig. 1; Fig. 5 is a fragmentary detail view; Fig. 6 is a diagram illustrating a circuit in which my improved switch may be employed.

The same letters of reference indicate the same parts wherever they are shown.

Referring first to Figs. 1 to 5, a polarized magnet 1 is provided with a tilting armature 2 carrying an arm 3 upon which is mounted a stepping pawl for a ratchet 5. The ratchet, when in normal position, engages a contact spring 6, which is mounted upon, but insulated from the frame of the device, and also engages a contact post 7 carried by, but insulated from, the frame.

Mounted upon the same shaft with the ratchet 5 is a disk 8, having a notch or groove 9 in its periphery adapted when the ratchet has been advanced a number of steps corresponding to the station where the switch is located, to receive a pin 10 carried by a dog 11 pivotally connected to one end of a lever 12 which is pivoted at approximately its central point to the frame of the device. The free end of the dog 11 carries a hook 13 adapted when the dog 11 falls, due to the pin 10 riding into the groove of disk 8, to assume a position, with relation to a pin 14 carried by a stepping pawl 4, such that when the magnet 1 is given a reverse impulse of current of a direction to move the arm 3 backward or to the right in Fig. 1, said pin engages the hook or latch 13 and moves the dog 11 to rock the lever 12 on its pivot.

The lower end of the lever 12 is provided with a groove or cut-away portion forming a shoulder 15 upon which normally rests a pin 16 carried by a pivoted arm 17, which is connected at its opposite end with a spring

18 secured to the frame of the device. Said arm 17 is adapted when the pin 16 is disengaged from the shoulder 15 of lever 12, upon the rocking of lever 12 as previously described, to be moved by spring 18 to cause an insulating button 19 carried thereby to force a spring 20 into engagement with contact anvils 21—22; these may control the connection of the subscriber's telephone set with the line. The ratchet 5 while at the limit of its forward movement engages an insulated contact spring 7^a carried by the frame.

A release finger 23 is mounted upon a pin 24 carried by the frame of the device, the finger being cut away so as to be longitudinally movable upon the pin 24 and slightly rotatable thereon. The base of the finger is adapted to be engaged, as the ratchet reaches the limit of its forward movement, by a pin 25 carried by said ratchet and moved upwardly to bring a hook 26 of said finger in position to be engaged by the pin 14 of the pawl 4 when the magnet is given an impulse of current in the same direction as the impulse previously referred to for rocking the arm 3. When the arm 3 is thus moved to the right the pin 14 rocks the finger 23 on its axis and causes the same to engage a pin 27 carried by the spring-actuated retaining pawl 28 of ratchet 5, thereby moving the retaining pawl from engagement with the ratchet 5 and permitting the same to return to normal position. As the ratchet approaches normal position the pin 25 thereof rides along an inclined lip 29 carried by the pivoted arm 17 and moves the same to permit the separation of the springs 20, 21, 22, and the engagement of pin 16 of said arm 17 with the shoulder 15 of the lever 12. Upon the return of the stepping pawl 4 to normal position, the release finger 23 falls to normal position.

Referring now to Fig. 6, I will describe the operation of my improved locking switch in connection with a party telephone line system.

The telephone set at each station is normally in operative relation to the limbs 31, 32, of the line, which extend to a springjack 33 and line drop 34 at the central office. A hand generator 30 is provided at each station normally in a circuit extending from the pole 35 of said generator through normally closed contacts of key 36, to contact 6, which is normally in engagement with the ratchet 5, and thence by way of conductors 37, 38, to limb 32 of the line, through the line drop 34, and back over limb 31 of the line, conductors 38, 39, through contacts of key 36 to the pole 40 of the ringing generator. A subscriber of a party line desiring to secure a connection with another subscriber, first operates the hand generator 30 at his station to display the target of the

line annunciator at the central office. The operator, seeing the signal displayed, inserts her answering plug 41 in jack 33 of the line and thereby connects the link conductors 42, 43, of her cord circuit, with the limbs 31, 32, of the line. She thereupon depresses her answering key 44, whereupon her telephone set is connected with the limbs 31, 32, of the line, the talking circuit at the substation extending over limb 31, conductors 38, 45, switch lever, secondary winding of the induction coil, telephone receiver, conductor 46, thence to contact 7, which is normally in engagement with the ratchet wheel 5, and thence by way of conductors 37, 38, to the other limb 32 of the line.

We will assume that subscriber at station No. 1 of the party line desires to converse with subscriber at station No. 2 of the same line. The operator, after receiving the order of subscriber at station 1, removes plug 41 from the spring-jack 33, inserts therein the mate plug 41^a and operates the keys 58 representing said stations. She then actuates her key 47 to start the brushes 48, 49. This key 47 connects contact brushes 48, 49, of an interrupter 50 with the limbs 31, 32, of the line, and also starts said brushes rotating over the contacts on the face of the interrupter by means of a suitable magnetic clutch or the like. The contact brushes 48, 49, in their movement, engage pairs of contacts 51, 52, contacts 51 whereof are connected with the positive pole of a battery 53, while the contacts 52 are connected with the negative pole of said battery. Between each pair of contacts 51, 52, is located a pair of contacts 54 55, the contacts 55 being connected with the positive pole of battery, while the contacts 54 are connected with conductors 56 leading through normally open contacts 57 of keys 58 to the negative pole of battery 53. A set of said contacts 54, 55, is provided for each station, the contacts representing each station being placed in position to be engaged by the contact brushes after the same have engaged the number of pairs of contacts 51, 52, corresponding to the number of such station of the party line. A key 58 is provided for each station, adapted when depressed to be locked in such condition by the armature 59 of a magnet 60.

When the brushes 48, 49, engage the first pair of contacts 51, 52, which represent station No. 1, a circuit is completed from the positive pole of battery 53 to contact 51, brush 48, link conductor 42, limb 31 of the line, conductor 38, at all the stations of the line, through the polarized magnets 1 of the locking switches, back to limb 32 of the line, link conductor 43, contact brush 49, conductors 52 to the negative pole of the battery 53. The magnets 1 at all the stations will thereupon operate to advance

their ratchets 5 one step. It will now be seen that at station No. 1 the pin 10 rests in the groove 9 of segment 8, and the latch 13 of dog 11 is in position to be engaged by the pin 14 when the magnet receives a reverse impulse. The contact brushes 48, 49, next engage the terminals 54, 55, which represent station No. 1, whereupon current flows from the positive pole of battery 53, through contacts 55, brush 49, link conductor 43, limb 32 of the line, through conductor 38, and magnet 1 at each of the stations, back to limb 31 of the line, link conductor 42, brush 48, terminal 54, through contacts 57 of key 58, to the negative pole of battery 53. The magnet 1 of all the stations now receives an impulse of current in the opposite direction to that required for advancing the ratchets, but since only at the switch at station 1 is the dog in position to be engaged by the pin 14 of stepping pawl 4, the talking circuit of station 1 will be the only one completed. The dog 11 at station 1 is therefore moved by pawl 4 to effect the release of arm 17, which is now moved by spring 18 to close contact springs 20, 21, 22.

The contact brushes 48, 49, next engage the second set of terminals 51, 52, and the magnets 1 will receive current of a direction to cause the same to advance their ratchets one step; and as the brushes 48, 49, engage the terminals 54, 55, representing station No. 2, a reverse impulse will be sent through the magnets just as previously described to cause the closure and locking of springs 20, 21, 22, at station 2, as outlined in connection with station 1. The telephone apparatus of stations 1 and 2 are now the only ones in operative relation to the limbs 31, 32, of the line.

The brushes 48, 49, now proceed over the contacts and advance the ratchets at all the stations to the limit of their forward movement, after which the brushes 48, 49, engage segments 61, 62, respectively. Segment 61 is connected through the armature and back contact of a relay 63 to the positive pole of battery 53, while the segment 62 is connected with the negative pole of said battery. While the brushes are in engagement with their segments, the contact brush 48 is connected through a segment 64 with a contact spring 65 which is connected with a conductor 66 leading through magnet 63 to the negative pole of battery 53, a circuit thus being completed for relay 63 from the positive pole of battery 53, through the armature and back contact of relay 63, segment 61, brush 48, segment 64, spring 65, conductor 66, including relay 63, to the negative pole of battery 53. The relay 63 thus serves to intermittently interrupt the circuit extending from the positive pole of battery 53, through the armature and back contact of relay 63, segment 61, brush 48, link conductor 42,

limb 31 of the line, through the bell at each of the stations Nos. 1 and 2, through springs 20, 21, 22, contact 7^a, closed by the ratchet while at the limit of its movement, conductors 37, 38, limb 32 of the line, link conductor 43, brush 49, segment 62, to the negative pole of battery 53. The bells at the two stations are thus operated. After the arms 48, 49, leave the segments 61, 62, they engage a pair of contacts 67, 68, to complete a circuit for the magnet 60, which attracts its armature 59 and releases the keys 58. This circuit may be traced as follows: from one terminal of magnet 60, to switch contact 63, moving contact 49, through calling key 47, to the ring of the cord plug 41^a, ring of jack 33, line conductor 32, substation conductor 38, line conductor 31, spring of jack 33, tip of plug 41^a, key 47, moving contact 48, fixed contact 67, to positive pole of battery 53, through said battery to the other terminal of magnet 60. Suitable means may be provided for stopping the brushes at the end of their revolution.

The talking circuit of each substation now extends from the limb 31 of the line, conductor 38, conductor 45, to the switch hook, secondary winding of the induction coil, telephone receiver, conductor 46, through springs 20, 22, contacts 7^a, ratchet 5, conductors 37, 38, to the limb 32 of the line.

At the end of conversation the subscribers operate their hand generators and keys 36 to affect the display of the clearing out annunciator at the central office, whereupon the operator actuates her key 69 to connect the battery 53 with the link conductors 42, 43, to apply current to the magnets 1 of all the substations to cause the same to move their arms 3 to the right and rock the fingers 23 to remove the retaining pawls 28 from engagement with the ratchets 5, permitting the restoration of the apparatus to normal condition. The key 36 may also be used in connection with the generator 30 for emergency calls from any of the substations, even though they be locked out.

The key 70 permits the ringing of the subscribers' bells subsequent to the normal ringing period determined by the automatic switch 50.

I claim:

1. In a switching device, the combination with a ratchet, of a polarized magnet responsive to current of one polarity for advancing the same, contact mechanism; and spring-actuated means, released by said magnet, in responding to current of opposite polarity after advancing the ratchet a predetermined distance, for operating said contact mechanism.

2. In a switching device, the combination with a ratchet, of a magnet for advancing said ratchet, contact springs, a spring-actuated arm normally tending to close said

5 springs, a lock for said arm normally preventing the operation thereof, and means for releasing said arm actuated by said magnet after advancing the ratchet a predetermined distance.

10 3. In a switching device, the combination with a ratchet, of a magnet for advancing the same, contact springs, an arm, a spring connected therewith normally tending to move said arm to operate said springs, a pivoted lever normally holding said arm against movement, and means, operated by said magnet after advancing the ratchet a predetermined distance, for tripping said lever.

20 4. In a switching device, the combination with a ratchet, of a magnet for advancing the same, contact springs, a pivoted arm, a spring normally tending to rock said arm to operate said springs, a pivoted lever having a shoulder thereon, a pin carried by said arm normally engaging said shoulder to prevent movement of the arm, and mechanical means, operated by said magnet after advancing the ratchet a predetermined distance, for rocking said lever to disengage said shoulder and pin.

25 5. In a switching device, the combination with a ratchet, of a magnet for advancing said ratchet, contact springs, a lever controlling the operation and locking thereof, and mechanical means, operated by said magnet when said ratchet has been advanced a predetermined distance, for actuating said lever.

30 6. In a switching device, the combination with a ratchet, of a stepping pawl therefor, a magnet for operating said pawl to advance the ratchet, contact springs, a lever controlling the operation and locking thereof, a dog carried by said lever, and means operated when the ratchet has been advanced a predetermined distance, for bringing said dog in position to be operated by said stepping pawl to actuate said lever.

35 7. In a switching device, the combination with a ratchet, of a stepping pawl therefor carrying a pin, a polarized magnet for operating said pawl in response to current of one direction to advance the ratchet, contact springs, a lever controlling the operation and locking thereof, a dog carried by said lever having a hook at the free end thereof, and means operated when said ratchet has been advanced a predetermined distance, for moving said dog to bring the hook in position to be engaged by said pin when the stepping pawl is operated by said magnet in response to current of reverse polarity therein.

40 8. In a switching device, the combination with a ratchet, of a stepping pawl therefor carrying a pin, a polarized magnet for operating said pawl in response to current of one

direction to advance said ratchet, contact springs, a rocking lever controlling the operation of said springs, a dog carried by said lever having a hook at its free end, a disk mounted to move with said ratchet and having a notch in its periphery at a predetermined point, a pin carried by said dog, riding upon the periphery of said disk, and adapted when the ratchet and disk have advanced a predetermined distance to enter said notch and present said hook in position to be engaged by said pawl when operated by said magnet in responding to current of opposite polarity.

45 9. In a switching device, the combination with a ratchet, of a magnet for advancing the same, contact springs, an arm, a spring connected therewith normally tending to move said arm to operate said springs, a pivoted lever normally holding said arm against movement, a disk moving with said ratchet, means controlled by said disk and magnet, after the ratchet has been advanced a predetermined distance, for tripping said lever to operate said springs.

50 10. In a switching device, the combination with a ratchet, of a stepping pawl therefor, a polarized magnet for operating said pawl in response to current of one direction, to advance the ratchet, contact springs, a pivoted arm, a spring connected therewith normally tending to move said arm to operate said springs, a pivoted lever normally holding said arm against movement, a dog carried by said lever having a hook at the free end thereof, a disk moving with said ratchet, and means controlled by said disk, after the ratchet has been advanced a predetermined distance, for bringing said hook in position to be engaged by said stepping pawl when said magnet responds to current of reverse polarity.

55 11. In a switching device, the combination with a ratchet, of a magnet for advancing the same, contact springs, an arm, a spring connected therewith normally tending to move said arm to operate said springs, a pivoted lever normally holding said arm against movement, mechanical means, operated by said magnet after advancing the ratchet a predetermined distance, for tripping said lever, and means operated when the ratchet returns to normal position for effecting the engagement of said arm and lever.

60 12. In a switching device, the combination with a ratchet, of a magnet for advancing the same, contact springs, a pivoted arm, a spring connected with one end thereof and normally tending to rock said arm to operate said springs, a pivoted lever having a shoulder thereon, a pin carried by said arm normally engaging said shoulder to prevent movement of the arm, means operated by

said magnet after advancing the ratchet a predetermined distance, for rocking said lever to disengage said shoulder and pin, an inclined lip upon said arm, and a pin carried by said ratchet adapted when the same returns to normal position to engage said lip and effect the reengagement of the pin upon the arm and said shoulder.

In witness whereof, I hereunto subscribe my name this 21st day of July A. D., 1906. 10

JOHN G. ROBERTS.

Witnesses:

CLARENCE A. COGGIN,
E. F. BEAUBIEN.