No. 825,396. PATENTED JULY 10, 1906.

F. T. KITT.

ELECTRICALLY CONTROLLED RAILWAY SWITCH.

APPLICATION FILED JULY 18, 1904. RENEWED JUNE 15, 1905.

2 SHEETS—SHEET 1.

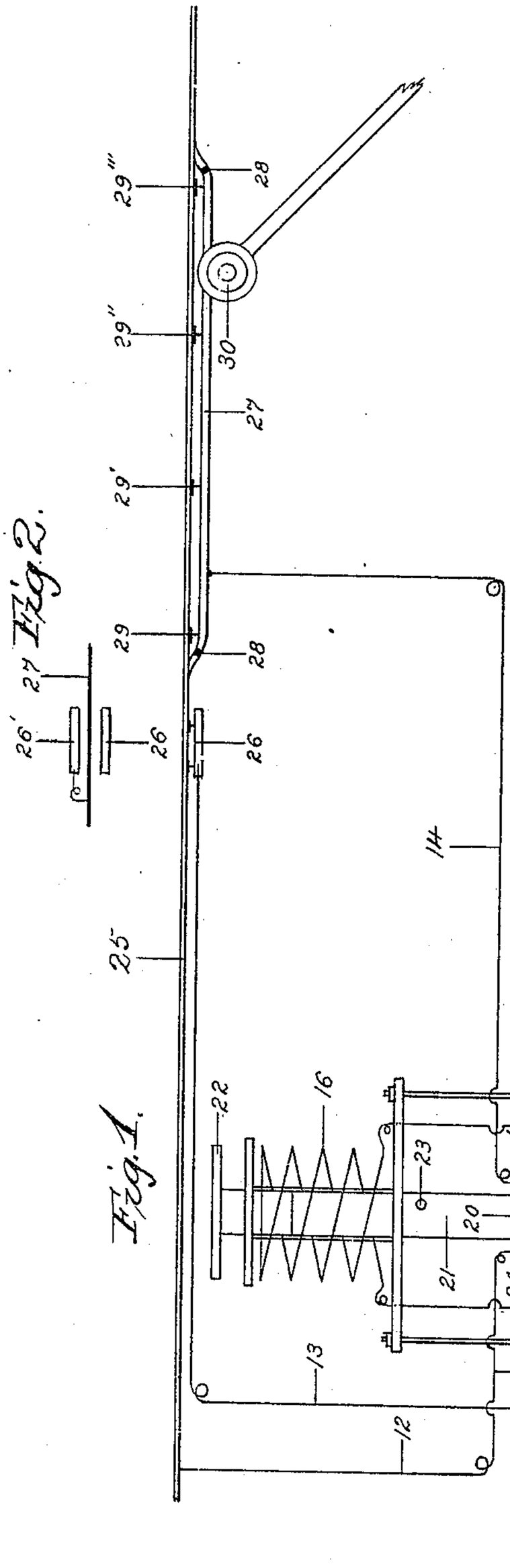


Fig. 1.

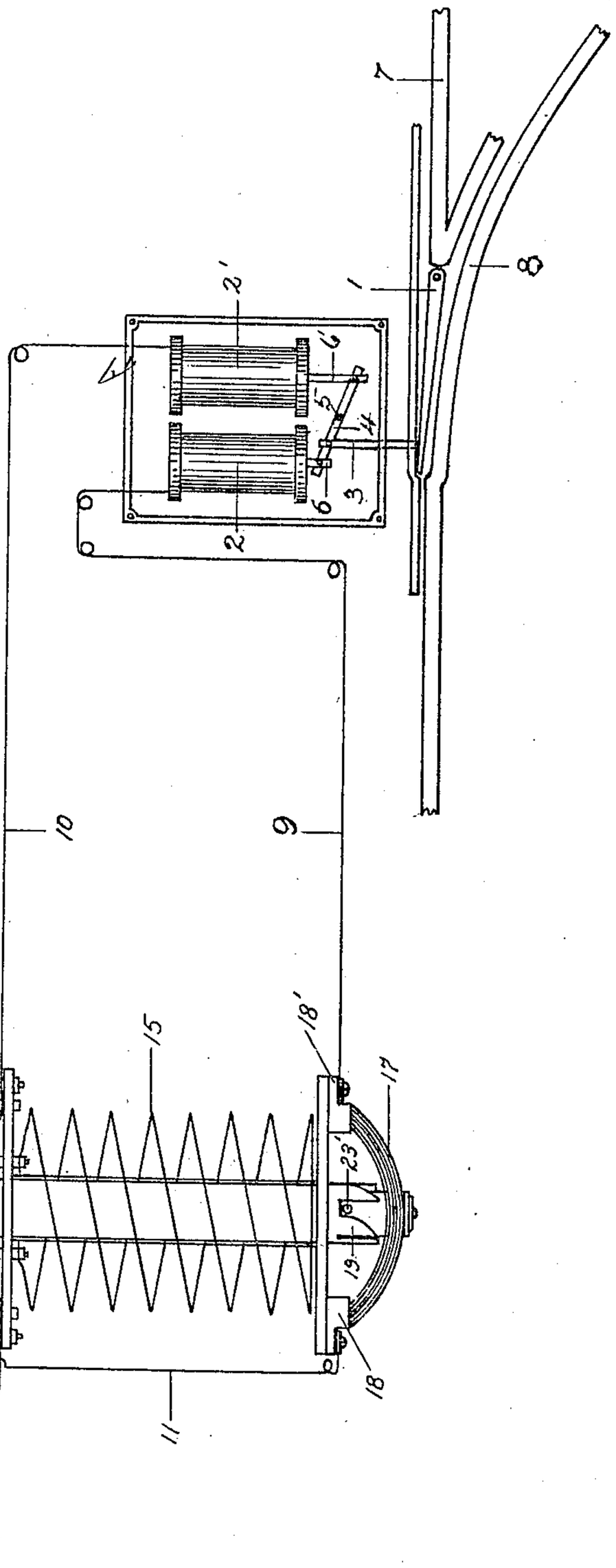


Fig. 2.

WITNESSES:
Alden W. Campbell.
J. Fred Schultz

Fred T. Kitt INVENTOR.

No. 825,396. PATENTED JULY 10, 1906.

F. T. KITT.

ELECTRICALLY CONTROLLED RAILWAY SWITCH.

APPLICATION FILED JULY 18, 1904. RENEWED JUNE 15, 1905.

2 SHEETS—SHEET 2.

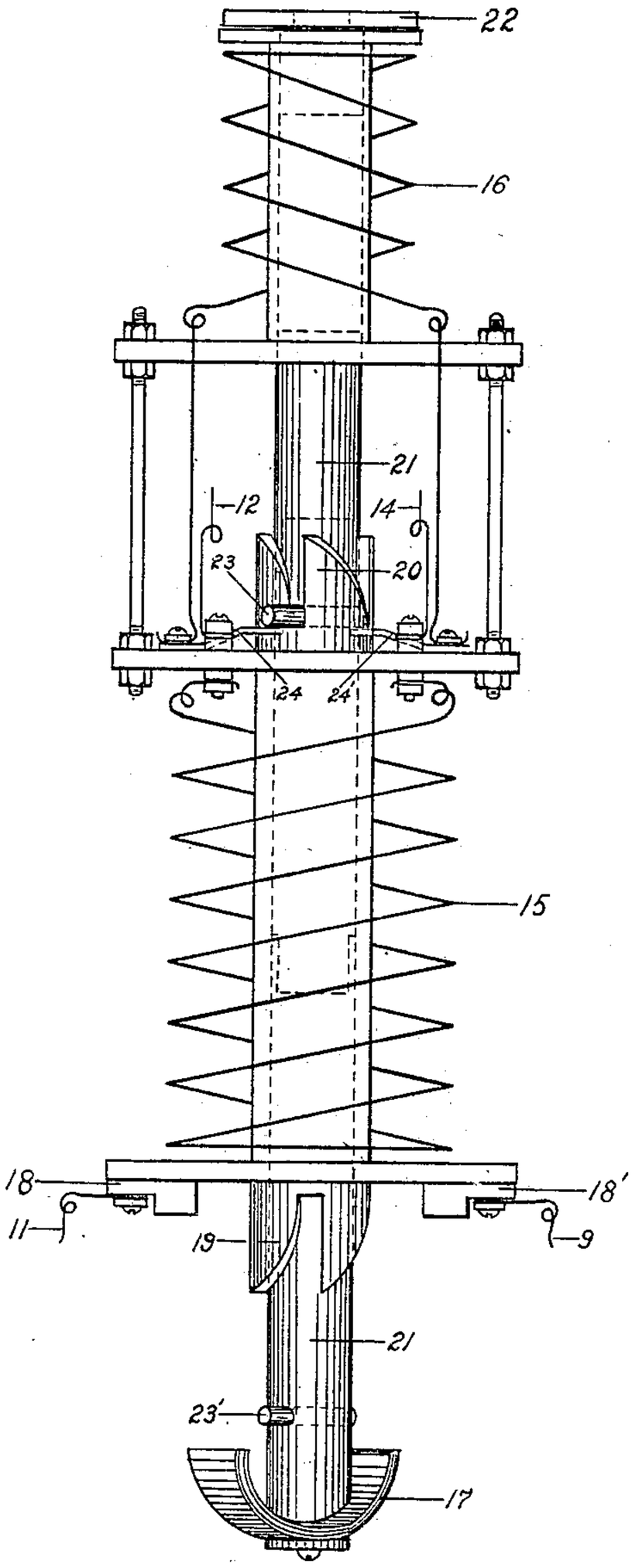
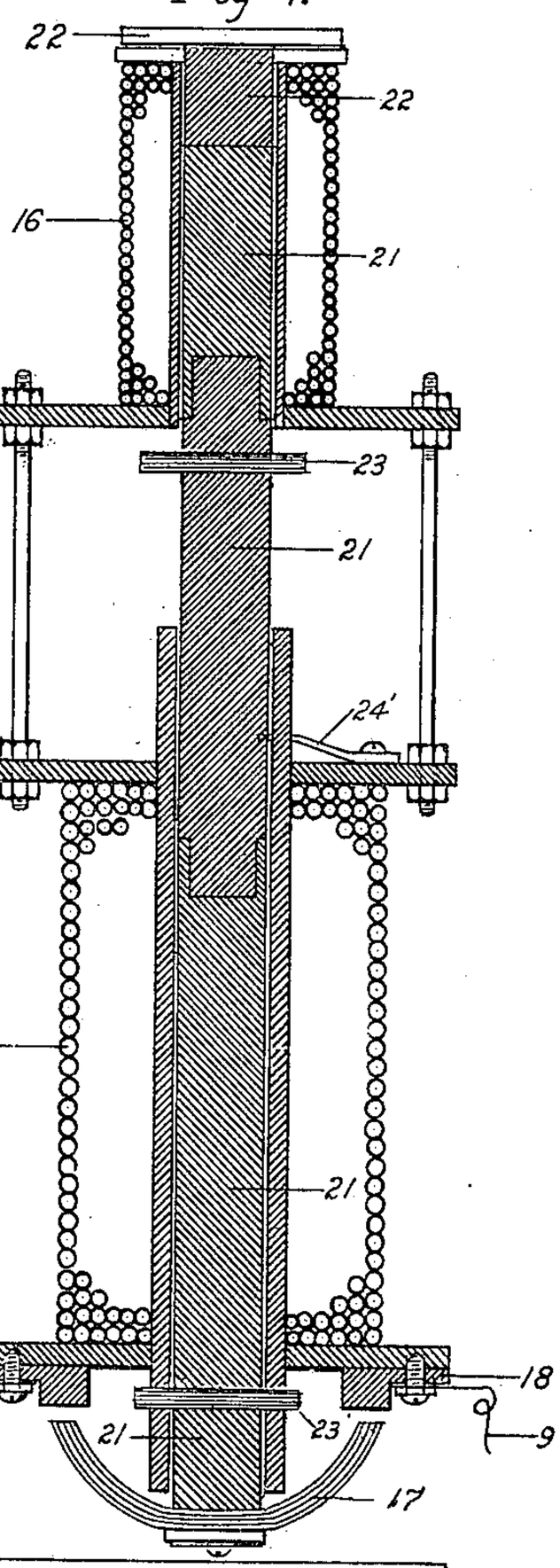


Fig. 3.

Fig 4.



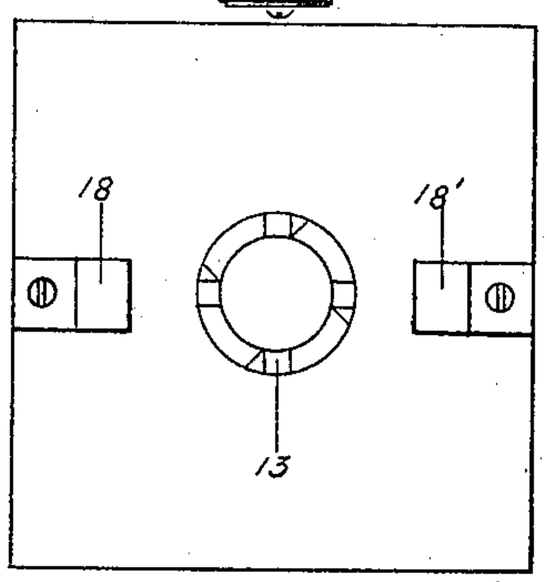


Fig. 5.

WITNESSES:
Alden W. Campbell.
J. Fred Schultz

Fred T. Kitt INVENTOR.

UNITED STATES PATENT OFFICE.

FREDERICK T. KITT, OF DENVER, COLORADO.

ELECTRICALLY-CONTROLLED RAILWAY-SWITCH.

No. 825,396. Specification of Letters Patent. Patented July 10, 1906.

Application filed July 18, 1904. Renewed June 15, 1905. Serial No. 265,434.

To all whom it may concern:

Be it known that I, FREDERICK T. KITT, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented a new and useful Electrically-Controlled Railway-Switch, of which the following is a specification.

My invention relates to improvements in an electric switch-operating device, my object being to provide means whereby the switch-tongue in a railway-track on which are operated electric cars or trains can be controlled by the motorman.

The chief object of my improvement is to provide means whereby it is impossible for the motorman to shift said switch-tongue accidentally and at the same time to enable him to control it in a practical and convenient manner.

In carrying out my invention I employ two large solenoids, which are so arranged that they will shift the switch-tongue in opposite directions on being separately energized, an insulated section of the trolley-wire or other conductor, as may be the case, a relay so connected that it is energized by the current which a car takes when its trolley-wheel is on said insulated section and having means for completing a circuit from the trolley-wire or a feed-wire through one of said large solenoid-coils. Said relay is also so arranged that it must be energized and de-energized at least twice before said circuit through the large solenoid will be completed, and means whereby, if it is energized once by one car, it will automatically correct its position before the trolley-wheel of the next car can get in contact with the insulated section, thus making it necessary for any motorman wishing to shift the tongue to the position which the solenoid which is in the relay-circuit is adapted to shift it to make at least two operations of his controller—that is, he must apply his current, then shut it off and apply again while the trolley-wheel is in contact with the insulated section. I also employ means whereby the passing of the trolley-wheel over a contact placed in advance of said insulated section closes a circuit through the other solenoid-coil and shifts the switch in the opposite position. I prefer to so arrange the connections that the passing of the trolley-wheel over said contact shifts the switch in a position to guide the car on the straight track and to so connect the other solenoid that it is energized only by means of the relay. Thus there is no possibility of a car running into the curve accidentally, for if the switch is open it will be closed when the trolley-wheel comes in contact with said contact-strip, and as two operations of the controller is necessary to open the switch it makes no difference if the car is consuming current when its trolley-wheel is in contact with the insulated section. In most devices of this class it is possible to run into an open switch, or if the switch be closed it is possible for the motorman to forget the switch and run at a high speed with the current on, and in that case the switch may be thrown open when the trolley-wheel comes in contact with the insulated section, thus sending the car around a sharp curve at a speed great enough to do serious damage. In my device this is impossible, as it makes no difference whether the car is using current or not. The switch is always shifted for the main line unless the current is applied twice while going under the insulated section, and as it is impossible to do this at any great speed or unintentionally no accident can occur.

Having briefly outlined my improved construction, I will now proceed to describe it in detail, references being made to the accompanying drawings, in which is illustrated an embodiment thereof, the same reference characters representing the same parts in all the figures.

In the drawings, Figure 1 shows the details of connections of all the parts. Fig. 2 shows a top view of the contact-strips. I have not deemed it necessary to show the manner in which they are mechanically attached to the trolley-wire. Fig. 3 is a detail view of the relay, and Fig. 4 a sectional view of same. Fig. 5 is a view of the part containing the stationary contacts which are bridged by a movable contact-piece to complete a circuit.

Let the numerals 1 indicate the switch-tongue, 2 and 2′ the solenoids for shifting same, 6 and 6′ the plungers for said solenoids, and 4 a connection between said plungers, fulcrumed at 5 and having a connection 3 to the switch-tongue.

7 and 8 represent the rails of the main line and a curve, respectively; 9 and 10, connecting-wires for transmitting energy to said solenoids; 15, the main solenoid of the relay; 21, the relay-plunger; 17, a contact-arm fastened to said plunger; 18 and 18′, contact-blocks which said contact-arm is adapted to span; 19, a cam adapted to turn said plunger a part

of a revolution by engaging pin 23′ when it is moved upward; 20, a similar cam having its angular surfaces cut in an opposite direction and adapted to turn said plunger also a part of a revolution in the same direction by engaging pin 23 when it is moved in a downward direction. Said pins and cams are so arranged that when one pin comes into engagement with one of the angular surfaces of one cam the plunger is turned a sufficient distance, so that at the opposite movement of said plunger the other pin will engage the angular surface next to the one it engaged at the previous operation. Thus the rotation is positive and always in the same direction. It will be noticed that the bridge-piece is rigidly secured to the plunger, and as the cams each have four of said angular surfaces it will be noticed that the contact-blocks 18 and 18′ are connected only every other time. This will be clearly seen by noticing Fig. 3.

16 is what I have termed a "correction-coil;" 22, an extra armature or plunger for same; 12, a wire leading from the trolley or feeder to one terminal of the main relay-coil; 14, a wire leading from the opposite terminal to the insulated section 27.

28 28′ 29 29′ 29″ 29‴ represent insulation. Hence it will be plain that any current passing through the trolley 30 to the car must pass through the coil 15.

11 is a wire connecting contact-block 18 with the trolley or feeder.

24 and 24′ are springs, on which rest pin 23 when the plunger is in position shown in Fig. 3 and to which the terminals of the coil 16 are attached. The conductor 10 is also attached to spring 24′, and the conductor 13, leading from the contact-strip 26, is attached to spring 24.

26′ is a contact-strip mounted on the opposite side of the trolley-wire opposite to 26 and is electrically connected to the trolley-wire. Both strips are so arranged that the flange of the trolley-wheel connects them together while it is passing.

Having referred to all the parts by numerals, I will now proceed to describe the operation of the device. Fig. 1 represents a car having its trolley-wheel on the insulated section and having just had its motor-circuit completed the second time since coming in contact with the insulated section. The bridge-piece 17 is now in contact with the blocks 18 and 18′, and the solenoid-coil 2 is energized, which has moved the tongue in the position for guiding the car onto the curve. Now let us assume that the car has passed entirely over the section. The plunger 21 will now drop by gravity and pin 23 will come into engagement with cam 20, turning the plunger one-eighth of a revolution and leaving it in the position shown in Fig. 3. Now suppose another car follows. When its trolley-wheel comes in contact with contacts 26 and 26′, a current will flow through the wire 13 to spring 24, through pin 23 to spring 24′, and conductor 10 to coil 2′, and shift the switch to the position for guiding the car on the main line. If the car wishes to continue on the main line, it may do so by either coasting over the section 27 or using power only once. Assuming that it does the latter, the relay will be operated once and the bridge-piece will be raised, but in a position at right angles to the position it must have in order to bridge the contact-blocks 18 and 18′. Hence no connection is made and the switch is left set for the main line. The position of the relay, however, is changed, and if no correcting device was employed the next car would open the switch if it passed under section 27 with its motors taking current. However, the correcting-coil 16 operates as follows: The plunger 21 having a piece of non-magnetic material inserted near its center, as shown in the section, Fig. 4, a separate armature is provided for both coils 15 and 16. Pin 23 would be in the slot away from springs 24 and 24′. Thus when the trolley-wheel comes into contact with the strip 26 a current flows through the conductor 13 to spring 24 again, and the electrical connection between the two springs 24 and 24′ is now only through the winding of coil 16, which is now energized and lifts the entire plunger to the position shown in Fig. 4. The armature 22 also has a force exerted on it by the solenoid 16, and as the magnetic part of the upper end of plunger 21 is short it is only drawn upward until it meets the part 22, which is not high enough to allow the arm 17 to connect the blocks 18 and 18′, but is sufficiently high to cause the plunger to rotate sufficiently, so that when the trolley-wheel leaves the contacts it will fall and turn to the position shown in Fig. 3. In this case there was no movement of the switch-tongue, as it was already set for the main line. It is obvious, however, that had it been open the same current that corrected the position of the relay would have closed the switch, as both coils were in series. Let us now assume that the same car that just corrected the relay wishes to take the curve. By the time the trolley-wheel travels from contact 26 to the insulated section 27 the plunger of the relay has dropped and is, as above stated, in the correct position. The current must now be applied, shut off, and applied again, when the position of all the parts will be as shown in Fig. 1. It is obvious also that if the motors are taking current when the trolley-wheel comes in contact with section 27 the current need only be shut off and then applied again in order to give the combination shown in Fig. 1. It will also be noticed that while the armature 22 limits the upward movement of the plunger when the coil 16 is energized it does not do so when coil 15 is

energized, as it takes the position shown in Fig. 1.

Having thus described my invention, what I claim is as follows:

1. In an automatic track-switch for electric railways of the class whereby the shifting of the switch-tongue is accomplished by manipulation of the controller of a car, the combination of means whereby more than one operation of said controller is required in order to shift said tongue.

2. In an automatic track-switch for electric railways, the combination of means whereby the switch-tongue is shifted in one position by the passing of a trolley-wheel over a contact placed on the trolley-wire, and in the opposite position by means of the controller of a car being operated a predetermined number of times while the trolley-wheel is in contact with an insulated section of conductor.

3. In an automatic track-switch for electric railways, the combination of a pivoted connected switch-tongue, two solenoid-coils adapted, when energized, to shift said tongue in opposite directions, two parallel contact-strips and an insulated section mounted on the trolley-wire, an electromagnetic relay, having one terminal of its magnetic coil connected to said insulated section and the other to a feed-wire, all so combined that when the trolley-wheel passes over said contact-strips a current is sent through one of said solenoid-coils and the switch-tongue shifted in one position, and when the trolley-wheel is on said insulated section a current may be sent through the other solenoid-coil and the tongue shifted in the opposite position by means of the motor-circuit on the car being completed through the controller.

4. In an automatic track-switch for electric railways, the combination of a pivoted connected switch-tongue, two solenoid-coils adapted, when energized, to shift said tongue in opposite directions, two parallel contact-strips and an insulated section mounted on the trolley-wire, an electromagnetic relay, having one terminal of its magnetic coil connected to said insulated section and the other to a feed-wire, all so combined that when the trolley-wheel passes over said contact-strips a current is sent through one of said solenoid-coils and the switch-tongue shifted in one position, and when the trolley-wheel is on said insulated section a current may be sent through the other solenoid-coil and the tongue shifted in the opposite position by means of the motor-circuit on the car being successively closed and opened a predetermined number of times.

5. In an automatic track-switch for electric railways, the combination of a pivoted connected switch-tongue, two solenoid-coils adapted, when energized, to shift said tongue in opposite directions, two parallel contact-strips and an insulated section mounted on the trolley-wire, an electromagnetic relay, having one terminal of its magnetic coil connected to said insulated section and the other to a feed-wire, all so combined that when the trolley-wheel passes over said contact-strips a current is sent through one of said solenoid-coils and the switch-tongue shifted in one position, and when the trolley-wheel is on said insulated section a current may be sent through the other solenoid-coil and the tongue shifted in the opposite position by means of the motor-circuit on the car being successively closed and opened a predetermined number of times, and means whereby the position of the movable parts of said relay is automatically corrected.

6. An electromagnetic relay adapted to close a circuit only after its magnet-coil has been energized and deënergized a number of times, and to hold said circuit closed only while said magnet-coil is being energized.

7. An electromagnetic relay adapted to close a circuit only after its magnet-coil has been energized and deënergized a number of times and means whereby the position of the movable parts can be automatically brought to their original position as specified.

8. In an electromagnetic relay having a sliding core, a contact fastened thereto, stationary contacts, means for changing the position of said movable contacts by turning said sliding core a part of a revolution each time said relay is energized, so combined that said relay must be energized and deënergized a number of times in order to bring said movable and stationary contacts into engagement and means whereby the position of said movable contacts may be corrected before the operations are begun.

9. In an electromagnetic relay having a sliding core, a contact fastened thereto, stationary contacts, means for changing the position of said movable contacts by turning said sliding core a part of a revolution each time said relay is energized, so combined that said relay must be energized and deënergized a number of times in order to bring said movable and stationary contacts into engagement.

FRED. T. KITT.

Witnesses:
GRACE MORSE,
ALBERT E. BLAIR.