No. 773,324. PATENTED OCT. 25, 1904.

C. F. HOPEWELL.

TRACK SWITCH OPERATING MECHANISM.

APPLICATION FILED AUG. 17, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

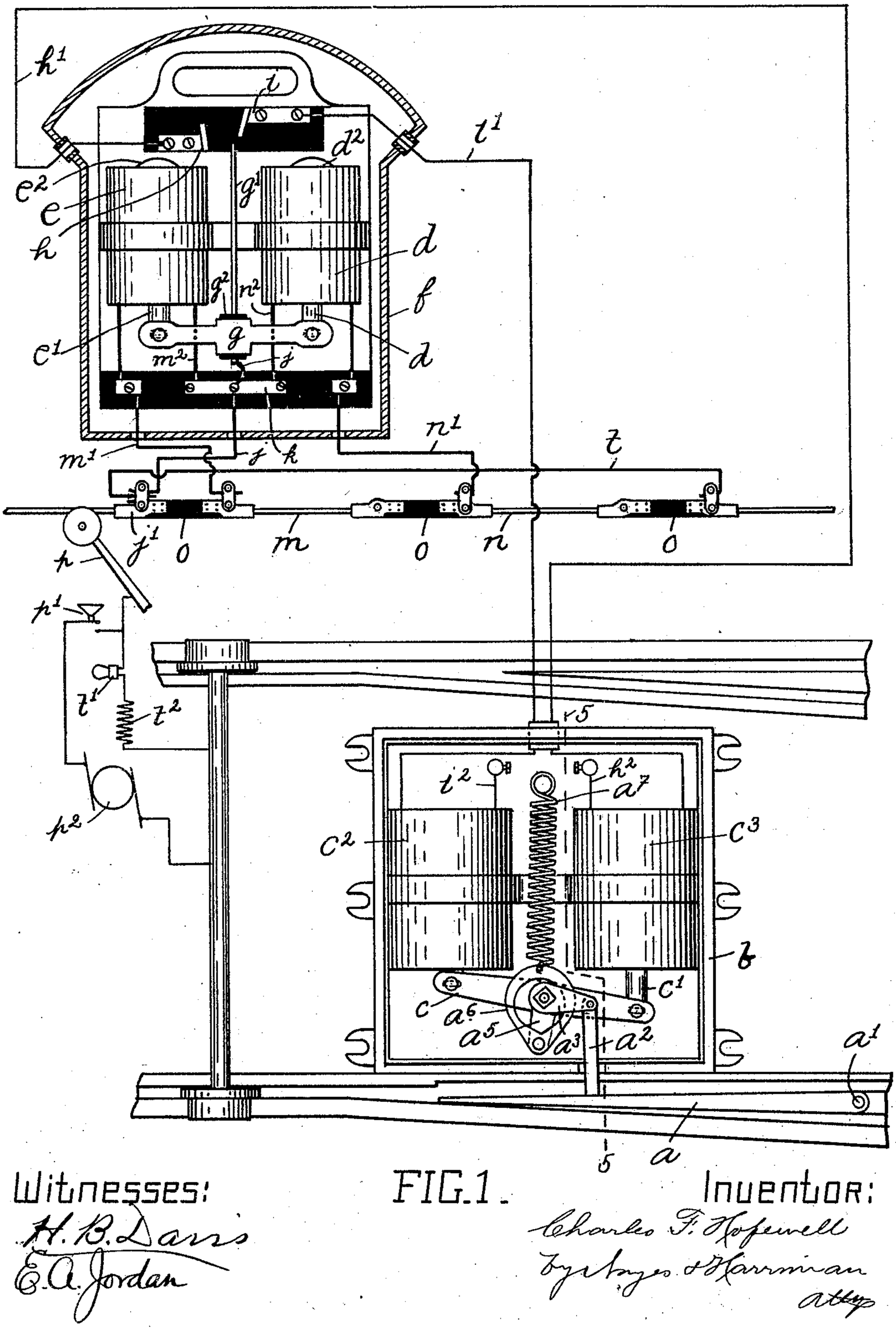

FIG. 1.

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NO MODEL. 2 SHEETS—SHEET 2.

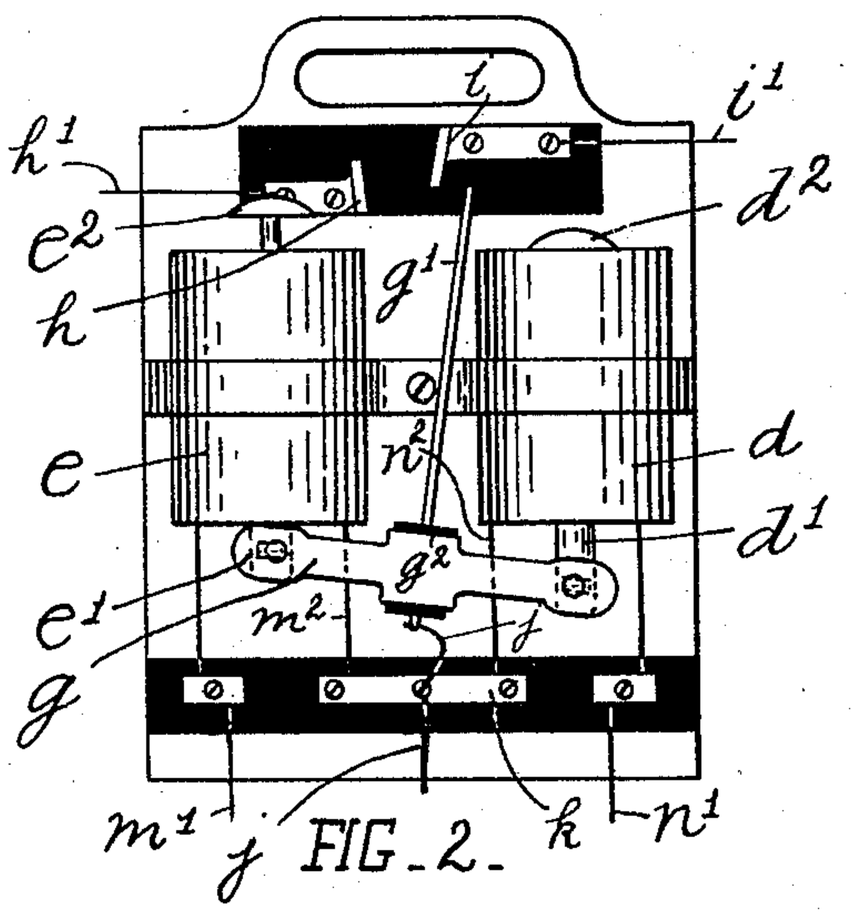

FIG_2_

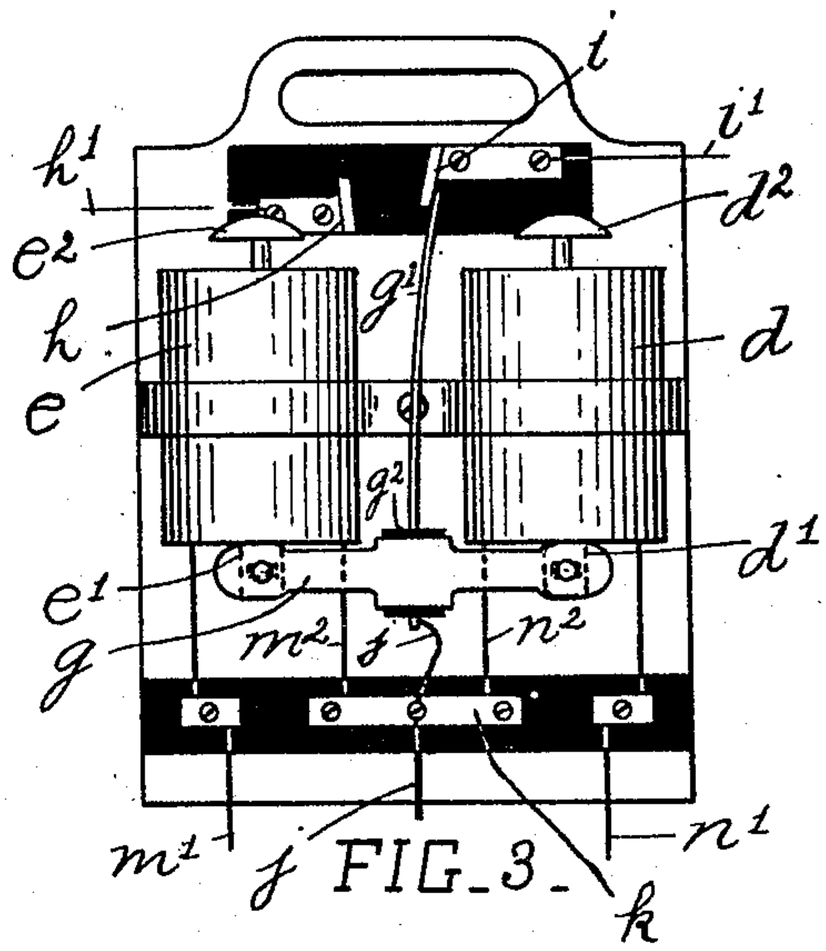

FIG_3_

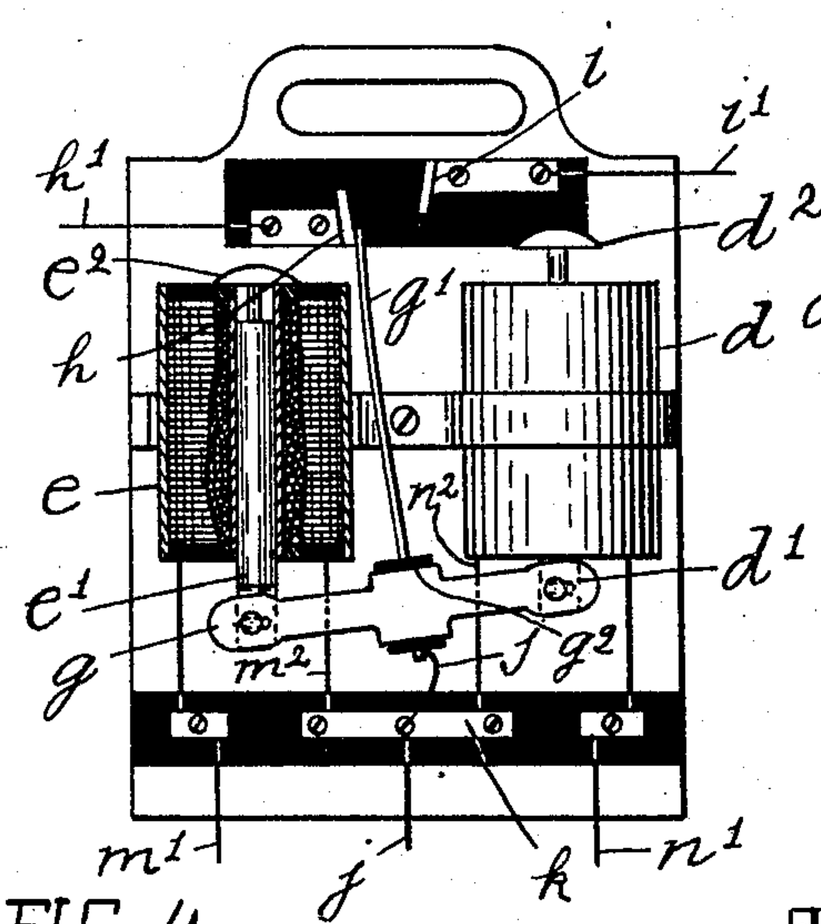

FIG_4_

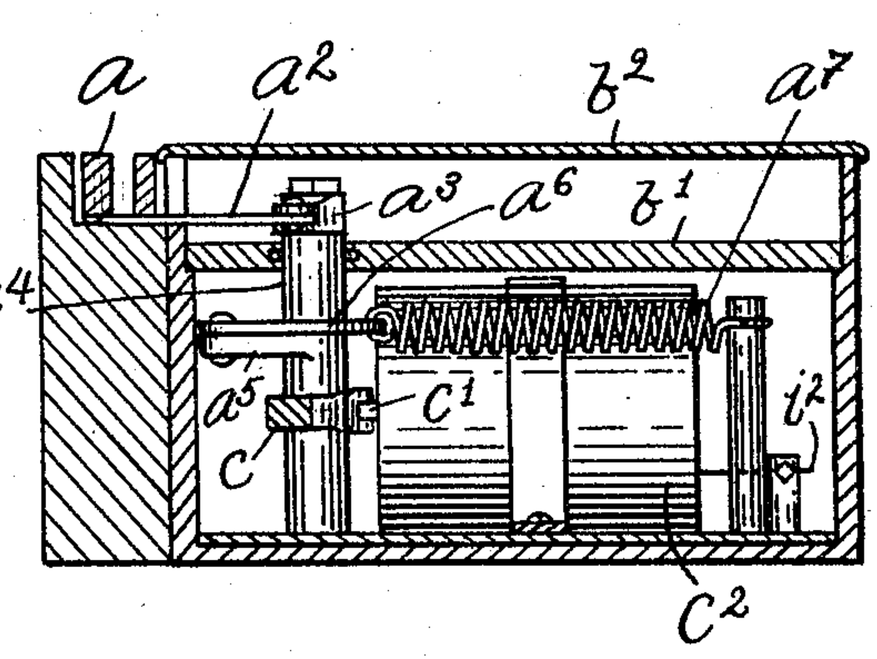

FIG_6_

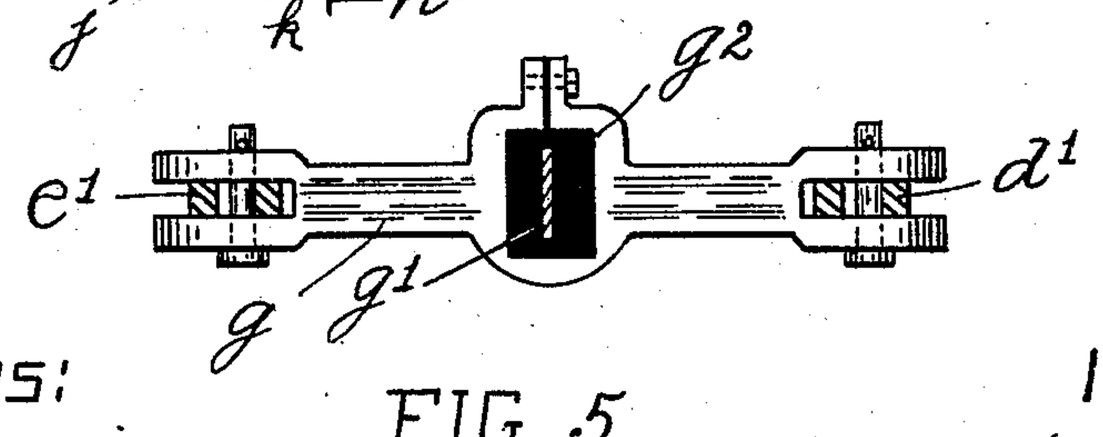

FIG_5_

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No. 773,324. Patented October 25, 1904.

UNITED STATES PATENT OFFICE.

CHARLES F. HOPEWELL, OF CAMBRIDGE, MASSACHUSETTS.

TRACK-SWITCH-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 773,324, dated October 25, 1904.

Application filed August 17, 1904. Serial No. 221,014. (No model.)

To all whom it may concern.

Be it known that I, CHARLES F. HOPEWELL, of Cambridge, county of Middlesex, State of Massachusetts, have invented an Improvement in Track-Switch-Operating Mechanism, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to electrically-operated railway-switches especially adapted for electric railways, and has for its object to provide two similarly-constructed actuating devices for the pivoted switch-plate, one for moving it in one direction and the other for moving it in the opposite direction, and to provide an operating device for said actuating devices, and means for determining which actuating device shall be operated by the operating device, said means being under the control of the operator or motorman.

Figure 1 shows in plan view a track-switch and actuating devices for it and in front elevation and diagram the operating device for said actuating devices and means under the control of the motorman for determining which actuating device shall operate. Fig. 2 is a view showing the operating and selecting solenoids and circuit-controlling devices operated by them, the selecting-solenoid being energized and the movable member of the circuit-controlling devices being thereby set in position to be operated by the operating-solenoid to close the circuit of one of the actuating devices for the switch-plate. Fig. 3 is a similar view of the parts, the operating-solenoid being energized and one of the circuits operated by it closed. Fig. 4 is a view showing the operating and selecting solenoids and the circuit-controlling devices operated by them, the movable member of the circuit-controlling devices being represented as closing the circuit of the other actuating device for the switch-plate. Fig. 5 is a detail showing the cross-bar to which the movable member of the circuit-controlling devices is attached. Fig. 6 is a longitudinal section of the box or case containing the actuating devices for the switch-plate, taken on the dotted line 5 5, Fig. 1.

a represents the ordinary switch-plate, which is pivoted at a'. An arm a^2 is secured to said switch-plate, which projects through a hole in one side of a box or case b and is connected loosely to the extremity of a short arm a^3, secured to a sleeve a^4, mounted upon an upright post or other fixed support which is contained within said box or case b. The sleeve a^4 has secured to or formed integral with it an arm a^5, which projects a short distance, and to the extremity of said arm a loop-like link a^6 is loosely connected, and said link surrounds the sleeve, and its opening is made large enough to provide for the free and unobstructed movement of the link, as will be required. To the opposite or rear end of said loop-like link a^6 a strong spring a^7 is connected, the action of which is to pull upon the arm a^5 and hold the sleeve, with said arm a^5, at one or the other side of a line passing through the sleeve and the point of attachment of the spring to thereby yieldingly yet positively hold the pivoted switch-plate a in either one of its two positions.

A cross-bar c is rigidly secured to the sleeve a^4, to both extremities of which solenoid-armatures c' are loosely connected—one for the solenoid c^2 and the other for the solenoid c^3—and as either one of the solenoids is energized its armature will be attracted and the cross-bar correspondingly moved to thereby turn the sleeve and move the switch-plate a on its pivot. The solenoids c^2 c^3 therefore respectively move the switch-plate in opposite ways and, together with the connections between their armatures and the switch-plate, serve as and constitute two actuating devices for said switch-plate—one for moving the switch-plate in one direction and the other for moving it in the opposite direction. The two solenoids and their armatures and connected parts are all contained in the box or case b, being placed at the bottom of the box and covered first by a plate b', which has a hole through it for the sleeve, and then by a plate b^2. The compartment of the box containing the actuating de-

vices is thus made water-tight. The two solenoids are adapted to be operated by means controlled by the motorman of the passing car, so that either solenoid may be operated at the will of the motorman.

Each solenoid c^2 c^3 is included in a separate circuit, and the circuit-controlling devices for said circuits are operated by the solenoid d, which is herein referred to as the "operating-solenoid," and controlled by the solenoid e, which is herein referred to as the "selecting-solenoid." The solenoids d and e are contained in a box or case f. The armature e' of the solenoid e is loosely connected at its lower end to one end of a cross-bar g, and at its upper end a headed pin e^2 is secured to it, which by striking upon the upper end of the solenoid limits the downward movement of the armature. The armature d' of the solenoid d is loosely connected at its lower end to the opposite end of said cross-bar g, and at its upper end a headed pin d is secured to it, which by striking upon the upper end of the solenoid limits the downward movement of the armature. The cross-bar g is thus supported by the two armatures e' d'.

The cross-bar g has an arm g', which extends upward and which is insulated from the cross-bar, said arm being herein shown as set in and passing through a block of insulating material, (represented at g^2, Fig. 5,) and said arm is adapted to serve as the movable member of the circuit-controlling devices for the circuits of the solenoids c^2 c^3. The arm g' is designed to engage the contact-plate h to close one of the circuits and to engage the contact-plate i to close the other circuit, said contact-plates being secured to the frame-plate within the box f.

A wire h' leads from the contact-plate h to the solenoid c^3, and a wire h^2 leads from said solenoid to the ground, and a wire i' leads from the contact-plate i to the solenoid c^2, and a wire i^2 leads from said solenoid to the ground. A wire j leads from the arm g' to a fixed plate k and from said plate to the main trolley-wire at j''; but said arm normally occupies a vertical position out of engagement with both contact-plates h and i, as shown in Fig. 1.

The trolley-wire has two insulated sections, (represented at m and n.) These sections form a part of the trolley-wire, but are insulated therefrom and from each other by sections o of insulating material. A wire m' leads from the section m to the solenoid e, and a wire m^2 leads from said solenoid to the plate k. A wire n' leads from the section n to the solenoid d, and a wire n^2 leads from said solenoid to the plate k.

p represents the trolley, and p' the circuit-controller, which is under the control of and operated by the motorman, and which is connected in circuit with the motor p^2, which leads to the ground.

In operation, when the trolley p passes onto the insulated section m if the controller p' is closed the circuit of the solenoid e is closed, the circuit thus established leading from the trolley-wire, over wire j to plate k, over wire m^2, solenoid e, wire m', insulated section m, and trolley p to ground, and the solenoid e is energized and draws up the armature e' and moves the arm g' toward the right, as shown in Fig. 2. The arm passes beneath but does not engage the contact-plate i, and the circuits of the solenoids c^2 c^3 are not effected by this movement of the arm g'. Then as the trolley passes onto the insulated section n, the controller p' remaining closed, the circuit of the solenoid d is closed, the current passing from the trolley-wire over wire j to plate k, then over wire n^2 to solenoid d, then over wire n' to insulated section n, and then by the trolley through motor to ground. The solenoid d is energized and its armature d' attracted, and in practice this armature is drawn up before the armature e' has had time to retract, notwithstanding the circuit of the solenoid e is open by the passing of the trolley off the section m, and as a result the arm g' is forced into engagement with the contact-plate i, as shown in Fig. 3, closing the circuit of the solenoid c^2, which attracts its armature and moves the switch-plate into the position shown in Fig. 1 for the car to continue on a straight track. The switch-plate having thus been moved will be held in such position by the spring a' and the armature e' and d' will be held in attracted positions notwithstanding the circuit of the solenoid c^2 is immediately thereafter opened and the circuit of the solenoid d is likewise immediately opened by the passing of the trolley off the section n. Thus when the motorman desires to proceed on a straight track he holds the controller p' closed and proceeds under both insulated sections m and n. If he desires to proceed on a curved track, he opens the controller p' while the trolley passes beneath the section m and closes it while passing beneath the section n. The operation of the parts under this condition is different, for as the trolley passes onto the section n the solenoid e is not only deënergized, but its armature e' is in its full retracted position, and then as the solenoid d is energized and its armature attracted the arm g' will be moved into engagement with the contact-plate h, as shown in Fig. 4, thereby closing the circuit of the solenoid c^3, which latter attracts its armature and moves the switch-plate into its other position, so as to proceed on the curve. A wire t is employed, which is connected at its opposite ends with the main trolley-wire at points beyond the two insulated sections to maintain the continuity of the current, and on the car a branch wire will be employed, which includes the lamps t' and heating apparatus t^2, the parts being so propor-

tioned that the current for the lighting and heating apparatus will not operate the actuating devices of the switch-plate.

Instead of employing the controller p' as a means of controlling the operation of the solenoids e and d the insulated sections o between m and n may be made quite short, and the speed of the car may be depended upon to accomplish this result in the following manner: If the car passes under the short insulated section o slowly, the armature of the solenoid e will have time to retract before the trolley passes onto the section n; but if the car passes along quickly said armature of solenoid e will not have time to retract. It will be seen that the solenoid d in either event is the operating-solenoid for both actuating devices, and the solenoid e serves as the selecting device or means for determining whether one or the other actuating device shall be operated.

This device may be used equally well in a third-rail system, the third rail being the equivalent of the trolley-wire. Furthermore, it is obvious that the insulated sections m and n may be in the track-circuit instead of the trolley-wire.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a pivoted switch-plate, of two solenoids, armatures therefor, a cross-bar to which said armatures are loosely connected, a sleeve to which said cross-bar is rigidly secured, and means for connecting said sleeve with the switch-plate, substantially as described.

2. The combination with a pivoted switch-plate, of two solenoids, armatures therefor, a cross-bar to which said armatures are loosely connected, a sleeve to which said cross-bar is rigidly secured, and means for connecting said sleeve with the switch-plate, an arm projecting from said sleeve, a spring connected by a link with said arm for holding the switch-plate in either one of its positions, substantially as described.

3. The combination with a pivoted switch-plate, and two actuating devices therefor, circuits for said actuating devices, circuit-controlling devices for said circuits, an operating-solenoid for said circuit-controlling devices, a selecting-solenoid for determining which circuit-controlling device shall be operated and means for operating said solenoids controlled by the operator, substantially as described.

4. The combination with a pivoted switch-plate, and two actuating devices therefor, circuits for said actuating devices, circuit-controlling devices for said circuits, an operating-solenoid for said circuit-controlling devices, a selecting-solenoid for determining which circuit-controlling device shall be operated, circuits for said solenoids connected with the main trolley-wire, and two insulated sections of trolley-wire to which the circuits of said solenoids are respectively also connected, whereby said solenoid-circuits are operated by the passing trolley, substantially as described.

5. The combination with a pivoted switch-plate, and two actuating devices therefor, circuits for said actuating devices, circuit-controlling devices for said circuits, an operating-solenoid for said circuit-controlling devices, a selecting-solenoid for determining which circuit-controlling device shall be operated, circuits for said solenoids connected with the main trolley-wire, and two insulated sections of trolley-wire to which the circuits of said solenoids are respectively also connected, whereby said solenoid-circuits are operated by the passing trolley, and a controller for the trolley-operated circuits, substantially as described.

6. The combination with a pivoted switch-plate, electromagnetically-controlled means for moving it, a selecting-solenoid, and an operating-solenoid for the circuits of said means, electrically connected to the trolley-wire and to respective insulated sections of the trolley-wire and adapted to be energized at the will of the operator, to correspondingly energize respective circuits of said means, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES F. HOPEWELL.

Witnesses:
B. J. NOYES,
H. B. DAVIS.