(No Model.)

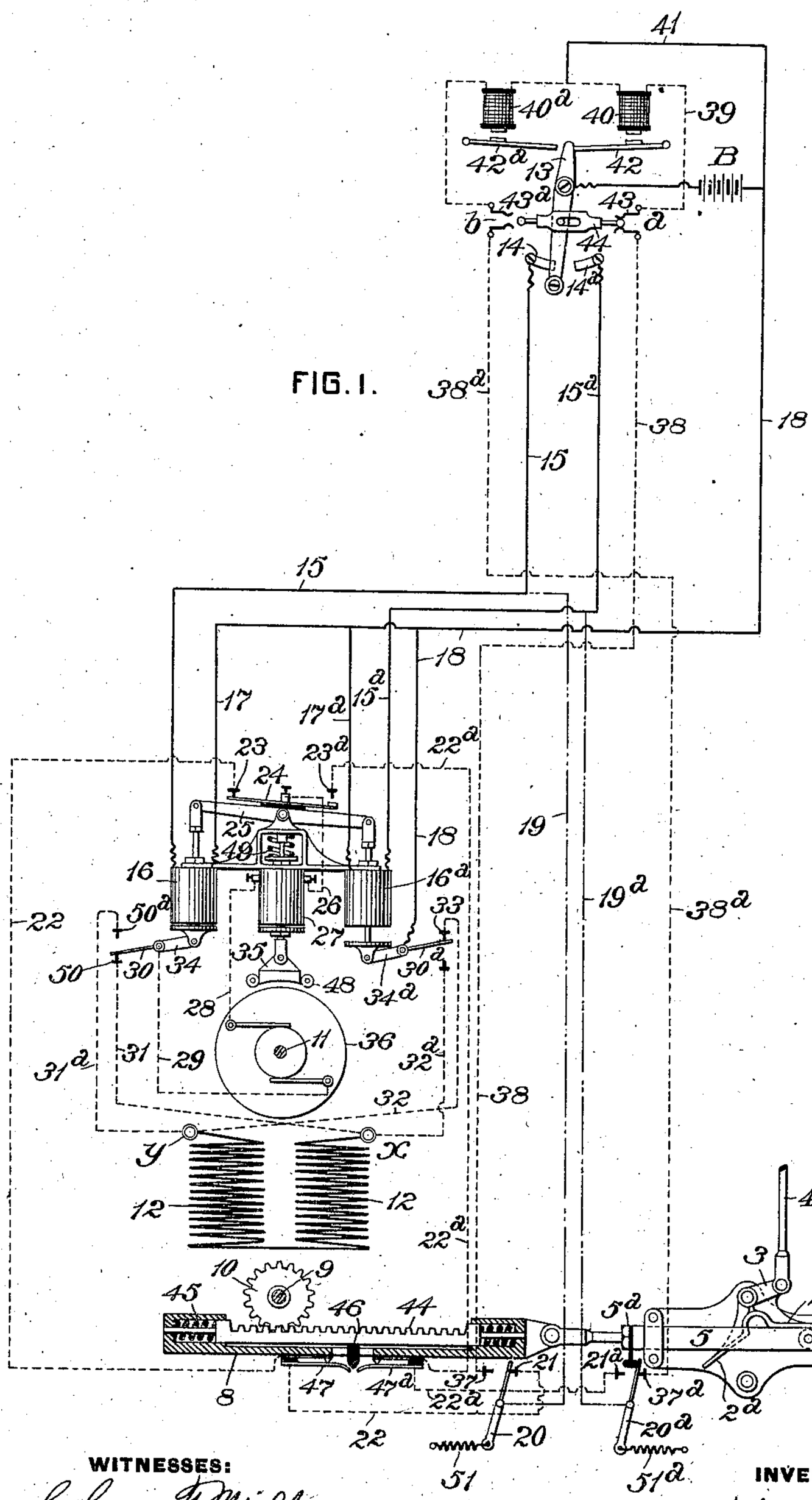
2 Sheets—Sheet 1.

J. P. COLEMAN.

SWITCH APPARATUS.

No. 591,590. Patented Oct. 12, 1897.

FIG. 1.



WITNESSES:

Chas. F. Miller.

Wm. H. Erskine

INVENTOR.

John Prefsley Coleman

by Dennis S. Wolcott

Att'y.

(No Model.)

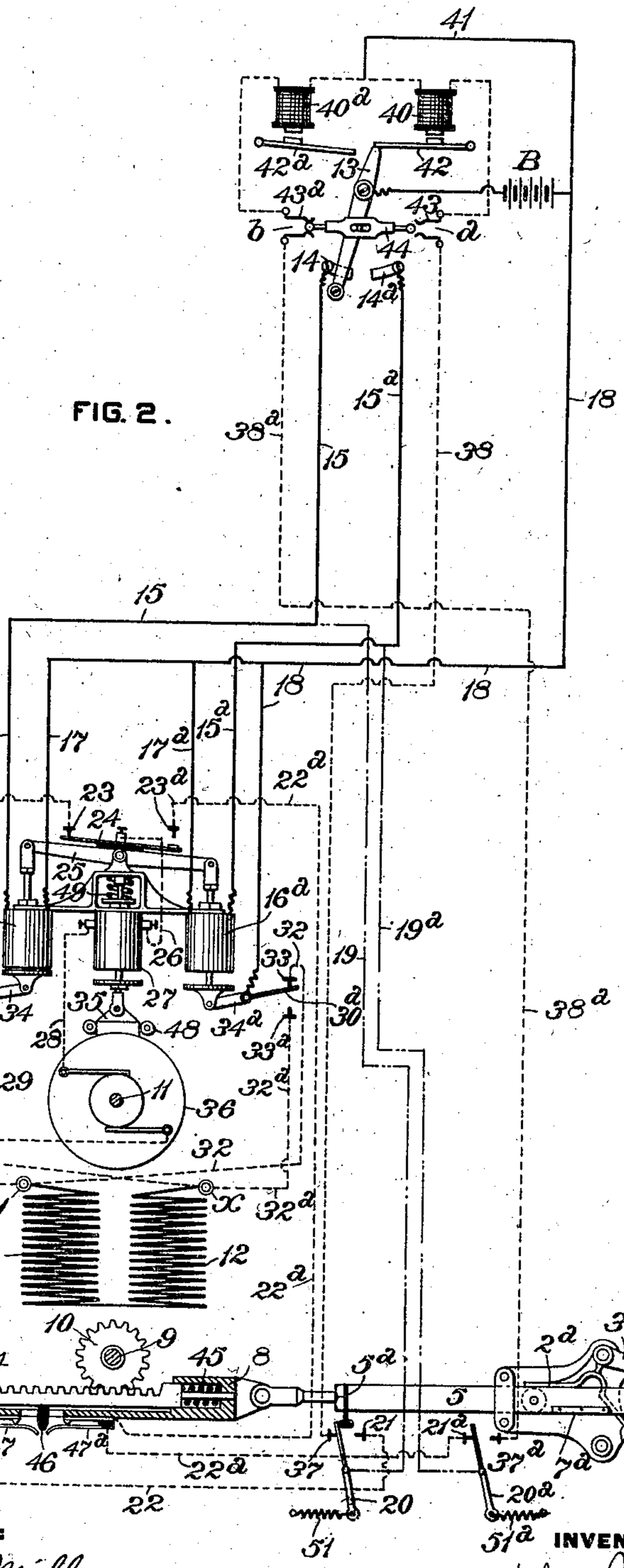
2 Sheets—Sheet 2.

J. P. COLEMAN.

SWITCH APPARATUS.

No. 591,590. Patented Oct. 12, 1897.

FIG. 2.



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UNITED STATES PATENT OFFICE.

JOHN PRESSLEY COLEMAN, OF SWISSVALE, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH AND SIGNAL COMPANY, OF SAME PLACE.

SWITCH APPARATUS.

SPECIFICATION forming part of Letters Patent No. 591,590, dated October 12, 1897.

Application filed July 3, 1897. Serial No. 643,353. (No model.)

To all whom it may concern:

Be it known that I, JOHN PRESSLEY COLEMAN, a citizen of the United States, residing at Swissvale, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Switch Apparatus, of which improvements the following is a specification.

The invention described herein relates to certain improvements in electrically-actuated mechanism for operating switches and safety devices in connection therewith, and has for its object a construction and arrangement of electric motor and a mechanism connecting the same to the switch-bar and circuit-reversing device whereby the switch-rails may be shifted to their several positions by a reversal of the motor, and whereby such reversal of the current for changing the motion of the movement of the motor is controlled by the switch-rails.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a diagrammatic view illustrating my invention, the several parts being shown in the position which they would occupy immediately after the circuit has been closed through the motor, but before the motor has operated to shift the switch; and Fig. 2 is a similar view showing the position of the parts after the motor has operated to shift the switch and the circuit-changing switch locked as against a complete reversal thereof.

In the practice of my invention the movement of the locking-bar and detector-bar and switch-rails is effected in orderly sequence by means of a mechanism fully described and shown in Letters Patent No. 329,643, granted November 3, 1885, to J. T. Hambay, and consisting of a bell-crank lever 1, provided with jaws 2 and 2^a, arranged at an angle to each other, and with an arm 3, connected by a rod 4 to the switch-rails. This lever is shifted by means of a roller or projection on the slide 5 striking against the arms 2 or 2^a. One end of the slide 5 is connected by a rod 6 to the detector bar or rail, and on the slide are secured blocks 7 and 7^a, adapted to engage notches in the locking-bar, so as to prevent any movement thereof or of the switch-rails to which it is connected until after the detector bar or rail has been moved to operative position. This sliding bar 5 is connected by a link or other suitable means to a slide 8, provided with a series of teeth arranged to intermesh with a pinion 9 on the shaft 10, which is driven through suitable interposed gearing by the armature-shaft 11 of the motor. It will be readily understood that by the rotation of the armature-shaft the slide 8 and the switch-operating devices connected thereto will be shifted back and forth in accordance with the direction of current through the field-magnets 12 12^a of the motor. These field-magnets of the motor are excited by a battery B, one pole of which is connected to a circuit-changing switch 13. One circuit from the battery B consists of lever 13, contact-plate 14, wire 15, circuit-changing magnet 16, and wires 17 and 18, back to the opposite pole of the battery B. Another circuit from the battery consists of lever 13, contact-plate 14, wires 15 and 19, movable contact-bar 20, contact-point 21, wire 22, contact-point 23, switch bar or plate 24, secured to and insulated from the lever 25, wire 26, electromagnet 27, and wire 28 to one of the brushes of the motor, while the opposite brush is connected by a wire 29 to a movable contact-plate 30, contact-point 50 at one end of the wire 31, whose opposite end is connected to the pole x of the field-magnets of the motor, wire 32 to a contact-point 33, and plate 30^a, which is connected to the wire 18, leading to the opposite pole of the battery B.

When the switch-lever 13 is shifted to position shown in Fig. 1, the circuit from the battery B will be first completed through the magnet 16, and by reason of the movement of the switches 30 and 30^a, due to the energizing of magnet 16, the circuit will be completed through the branch wire 19, contact plate and point 20 and 21, wire 22, contact plate and point 23 and 24, wire 26, brake-magnet 27, wire 28, through the motor-armature, wire 29, switch-plate 30, wire 31, through the field-magnets of the motor from pole x to pole y, wire 32, contact-point 33, switch-plate 30^a, and wire 18 to the opposite pole of battery B. It will be observed that the movement of

the lever 13 to the position shown in Fig. 1 first completes the circuit through magnet 16, thereby so shifting its armature that the arm 34 connected thereto will be moved to shift the switch-plate 30 against the contact-point 50. The movement of the armature of magnet 16 also so shifts the lever 25 as to bring the contact-plate 24 against the point 23, and at the same time shifts said plate away from contact-point 23^a. From the plate 24 the current passes through brake-magnet 27, thereby so shifting its armature as to pull the brake-shoe 35, connected to said armature, away from the brake-drum 36 on the shaft of the motor. From the brake-magnet 27 the current passes by the wire 28 to the motor-brushes, through the armature of the motor, and thence by the wire 29 and switch-plate 30, through the field-magnets of the motor, and thence back to the battery through wire 32, switch 30^a, and wire 18. The motor being excited the slide 8 is shifted, and through its connection with the sliding bar 5 the switch is unlocked and shifted to reverse position and locked. The movement of the sliding bar 5, which is provided with an arm 5^a, adapted to strike against the switch-plates 20 and 20^a, will shift the plate 20 against contact-point 37, thereby breaking the motor-circuit and completing a circuit consisting, starting from one pole of the battery B, of lever 13, contact-plate 14, wires 15 and 19, movable plate 20, contact-point 37, wire 38, make-and-break mechanism *a*, wire 39, magnet 40, and wire 41 to the opposite pole of the battery. The energizing of the magnet 40 will so shift the stop 42 as to permit of a complete movement of the lever 13 to reverse position, as shown in Fig. 2. By reference to Figs. 1 and 2, it will be seen that make-and-break mechanism *a* and *b* are formed by springs 43 and 43^b and metallic balls or knobs carried by, but insulated from, sliding plate 44. This plate is adapted to be shifted by the lever 13, but as the plate is not to be shifted until after the switch-rails have been moved it is so connected as by a slot-and-pin device to the lever that the latter can be moved from normal or reverse position to a point a little past middle position or where it will make contact with the plates 14 or 14^a. By a complete movement of the lever 13 to the left the circuit through the magnet 40 is broken, so that when the lever 13 is shifted to the right the stop 42 will drop and prevent any return movement of the lever until magnet 40 is again excited. The movement of the upper end of the lever out from under the stop 42^a will permit the latter to drop into such position as will prevent the return of the lever 13 to full reverse position, but will allow a movement of the lever 13 from the normal position, as shown in Fig. 2, to a point toward reverse position, where it will make contact with the plate 14^a.

The contact of the lever 13 with the plate 14^a will complete a circuit from a battery consisting of the lever 13, plate 14^a, wire 15^a, magnet 16^a, and wires 17 and 18, back to the battery, and also another circuit branching from the wire 15^a, and consisting of the wire 19^a, switch-plate 20^a, point 21^a, wire 22^a, contact-point 23^a, switch-plate 24, wire 26, magnet 27, wire 28, the brushes and armature of the motor, wire 29, switch-plate 30, contact-point 50^a, wire 31^a, to pole *y* of the field-magnets 12, thence from the pole *x* to contact-point 38^a, switch-plate 30^a, which had previously been shifted by the energization of the magnet 16^a, and thence by wire 18 to battery. It will be observed that in this instance the current passes in a reverse direction through the field-magnets of the motor, and that therefore a reverse rotation of the armature of the motor and a corresponding movement of the switch-rails will be effected. By this reversal of the switch the arm or projection 5^a on the slide 5 of the switch mechanism will shift the plate 20^a against contact-point 37^a, thereby breaking the motor-circuit and completing the circuit consisting of lever 13, contact-plate 14^a, wires 15^a and 19^a, plate 20^a, contact-point 37^a, wire 38^a, make-and-break mechanism *b*, wire 39^a, magnet 40^a, and wire 41 to battery. The excitation or energization of magnet 40^a will so lift the stop 42^a as to permit a complete reversal of the lever 13 and the shifting of the plate 44, so as to complete the make-and-break mechanism *a* preparatory for the next movement of the switch.

It will be observed that the circuits for exciting the motor pass through the make-and-break mechanism, consisting of the movable plates and points 20, 21, and 20^a and 21^a, and hence that the movements of the sliding bar 5 will, through the medium of the projection or arm 5^a thereon, shift the plates 20 or 20^a as the bar reaches the limits of its movement, so as to break the circuit through the motor; and it will also be observed that the movement of plate 20 or 20^a to break the motor-circuit will complete the circuit through the indication-magnets 40 or 40^a, thereby unlocking the lever 13, so that a complete movement thereof can be effected as is necessary for a completion of the indication-circuit for the next movement of the switch.

It may sometimes happen that the switch-rails cannot be shifted by reason of snow or ice or other impediment and in such case it is desirable to break the circuit through the motor in order to avoid any injury thereto or to the parts connecting it with the switch. To this end the rack-bar 44 is formed independent of the slide 8 and adapted to move back and forth therein in suitable guideways. In order that the slide may move under normal conditions with the rack-bar, springs 45 are interposed between the ends of the rack-bar and the ends of the slide, said springs being of sufficient stiffness or rigidity to effect, without material compression, a shifting of the slide 8 and its connections to the switch. To the bar 44 is attached an arm 46, adapted

when the bar 44 is moved independently of the slide to open make-and-break mechanisms 47 or 47ª, said mechanisms consisting of springs attached in any suitable manner to a block of insulating material, which is secured to the slide 8 so as to move therewith. These contact-springs are so constructed and arranged as to be normally in contact with each other and form a portion of circuits formed by the wire 22 or 22ª. These circuit-breakers are so attached to the slide 8 that when the bar 44 moves independent of the slide its projection 46 will shift one of the springs away from the other and thereby break the circuit to the motor. The switch-plates 20 and 20ª are normally held against the contact-points 21 and 21ª, respectively, by springs 51 and 51ª, so that as soon as the arm 5ª is moved away from said plates they will be shifted against the points 21 and 21ª, thereby closing at that point the motor-circuit. This is an important characteristic of my improvement, as in case of the blocking of the switch-rails after a partial movement the operator can by a reversal of the lever 13 reverse the motor and restore the switch to its original position. For example, if the motor could not, with the several parts in the position shown in Fig. 1, entirely shift the switch-rails the operator would move the lever 13 against the plate 14ª, thereby reversing the motor, as the plate 20ª was shifted by its spring against contact-point 21ª. If the operator should again move his lever 13 against plate 14, the motor would be reversed, and by repeating these operations the switch-rails might be freed either by dislodging the obstruction or crushing it.

The brake mechanism consists of a block 35, arranged to move between suitable guides 48 and pivotally attached to the armature of magnet 27. The stem of this armature passes up through the magnet, and is provided near its upper end with a shoulder forming one bearing for the spring 49, the opposite end of which will bear against a suitable abutment formed on the frame carrying the several magnets.

I claim herein as my invention—

1. In an apparatus for shifting a part or appliance connected to a track for controlling the movement of trains, the combination of a motor, a generator having each of its poles connected to both poles of the motor, a circuit-changer controlling the connection of the generator to the motor, a magnet controlling the circuit-changer, and connections from the motor to the part or appliance to be shifted, substantially as set forth.

2. In an apparatus for shifting a part or appliance connected to a track, the combination of a motor, a generator having each of its poles connected to both poles of the motor, a circuit-changer controlling the connection of the generator to the motor, a magnet controlling the circuit-changer, a motor-brake, a magnet controlling said brake and included in the motor-circuit and connections from the motor to the part or appliance to be shifted, substantially as set forth.

3. In an apparatus for shifting a part or appliance connected to a track, a motor connected to such part or appliance, a generator having each of its poles connected to both poles of the motor, a circuit-changer controlling the connection from the generator to the motor, a magnet controlling the circuit-changer, and a make-and-break mechanism included in the motor-circuit and operated by the part or appliance to be shifted, substantially as set forth.

4. In an apparatus for shifting a part or appliance connected to a track, a motor connected to such part or appliance, a generator having each of its poles connected to both poles of the motor, a circuit-changer controlling the connection from the battery to the motor, a magnet controlling the circuit-changer, a make-and-break mechanism included in the motor, circuit-stops controlling the make-and-break mechanism, magnets controlling said stops, and make-and-break mechanisms in the circuits of said magnets controlled by the part or appliance to be shifted, substantially as set forth.

5. In an apparatus for shifting a part or appliance connected to a track, an electric motor, a resilient connection between the motor and the part or appliance to be shifted, a make-and-break mechanism in the circuit of the motor and operated by a part of the resilient connection, substantially as set forth.

6. In an apparatus for shifting a part or appliance connected to a track, the combination of a slide connected to the part or appliance to be shifted, a rack-bar resiliently connected to the slide, a motor having a gearing connection to the rack-bar, a make-and-break mechanism in the motor-circuit controlled by the rack-bar, substantially as set forth.

7. In an apparatus for shifting a part or appliance connected to a track, a motor connected to such part or appliance, a generator having each of its poles connected to both poles of the generator, a circuit-changer controlling the connection from the generator to the motor, a magnet controlling the circuit-changer and normally-closed make-and-break mechanisms included in the motor-circuits and adapted to be opened by the part or appliance to be shifted, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOHN PRESSLEY COLEMAN.

Witnesses:

DARWIN S. WOLCOTT,

F. E. GAITHER.