(No Model.) 2 Sheets—Sheet 1.

C. W. SQUIRES.

RAILWAY SWITCH OPERATING MECHANISM.

No. 602,667. Patented Apr. 19, 1898.

Fig. 1.

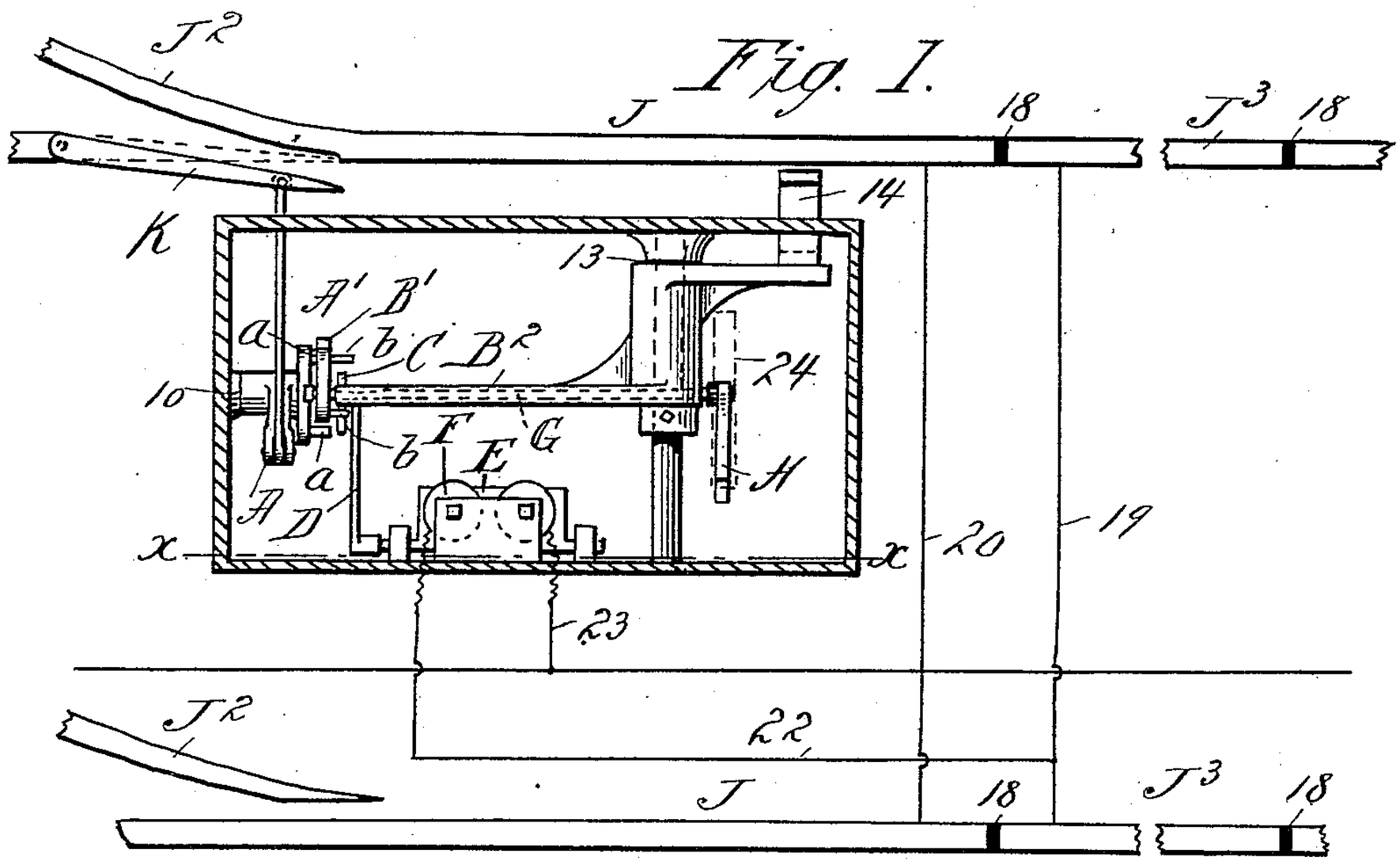


Fig. 2.

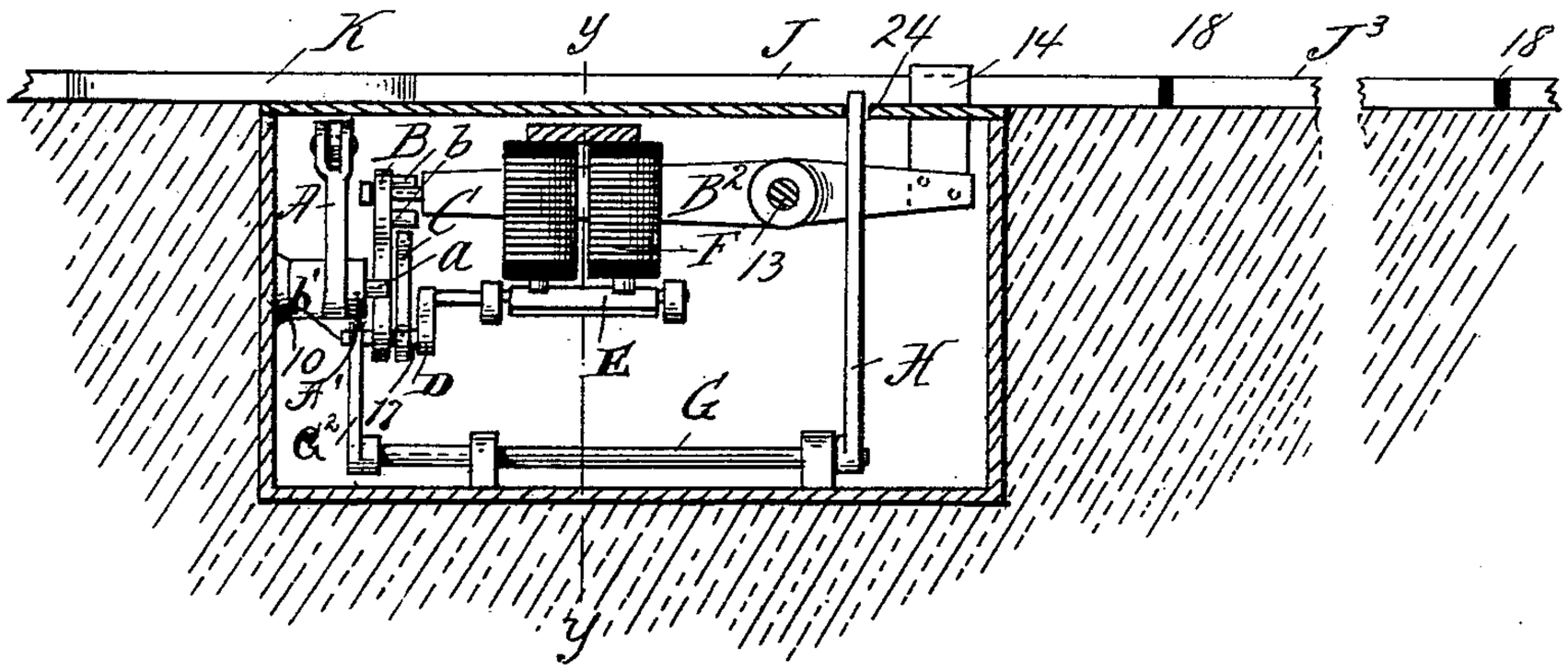
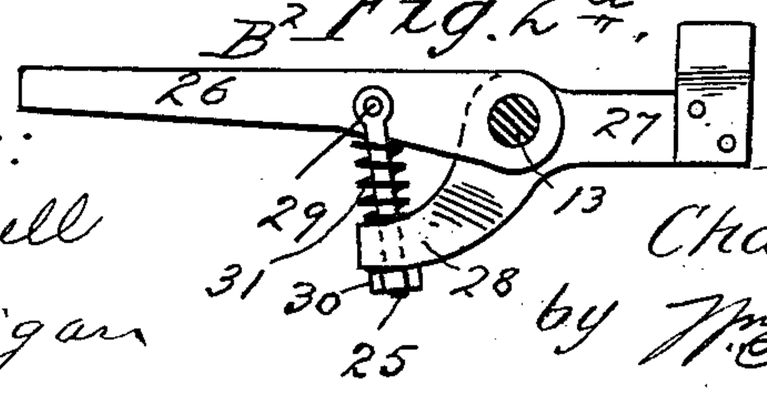


Fig. 2a.



Witnesses:
M. A. Campbell
F C Carrigan

Inventor,
Chas W. Squires,
by W. E. Ballou
Atty.

(No Model.) 2 Sheets—Sheet 2.

C. W. SQUIRES.

RAILWAY SWITCH OPERATING MECHANISM.

No. 602,667. Patented Apr. 19, 1898.

Fig. 4.

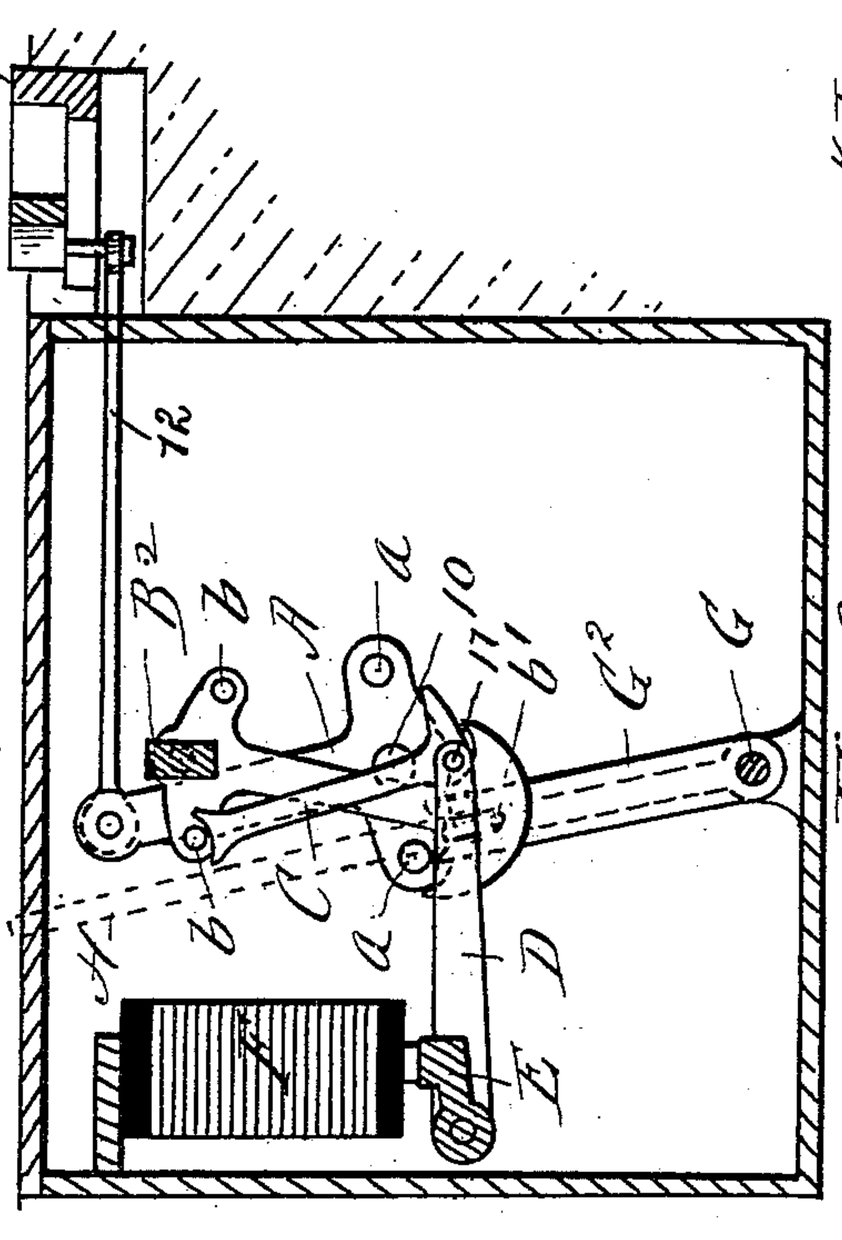


Fig. 6.

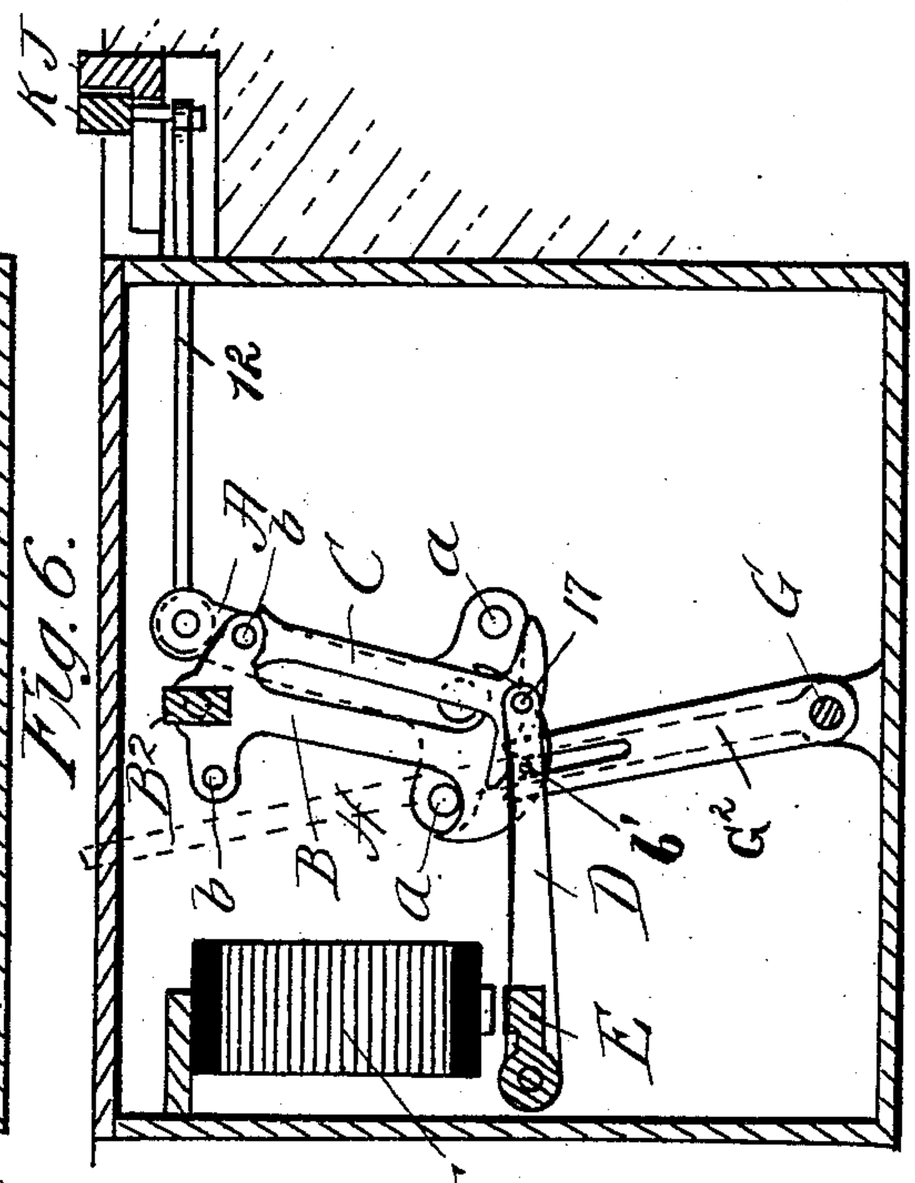


Fig. 3.

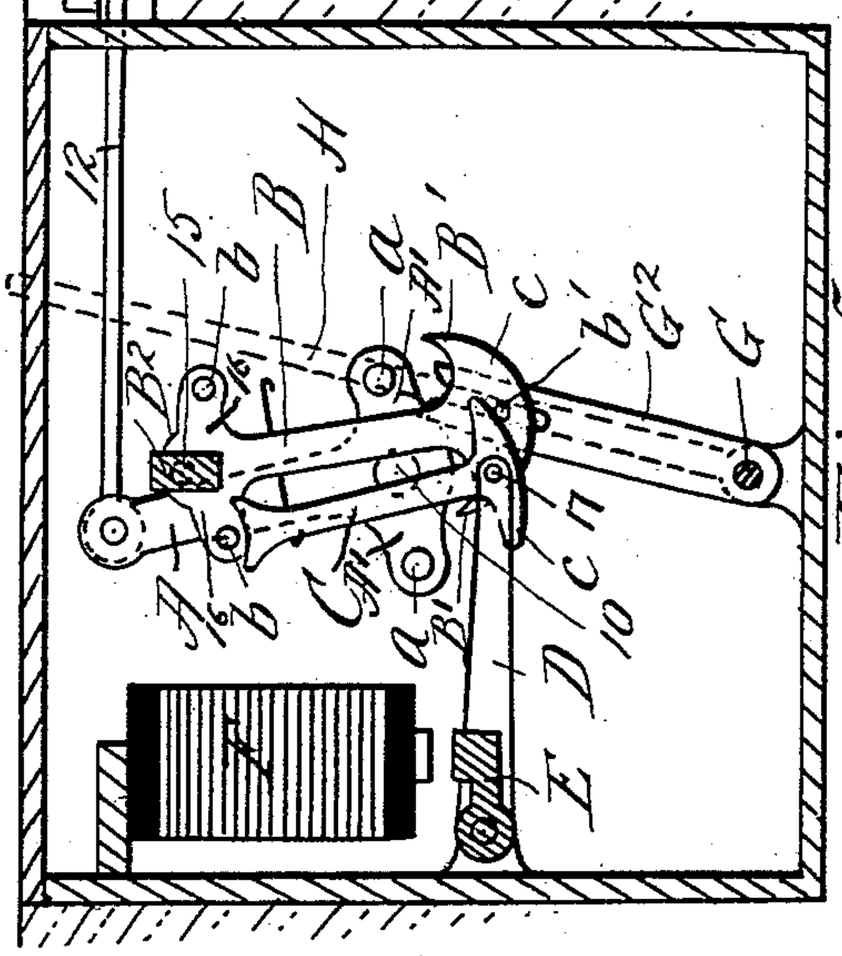
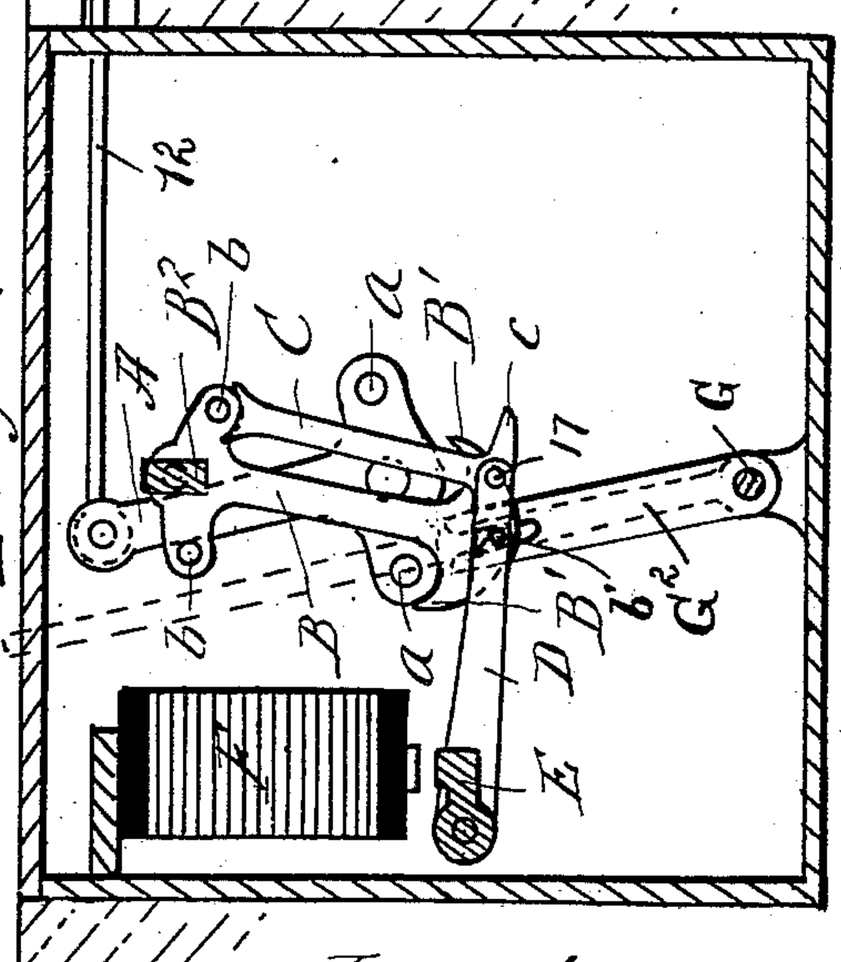


Fig. 5.



Witnesses.
M. A. Campbell
F C Carrigan

Inventor,
Chas. W. Squires,
by Wm. S. Bellows
Atty

UNITED STATES PATENT OFFICE.

CHARLES W. SQUIRES, OF SPRINGFIELD, MASSACHUSETTS.

RAILWAY-SWITCH-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 602,667, dated April 19, 1898.

Application filed November 8, 1897. Serial No. 657,723. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. SQUIRES, a citizen of the United States, and a resident of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Railway-Switch-Operating Mechanism, of which the following is a specification.

This invention relates to improvements in switch-operating mechanism especially available on electric railways where the feed-current may be made use of in operating the switch, the invention relating to switch-operating mechanism or apparatus of the character in which the whole action or operation of the switch-operating mechanism is under the control of the motorman on the car.

The objects of the invention are to attain simplicity and practicability in the switch-operating mechanism, and in general to provide a mechanism which will be acceptable and devoid of defect and objection existing in electromechanical switch-operating mechanisms as heretofore proposed.

The invention consists in the constructions and combinations of parts and instrumentalities, all substantially as will be hereinafter fully described, and set forth in the claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a plan view of the switch-operating mechanism as located in the road-bed of the railway in operative relation to the switch-tongue or "switch-point" and showing the provision for the electric-current conduction. Fig. 2 is a vertical longitudinal section and elevation as seen on line *x x*, Fig. 1. Fig. 2^a is a view in detail of the power-lever, to be hereinafter referred to. Figs. 3, 4, 5, and 6 are sectional elevations, transversely and on a larger scale, as seen on the plane indicated by the line *y y*, Fig. 2, these views being both for the purpose of further illustrating the mechanism and of rendering clear its operation, different relative positions of the parts being shown in such different views.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings, J J represent the usual car-track rails, J^2 being the branch or siding, and K represents the switch-point or switch-tongue.

A represents the switch-tongue-operating lever, pivotally mounted at 10 within a cast-iron box or housing, in which is comprised the present mechanism, said switch-operating device or shiftable switch-mover being by the rod 12 connected to the switch-point. The switch-operating lever has at opposite sides of its pivot 10, on which it is supported for its swinging movement, the two arms A′ A′, each of which has a contact-stud *a*.

B represents a depending engagement member, the same, as shown, having double hook members B′ B′, and said engagement member B is pivotally supported on the "power-lever" B^2, which lever is pivotally mounted, as indicated at 13, within the casing or housing, and the same has an extension or lug 14 located adjacent the car-track rail a short way from the switch, so that the wheel of a passing car will swing the lever B^2 and impart a reciprocatory movement or thrust to the said engagement member B. The said engagement member is provided at opposite sides of and adjacent its pivotal support 15 on the end of the power-lever with the extensions 16 16, which are provided with the contact-studs *b b*.

C represents a shifter, here designed as of an inverted-T form, the same having a pivotal support at 17 on the armature-lever D at about the lower end of the said shifter and intermediate between its two oppositely-extending members *c c*.

It is noted that the aforesaid shiftable engagement member B has at its lower end at its middle the offset stud *b′*, adjacent which lies one or the other member *c* of the shifter, according as to whether the engagement member is swung into one or the other of its positions, the coöperative action between the engagement member B and the shifter being peculiarly reciprocal for securing successively-changed relations between the two devices B and C and of the one B relative to the switch-operating lever.

The armature-lever D is formed as a part of or is attached to the armature E, provided in connection with the electromagnet F, suitably supported in the housing.

A portion of the car-track rail, indicated by the section J^3 thereof and comprising, for instance, fifty feet, more or less, of rail length

and which is in advance of the switch-point and its operating mechanism, is insulated from the track-rails, both to the rear and in advance thereof, the insulation being represented at 18 18 in Figs. 1 and 2 of the drawings. The opposite car-track rails J^3 are bonded, as represented at 19, and the car-track rails J nearer the switch are also bonded, as indicated at 20. From one of these connections 19 a wire 22 runs to connection with one pole of the electromagnet E, a wire 23 running from the other pole of the electromagnet to connection with the return-wire, which is provided as, usual, under the roadbed of the electric railway.

It is understood that this switch-operating mechanism is to form the part of the equipment of the most common and usual form of electric-railway systems now in use, it not being deemed necessary to complicate the present illustration with attempted representation of the overhead-trolley wire or line feed.

Assuming that the parts of the switch-operating mechanism are in the relative positions shown in Figs. 1 and 3 of the drawings, the switch-point being open, and a current is brought through the electromagnet, (which would be done immediately the motor-car came upon the insulated track-section J^3 by passing, before reaching the grounding or return wire, through the wire 22 to and through the magnet, and thence by wire 23 to the return-wire,) the armature, by reason of the vitalizing of the magnet, causes the upswinging of the armature-lever, whereupon the shifter C, carried by said lever, by having its upper end engaged with the left-hand contact-stud *b* of the shiftable engagement member B, Fig. 3, causes the reversal of the said engagement member B from its position under the right-hand contact-stud *a* of the switch-operating lever to the position under the left-hand contact-stud *a'* of the switch-operating lever, all as is shown in Fig. 4. So soon as the motor-car passes off from the insulated section J^3 the electromagnet becoming dead permits the armature to fall or retreat from its proximity to the magnet, and in so retreating the shifter C, moving bodily therewith, by having its left-hand member *c* brought to engagement with the said abutment *b'* on the engagement member B causes a reversal of the shifter to the position shown in Fig. 5, so that the next time the armature moves against the magnet the shifter will cause a changing of the position of the engagement member B; but it will be assumed that it is desired to have the car-wheel before reaching the switch operate the switch-throwing mechanism to place the switch-point in its closed position to give the straight track, and thus, with the parts remaining in the position shown in Fig. 5, as brought thereunto in the manner explained, upon the depression of the power-lever B^2 at its end adjacent the rail and the corresponding elevation of the opposite end of said lever, carrying upward also therewith the engagement member B, the latter by contact with the left-hand contact-stud *a* will in its rising movement with sufficient force cause the swinging of the switch-operating lever A from the left to the right and, through the switch connection, move the switch-point into the closed position, and the elevated position of the car-wheel-operated lever and actuator B and the correspondingly-swung position of the switch-operating lever and the closed position of the switch are shown in Fig. 6. Again, assuming that the parts are in the position shown in Fig. 3 before the motor-car reaches the insulated track-section J^3 and that on the car reaching said track-section the parts are brought into the positions represented in Fig. 4, as before described, whereby conditions are established upon the next following depression of the power-lever to move the switch-point closed, and it is desired to leave the switch open, so that the car will take the siding, it only becomes necessary for the motorman, while the motor-truck of his car is still on the insulated track-section J^3, to switch off and immediately switch on the current through the car, which causes the armature to fall away from the electromagnet and to be immediately drawn thereto. In first falling away from the electromagnet, while the car is still on the insulated track-section, the parts assume the relation shown in Fig. 5; but as the armature is the second time drawn up to the magnet the shifter C shifts the engagement member so that it inclines in the direction shown in Fig. 3, as it was in the first place, and now when the car-wheel comes onto the power-lever B^2 and elevates the engagement member B (the right-hand arm A' being already upwardly-inclined, so that the contact-stud *a* is distant from the right-hand hook member B' about as far as the bodily throw of the said engagement member) the engagement member will have its movement as a lost motion and without any effect on the switch-operating lever.

From the foregoing description of the mechanism comprised in the subject-matter of the present invention and from the explanations of its operations to change the switch from the open position to the closed position or when open to leave the switch open, and from the understanding of the successively-reversing actions of the parts for establishing conditions for throwing or non-throwing the switch, it will be apparent how if the switch is found closed on the approach of the car it will be automatically opened or how if closed on the approach of the car and it is desired that it shall remain closed it will be manifest in what way such condition is maintained or continued.

Inasmuch as the shiftable devices described may, on the approach of the car, be in positions to throw the switch-point to its oppo-

site position, or such devices may be in positions to move without throwing the switch, and as they are all concealed in the housing under the road-bed, I have combined with the shiftable devices—that is to say, with the swinging engagement member B—an indicator visible at the road-bed, the same consisting of the rock-shaft G, having at one end the slotted lever-arm G^2, in the slot of which engages the aforesaid stud b' of the said engagement member B, said rock-shaft having at its opposite end a lever-arm H, extending up through a slot 24 in the cover of the box or housing for the switch-operating mechanism. A position to the right or to the left of the protruding end of said lever H will indicate to the motorman the position, either inclining to the right or to the left, of the engagement member B, which, in conjunction with the observed position of the switch-point, will indicate to him whether the switch will be automatically thrown as the car passes or will remain as found, whereby he may govern himself accordingly.

In Fig. 2^a of the drawings I have shown the power-lever as formed in two members 26 and 27, both supported on the common pivot 13, the one having a projection or horn 28 extending longitudinally under or parallel with the other member, with a spring 31 interposed between said horn and the other member, all to the end of providing a lever which under ordinary circumstances operates as an integrally-formed lever, but which is capable of having its one member yield relative to the other in the event of a stone or other obstructing object becoming lodged in the switch, whereby the car may depress the member extended to near the track-rail without then causing the swinging movement of the other member, which in such an exigency would result in breakage of the switch-operating mechanism unless the same were certainly so powerfully constructed as to crush the obstructing object.

The lever constructed substantially as described has provisions for adjustment of the tension of the spring, the same consisting in the bolt 25, pivoted at 29 to the member 26 and extending through the center of the spring loosely through the horn 28 of the member 27 and receiving at its screw-threaded end the tensioning-nut 30.

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

1. The combination with a switch-moving device, and an engagement member or actuator which has a bodily thrust movement and also reversing movements whereby to assume different positions relative to the switch-moving device for engaging, and on the thrust of the actuator, throwing the switch-moving device in opposite directions, of a shifter coöperating with the actuator to successively shift or reverse the position of the latter, and a shiftable part comprised in the mechanism relative to which the shifter has an approaching and withdrawing motion, whereby, in the approach and engagement, the shifter is successively reversed to assume different shifting relations to the actuator, and means for imparting said bodily movement of approach and withdrawal relatively between said shifter and the shiftable part which it engages, and by which it is shifted, for the purpose set forth.

2. The combination with a switch-moving device and an engagement member or actuator which has a bodily thrust movement, and also reversing movements whereby to assume different positions relative to the switch-moving device for engaging, and on the thrust of the actuator, throwing, the switch-moving device in opposite directions, and having separated abutments or projections b b, and the abutment b', means for imparting a thrust movement to the actuator, a shifter coöperating with said abutments b b of the actuator and also arranged to engage said abutment b', and means for imparting a bodily movement to the shifter, substantially as described.

3. The combination with the switch and a movable switch-moving device, and a housed-in reversible actuator or engagement member coacting therewith, of a shifter arranged to coöperate automatically in conjunction with said reversible actuator whereby the said actuator is successively reversed from its one position to the other relative to the switch-moving device, said actuator being adapted for a thrust movement, means for insuring the shifting action of the shifter, and a movable indicator device operating in conjunction with the shiftable mechanism for showing by its position, any existing relations of the actuator relative to the switch-thrower.

4. The combination with a switch-moving device and an engagement member or actuator adapted for a bodily thrust movement and also reversing movements relative to the switch-moving device, provided with the abutments b b, an electromagnet and an armature-lever carrying shiftably thereon, a shifter adapted to engage according to its position one or the other of said abutments b, current connections for said electromagnet and a shiftable abutment member relative to which the shifter in its bodily movement with the armature-lever successively engages, whereby it is each time reversed, substantially as described.

5. The combination with a switch-moving device, a car-wheel-operated lever, and an engagement member or actuator pivotally mounted on the lever, adapted for a bodily thrust movement with the lever and also reversing movements relative to the switch-moving device, provided with the opposite abutments b b and the abutment b', an electromagnet and an armature-lever carrying shiftably thereon, a shifter adapted to engage according to its position one or the other

of said abutments *b* and current connections for said electromagnet, each time reversed, substantially as described.

6. The combination with the switch-point and the switch-operating lever A pivotally mounted, connected with the switch-point, and having the two arms oppositely extending and provided with the contact-studs *a a*, a car-wheel-operated lever having a portion thereof adjacent the switch-operating lever and having pivotally mounted thereon, the engagement member or actuator provided with the two arms B B with the contact-studs *b b* and provided with the opposite hook members B′ B′ and having the median stud or abutment *b*′, of an electromagnet and current connections therefor, the armature-lever having the shifter C pivotally and shiftably mounted thereon comprising the opposing members *c c* arranged for operation, substantially as and for the purposes described.

7. The combination with the railway-track having the switch and the insulated track-section J^3, the return-wire and a switch-operating device, of a reversible actuator or engagement member coacting therewith, an electromagnet and an armature-lever, a current-conductor in connection with said insulated track-section, and with a magnet, a current connection running from the magnet to connection with the return-wire, and the shifter movably mounted on the armature-lever, and bodily movable therewith, coöperating with the actuator to successively reverse it, and an abutment which the shifter engages each time it is reciprocated bodily by the armature-lever, whereby its own position is successively reversed, substantially as described.

8. In a switch-operating mechanism of the character described, the combination with the switch-operating device and a reversible actuator and means for reversing it, of the rock-shaft having an arm engaged with said actuator and having an indicator-arm visible at the road-bed, for the purpose set forth.

9. The combination with a switch-operating device, of a car-wheel-operating lever having a shiftable medium of engagement coöperating with said switch-operating device, said lever consisting of two articulated members, one being adapted to yield relative to the other and a spring interposed between these members for insuring normally their movements in unison, for the purpose set forth.

10. The combination with a switch-operating device, of a car-wheel-operated lever consisting of the two members 26 and 27 pivotally united, one thereof having the horn 28, a spring interposed between said horn and the other member, and means for varying the tension of the spring.

11. The combination with a switch-operating device, of a car-wheel-operating lever consisting of the two members 26 and 27 pivotally united, one thereof having the horn 28, a spring interposed between said horn and the other member, the bolt 25 pivoted to the one part adjacent the spring, and extended loosely through the other part, and having the nut 30, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 4th day of November, 1897.

CHAS. W. SQUIRES.

Witnesses:
WM. S. BELLOWS,
M. A. CAMPBELL.