

No. 695,563.

Patented Mar. 18, 1902.

E. V. R. KETCHUM.
ELECTRICALLY OPERATED SWITCH.

(Application filed May 15, 1901.)

(No Model.)

3 Sheets—Sheet 1.

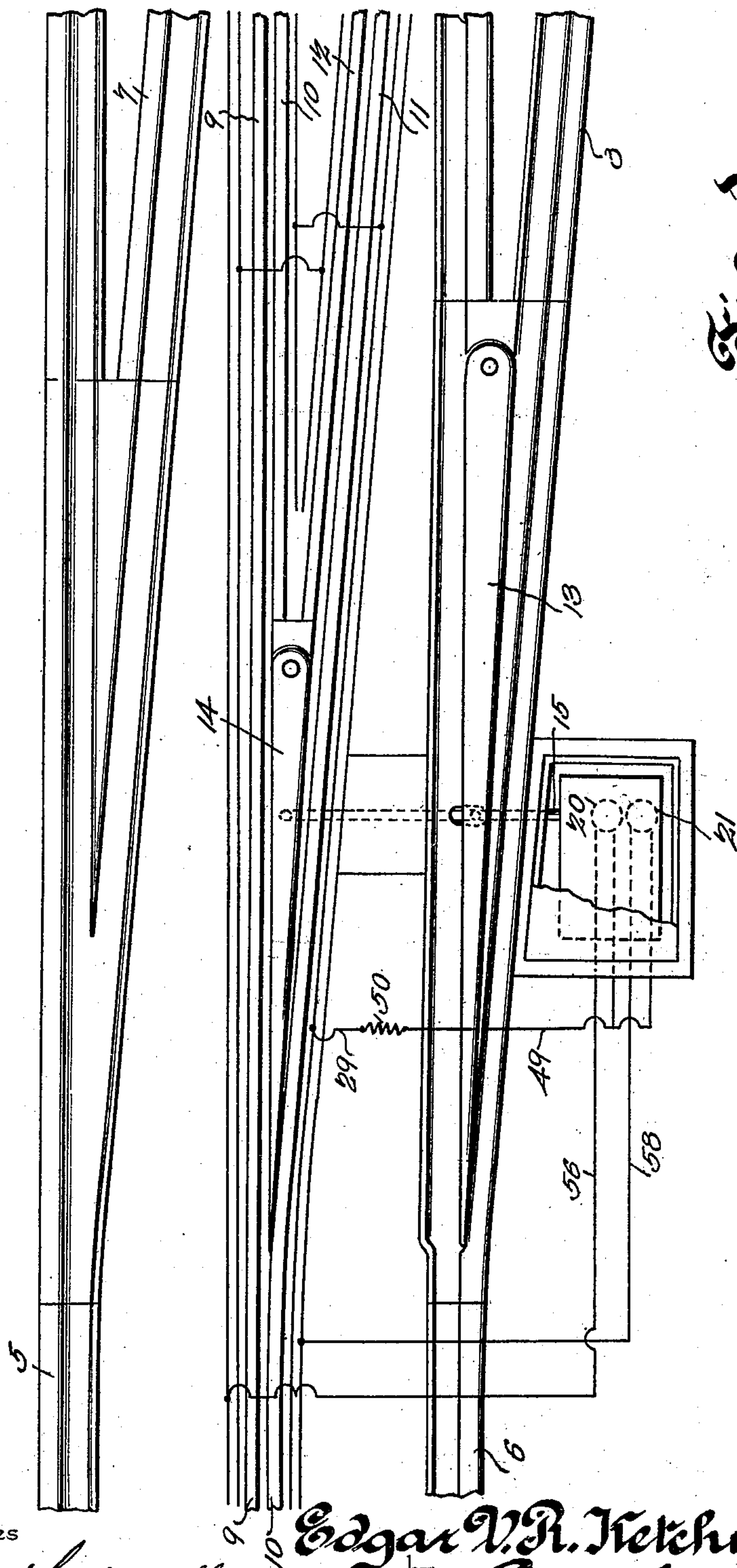


Fig. 1.

Witnesses

John C. Culverwell,
Geo. H. Chanalee.

Edgar V. R. Ketchum, Inventor.
by *C. A. Snow & Co.*
Attorneys

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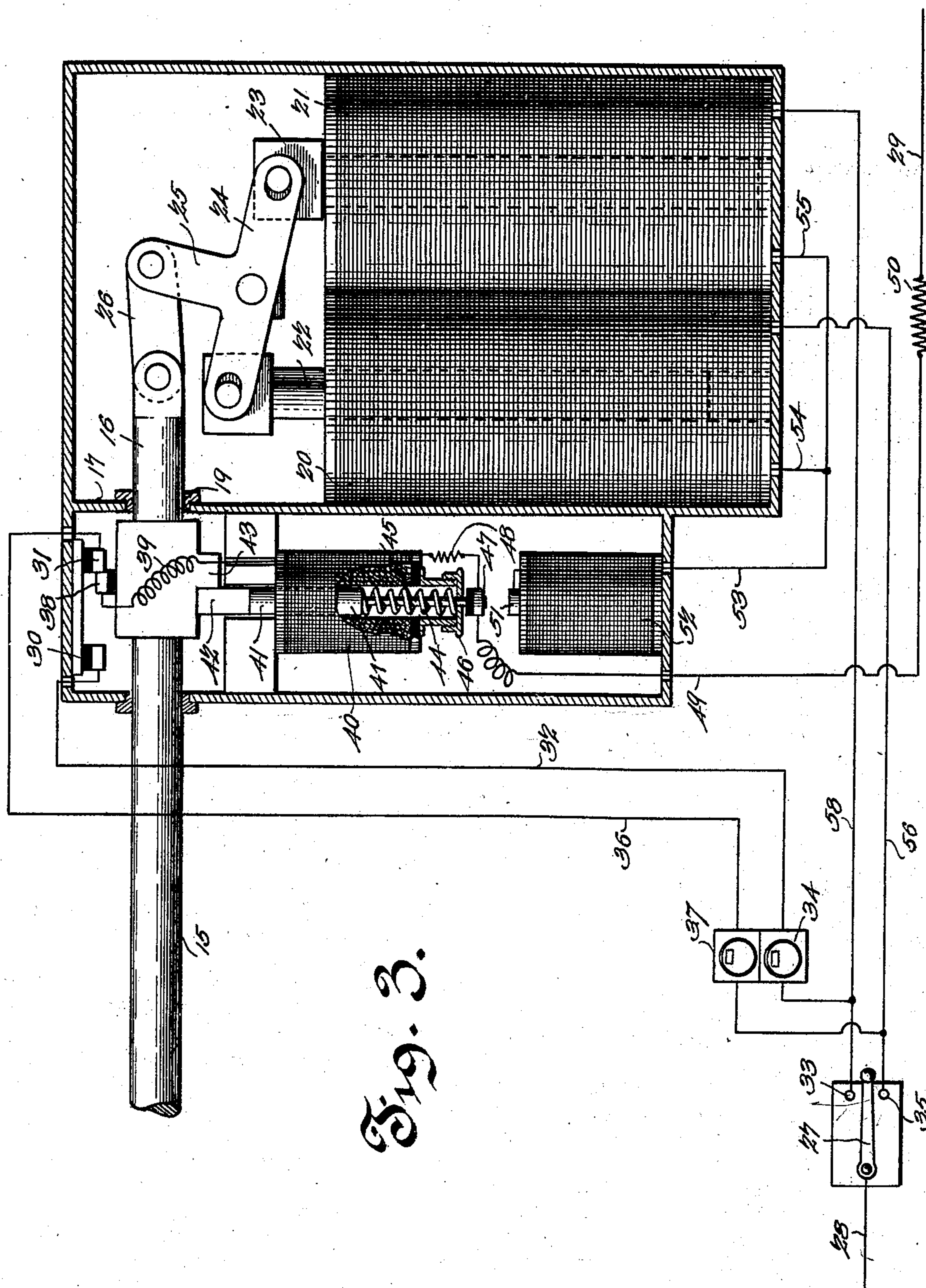


Fig. 3.

Witnesses

Frank A. L. Verwell.
Geo. H. Chandler.

Edgar V. R. Ketchum, Inventor.

by

C. A. Snow & Co.

Attorneys

UNITED STATES PATENT OFFICE.

EDGAR V. R. KETCHUM, OF NEW YORK, N. Y.

ELECTRICALLY-OPERATED SWITCH.

SPECIFICATION forming part of Letters Patent No. 695,563, dated March 18, 1902.

Application filed May 15, 1901. Serial No. 60,363. (No model.)

To all whom it may concern:

Be it known that I, EDGAR V. R. KETCHUM, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Electrically-Operated Switch, of which the following is a specification.

This invention relates to electrically-operated railway-switches; and it has for its object to provide a construction which may be operated by closing proper circuits from a moving car or from a switch-tower, a further object of the invention being to provide for indicating positively that the switch has been thrown.

Additional objects and advantages of the invention will be understood from the following description.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a plan view showing a portion of a track including a switch, the tongue of which is operated by mechanism constructed in accordance with the present invention, the circuits being shown in diagram. Fig. 2 is a view showing a portion of a track and conduit in section and showing also the dashboard of a vehicle, circuits being shown in diagram. Fig. 3 is a sectional view through the casing of the switch-throwing solenoids, the mechanism being shown in elevation and the circuits in diagram.

Referring now to the drawings, there is shown in Fig. 1 a portion of a trackway, including main rails 5 and 6 and switch-rails 7 and 8, and between which are the main slot-rails 9 and 10 and the switch slot-rails 11 and 12. The track-rails are provided with the usual switch-tongue 13, and the slot-rails with a second switch-tongue 14, the tongues being connected by means of the connecting-rod 15, so that they may be moved one from the other.

To reciprocate the connecting-rod 15 to throw the switch-tongues, a reciprocatory rod 16 is provided and is connected at one end to the connecting-rod and at the other is disposed in the upper portion of a casing 17, into which it is passed through the stuffing-box 19 to exclude all moisture. Within the casing are

disposed two solenoids 20 and 21, having cores 22 and 23, which at their upper ends are connected with the ends of a rocker 24, at the central portion of which is an upwardly-directed stem 25, connected by means of the link 26 with the reciprocatory or shift rod 16. The rocker is pivoted at the base of the stem, as shown. Thus it will be seen that if either of the solenoids be energized, its core will be drawn thereinto, with the result that the shift-rod will be operated to correspondingly move both switch-tongues, and if the other solenoid be then energized, both tongues will be returned to their former positions.

The simpler embodiment of the invention is shown in Fig. 3 of the drawings, wherein 27 represents a switch-lever at a switch-tower, and 28 is the positive conductor from a source of electricity, 29 being the negative or return conductor. Within the casing 17 are the contacts 30 and 31, which are insulated from each other, the contact 30 being connected by conductor 32 with one switch-point 33 through the indicator 34, while the other contact 31 is connected with the switch-point 35 by conductor 36 through the indicator 37, these indicators being of any suitable construction to indicate the positions of the switch-tongue to be controlled.

Between the contacts 30 and 31 is disposed a contact 38, carried by the shift-rod and insulated therefrom, and this contact 38 is electrically connected by means of wire 39 with one terminal of the winding of a solenoid 40, which is fixed in a compartment of the casing and has a core 41, provided with a locking-bolt 42 at its upper end and adapted to engage behind a shoulder 43, depending from the shift-rod to hold the shift-rod against movement. When the solenoid is energized, the core is drawn downwardly against the tendency of the encircling helical spring 44 to draw the bolt from engagement with the shoulder and permit the shift-rod to be moved, the spring directly encircling the diamagnetic stem 45 of the core, which is passed through the cap 46 of the tubular extension of the lower end of the core-spool, the spring resting with its lower end upon the cap and with its upper end against the lower end of the core.

The lower end of the stem 45 carries a con-

tact 47, with which is connected the second terminal of the winding of the solenoid 40, through the artificial resistance 48, said contact 47 being also connected with the return-conductor 29 by means of the wire 49 and through the artificial resistance 50.

When the solenoid is energized and draws its core downwardly, the contact 47 is moved into contact with a contact 51 at the upper end of the core of an electromagnet 52, one terminal of the winding of which is connected with one terminal each of each of the solenoids 20 and 21 by means of the wire 53 and its branches 54 and 55.

The operation of the mechanism is as follows: The parts being in the positions shown in Fig. 3, if it is desired to throw the switch-tongues to their opposite positions the lever 27 is moved into contact with the point 35, when current from conductor 28 will pass through indicator 37 and conductor 36 to contact 31, then to contact 38 and through wire 39, solenoid 40, resistance 48, contact 47, wire 49, and resistance 50 to conductor 29. The solenoid 40 being thus energized its core 41 is drawn downwardly to retract the bolt 42 from the shoulder 43 to unlock the shift-rod 16, and the contact 47 is engaged with the contact 51, when by reason of the resistance 48 the current passes from switch-point 35 through conductor 56 to one terminal of the winding of the solenoid 20, thence through said solenoid and out through wires 54 and 53 to magnet 52, and thence through contacts 51 and 47 and wire 49 and resistance 50 to conductor 29. The resistance 48 is of such value as to insure a sufficient flow of current through the shunt, including the solenoid 20 and magnet 52, to energize the solenoid and magnet, so that the core 22 is drawn downwardly to actuate the rocker 24 to shift the switch-tongues, and at the same time the contact 47 is held against contact 51, the contact 47 being mounted upon a paramagnetic head at the lower end of the stem of the core 41, so that it is held down by action of the magnet 52. When the core 22 is drawn downwardly and the rod 16 is shifted, the contact 38 is moved away from the contact 31, at which time the solenoid 40 is cut out, so that the entire current passes through solenoid 20 and magnet 52 in series, the magnet 52 holding the core 41 down to maintain engagement of contacts 47 and 51 even after solenoid 40 is deenergized. When the shift-rod 16 is thus moved by action of the solenoid 20, the contact 38 is finally carried into engagement with the contact 30, which establishes a shunt around the solenoid 20 and magnet 40 and including the indicator 34. This shunt may be traced from the branch conductor 54 to solenoid 21 and through conductor 58 to indicator 34, and thence by way of conductor 32, contact 30, contact 38, wire 39, solenoid 40, resistance 48, contact 47, conductor 49, and resistance 50 to conductor 29. While the solenoid 21 is thus energized, the rod 16 is not reversely shifted, for the reason

that the energization of solenoid 20 is greater than that of the solenoid 21, owing to the fact that the circuit of solenoid 21 includes solenoid 40 and resistance 48. The indicator 34 being thus energized it is operated to indicate that the contact 38 has reached the contact 30, at which time the rod 16 has moved a distance sufficient to throw the switch-tongues. After the switch-tongues have been thrown the lever 27 may be moved to its intermediate position shown, and when the switch-tongues are to be returned the lever is moved onto the point 33, when the current from conductor 28 will pass through indicator 34, contacts 30 and 38, wire 39, solenoid 40, resistance 48, contact 47, and wire 49 and resistance 50 to conductor 29. The core 41 being then drawn down to engage the contact 47 with contact 51, current passes from point 33 through wire 58, solenoid 21, branch 55, wire 53, magnet 52, contacts 51 and 47, and wire 49 and resistance 50 to conductor 29. The solenoid 21 is thus energized to return the parts, including the shift-rod, to the positions shown in Fig. 3, the contact 38 being moved from contact 30, so that the circuit through solenoid 40 is broken.

In Fig. 2 of the drawings there is shown an electrically-propelled vehicle and a section of a trackway equipped with means for sending currents through the wires 56, 58, 32, and 36. In this figure of the drawings there is shown a conduit 60, having the usual conductor rails or bars 61 and 62 for operative engagement by the shoes 63 and 64 on the plow 65, the shoes being in circuit with a controller 66 and a motor 67 through the medium of wires 68, 69, and 70, as shown. In the conduit are the supplemental conductor-bars 71 and 72, the wire 56 in Fig. 2 being connected with the bar 71 and the wire 58 being connected with the bar 72. The plow has also supplemental shoes 73 and 74, the shoe 73 being adapted to engage bar 71 and having connection with the switch-point 35, by means of wires 75 and 76, through indicator 34. The shoe 74 is connected by conductors 77 and 78, through indicator 37, with the switch-point 33, shoe 74 being adapted for engagement with bar 72. With this arrangement it will be seen that by shifting the lever 27 of the switch placed on the car the bars 71 and 72 may be thrown into circuit with the feed-conductor 68, which is connected by wire 28 with the switch-lever, as shown. In this case the wire 29, in Fig. 3, is of course connected with the return conductor-rail in the conduit.

In practice the lengths of the supplemental conductor rails or bars may be such as to maintain contact of the supplemental shoes therewith until the car has entirely passed the switch or may be only sufficiently long to insure operation of the switch mechanism, and it will be understood that in operating the mechanism from a car the switch-lever 27 may be set in proper position before the supplemental conductor-bars are reached, and when

they are engaged the switch will be thrown without requiring manipulation of the lever 27.

What is claimed is—

5 1. A device of the class described, comprising a shift-rod, electromagnetic devices connected with the rod to move it in opposite directions, a switch for connecting the electromagnetic devices interchangeably with a
10 source of electricity, a shunt around the electromagnetic devices and including an electromagnetic switch for closing the circuit between the first-named switch and the electromagnetic device in operative relation thereto,
15 and means operably connected with the said electromagnetic devices for shifting the shunt-circuit around the electromagnetic device that is out of operative relation to the first-named switch.

20 2. A device of the class described, comprising a shift-rod, solenoids having cores operably connected with the shift-rod to reversely move it, a switch having a point connected with one terminal of the winding of each
25 solenoid for connecting them with a source of electricity, said solenoids having a common return, an electromagnetic switch for controlling the common return, and an electromagnet in the common return for holding the switch
30 closed.

3. A device of the class described, comprising a shift-rod having a contact, fixed contacts with which the first contact is adapted for engagement interchangeably, solenoids
35 having cores connected with the rod to operate it reversely, a switch having separate points with which the fixed contacts are connected through separate indicators, said points being connected also with one terminal of the wind-
40 ings of their respective solenoids, a common return for the solenoids, and an electromagnetic circuit-closer for the common return and disposed between the contact on the shift-rod and the return-conductor beyond the point
45 of closure thereof.

4. A device of the class described, comprising a shift-rod having a contact, fixed contacts with which the first contact is adapted for engagement interchangeably, electromag-
50 netic devices for reversely operating the shift-rod, a switch having separate points with which the fixed contacts are connected

through separate indicators, said points being also connected each with one terminal of the winding of its respective electromagnetic de-
55 vice, a common return for the electromagnetic devices, an electromagnetic switch for closing the common return and electrically connected between the contact on the shift-rod and the return-conductor at a point beyond the point
60 of closure thereof, and an electromagnetic device for holding the circuit-closer in active position when its operating-circuit is broken by movement of the shift-rod.

5. In a device of the class described, a track-
65 switch, electromechanical means for shifting said switch in both directions, main and supplemental conductor-rails, a plow having a separate contact-shoe for each rail, current-conductors leading from the supplemental
70 rails to opposing portions of the shifting devices, a switch carried by the car and connected to the main conductor, said switch having contact-points connected separately to the shoes of the supplemental rails, and a
75 return leading from such shifting devices to the main return-rails, whereby said shifting devices may be energized for movement in either direction.

6. In a device of the class described, the
80 combination with a track-switch, of a pair of solenoids operatively connected to move said switch in opposite direction, main feed and return rails, a return-conductor common to both solenoids and connected to main return-
85 rail, supplemental conductor-rails, conductors leading from each of the supplemental conductor-rails to separate solenoids, a plow on the vehicle carrying a separate shoe for engagement with the main and supplemental
90 rails, a switch carried by the car connected to the main feed-conductor and having points connected with the shoes engaging the supplemental rails for supplying current from the feed-rail to the supplemental rails inter-
95 changeably.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

EDGAR V. R. KETCHUM.

Witnesses:

EDGAR KETCHUM,
HENRY GALLAGHER.