No. 734,098. PATENTED JULY 21, 1903.

J. J. RUDDICK.

ELECTRIC SWITCH.

APPLICATION FILED OCT. 15, 1900.

NO MODEL. 2 SHEETS—SHEET 1.

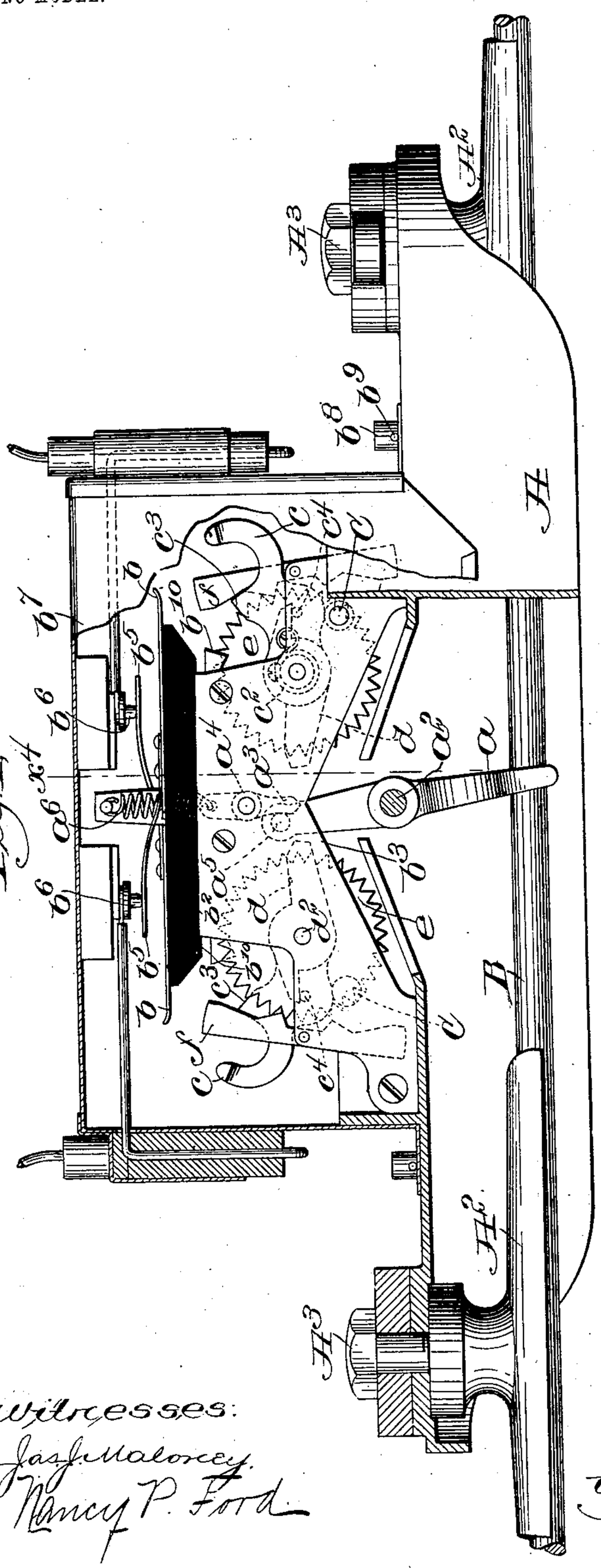

Fig. 1.

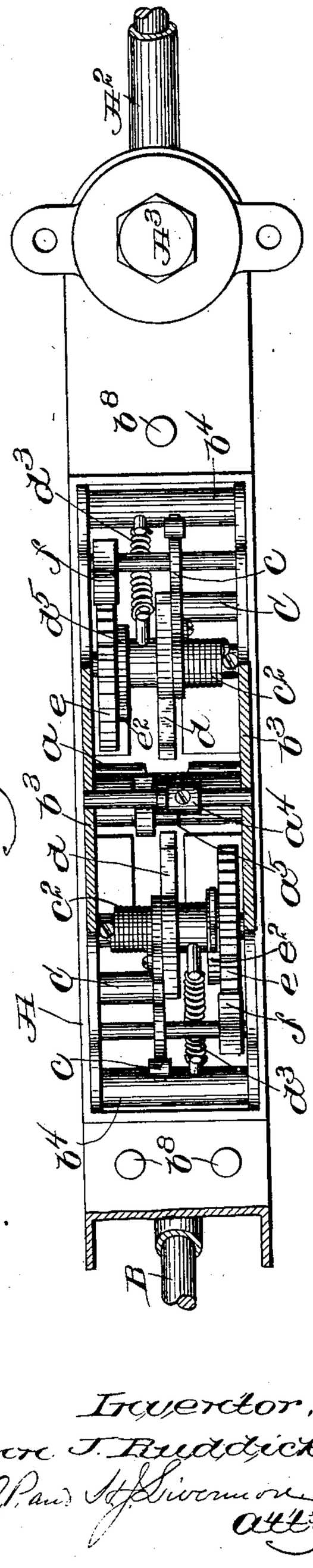

Fig. 2.

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ELECTRIC SWITCH.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

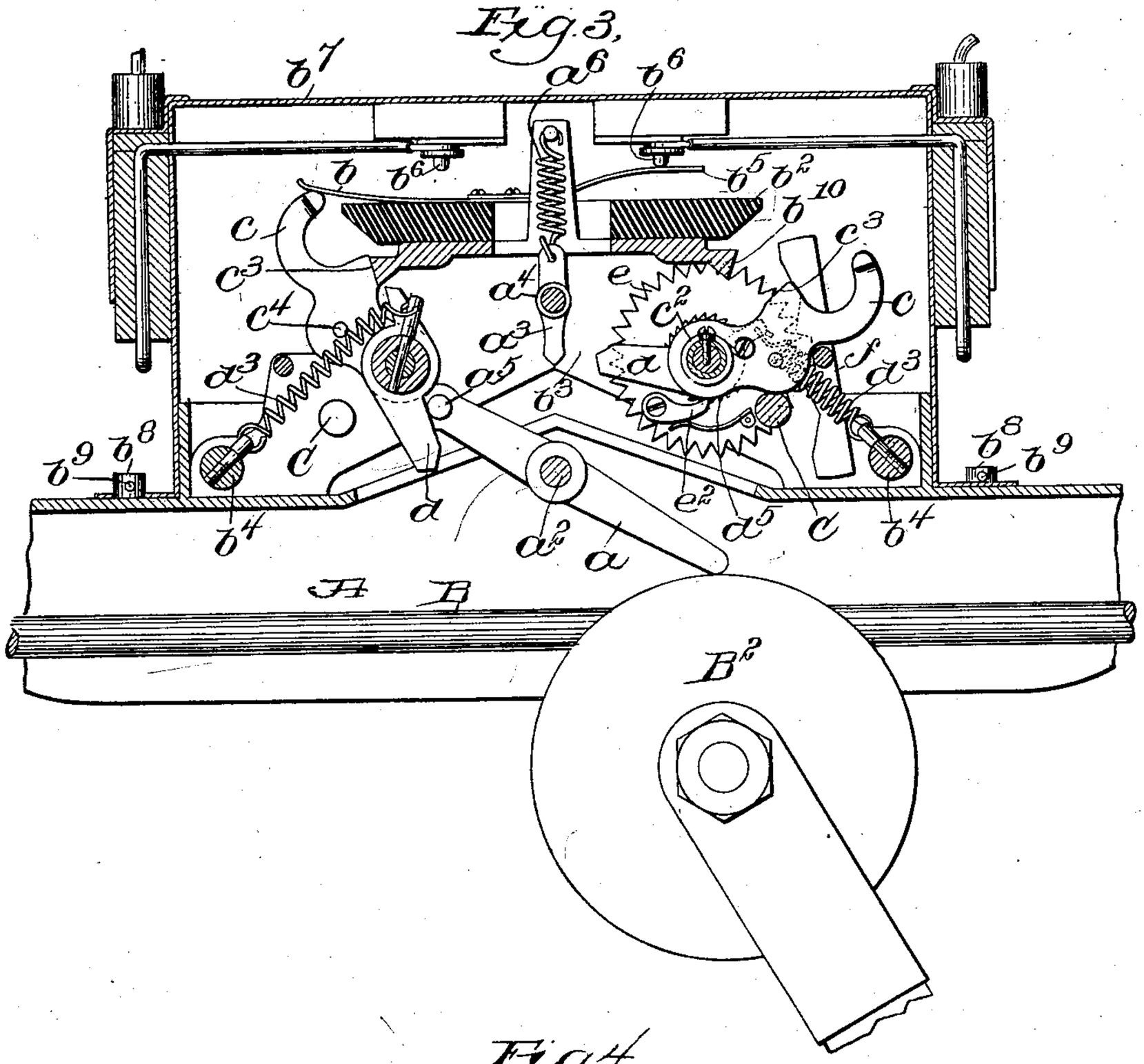
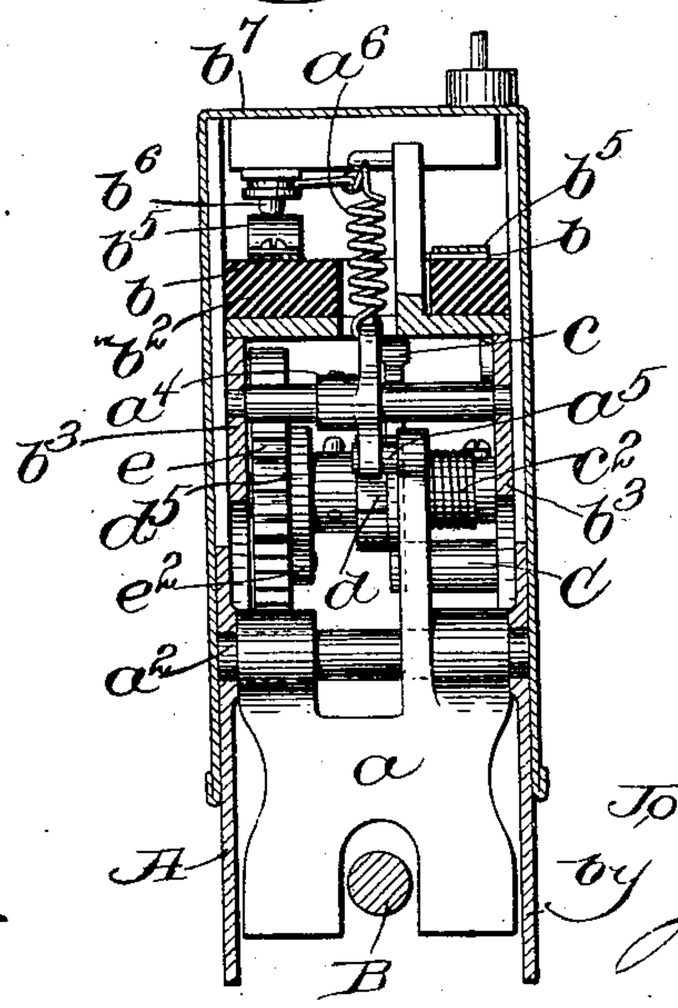


Fig. 4.



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No. 734,098. Patented July 21, 1903.

UNITED STATES PATENT OFFICE.

JOHN J. RUDDICK, OF NEWTON, MASSACHUSETTS, ASSIGNOR TO UNITED STATES ELECTRIC SIGNAL COMPANY, A CORPORATION OF MASSACHUSETTS.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 734,098, dated July 21, 1903.

Application filed October 15, 1900. Serial No. 33,125. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. RUDDICK, of Newton, county of Middlesex, and State of Massachusetts, have invented an Improvement in Electric Switches, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to an electric switch and is embodied in a switch for railway-signaling and analogous purposes in which the contacts are operated by the movement of a traveling object, such as a suitable projection or engaging portion carried by a car or vehicle.

As herein shown, the switch is arranged to be operated by the trolley of an electric car and is especially adapted for use with a block-signaling system for electric railways in which certain signals are set when the car enters a block and put out when the car leaves the same.

It is essential that a switch of this kind should be positive in its operation and that a good contact should be made for a sufficient length of time whether the car which operates the switch is traveling at a high speed or not. Furthermore, it is desirable to so arrange the switch that one set of operations should be performed when a car is traveling in one direction and a different set of operations when a car is traveling in the other direction, and it is essential to prevent any accidental performance of both operations in response to the operation of the same car. To attain these objects, the switch embodying the present invention is shown as provided with two sets of contact-makers having a common actuating device independent of said contact-makers, but adapted by its movement in one direction to operate one contact-maker and by its movement in the other direction to operate the other contact-maker, and said actuating device is provided with a yielding stop which prevents it from moving by its own momentum past a normal intermediate position when released. In order to protect the mechanism from the wear and tear of a sudden shock when a car is traveling rapidly, each contact-maker is provided with an intermediate operating member to which it is yieldingly connected, and said operating member which is directly acted upon by the actuator is provided with a spring or equivalent restoring device and a retarding device, so that the restoring movement is gradual. To insure a proper contact for an appreciable length of time, the intermediate operating member is arranged to continue its travel after contact is made, (the yielding connection permitting such further movement,) while the retarding mechanism causes an interval of time to elapse before the contact member is restored.

A further feature of the invention consists in a novel arrangement of the circuit connections in conjunction with a cover or housing for the actuating parts, whereby the said cover or housing can be removed for inspection, &c., without disconnecting any wires, the housing being provided with contact-pieces permanently connected with the external wires and adapted when placed in position to lie in electrical contact with the spring contact-pieces within the housing.

Figure 1 is a side elevation of a switch embodying the invention, the housing being broken away and shown partly in section; Fig. 2, a horizontal section of the switch, the operating parts being mainly shown in plan. Fig. 3 is a longitudinal vertical section showing the switch in operation, and Fig. 4 is a transverse section on line x^4 of Fig. 1.

The switch-actuating mechanism is mounted on a main frame A, adapted to be supported upon ears A^2, connected with the trolley-wire B, the frame being shown as fastened to the said ears by means of bolts A^3. The casing projects downward at each side of the trolley-wire in order to fully protect the parts and is wide enough to permit the trolley-wheel to run longitudinally through it.

The actuating device *a* comprises a lever or swinging member pivotally supported upon a pin a^2, which extends across from one side of the frame A to the other, the said member being forked, as best shown in Fig. 4, so as to straddle the trolley-wire B and be engaged by the periphery of the trolley-wheel B^2 when a car passes, as indicated in Fig. 3. The said actuator will therefore be swung in

one direction or the other, according to the direction of travel of the car, and will coöperate with one or the other of the contact devices, as will be described. To normally maintain the said actuator in a neutral position—or, in other words, to prevent the said actuator from passing such a neutral position when it swings back after being released by the trolley-wheel—a yielding stop a^3 is employed, the said stop being shown as having a pivotally-supported hub a^4 and normally held in the path of a projection a^5 from the actuator a by means of a spring a^6. When, therefore, the actuator a is engaged by the trolley, the stop a^3 will yield and permit the said actuator to perform its function, the spring a^6, however, being stiff enough to arrest the movement of said actuator when it swings back to its normal position.

The circuits are closed by means of stationary contact members b and movable contact members c, the members b consisting of springs mounted on a block of insulating material b^2 and insulated from each other thereby, said block being supported upon the top of a supplemental frame which consists of side plates b^3, connected together by means of transverse members b^4, the said supplemental frame being supported upon the main frame A. These contacts are connected with the circuit through contact-springs b^5, which are adapted to bear against studs b^6, electrically connected with the circuit-wires and having insulated supports in a cover or housing b^7, which fits over the supplemental frame and is connected with the main frame, as by projections b^8 and pins b^9, it being obvious that the said housing can be easily removed to inspect the mechanism without disconnecting any of the circuit-wires. The movable contact members c in accordance with this invention are yieldingly connected with intermediate operating devices d, the said intermediate operating devices being herein shown as levers pivotally supported at d^2 in the side members b^3 of the supplemental frame, the said levers being normally held in the position shown in Fig. 1 by means of springs d^3, the said normal position being determined by stops c^4 on the members c, said members c normally lying against stops or pins C, supported by the supplemental frame. The ends of the said levers d project into the path of the projection a^5 from the actuator a, so that one or the other of said levers will be rocked, as indicated at the left-hand side of Fig. 3, when the said actuator is moved by the trolley-wheel. To relieve the contact members c from a shock when a car is traveling rapidly, the said contact members are yieldingly connected with the intermediate operating members d, being herein shown as pivotally supported upon the shafts which are connected with the said levers and provided with connecting-springs c^2, shown as spiral springs, wound upon the said shafts and connected at one end therewith and at the other end with the members c. When, therefore, the levers d are rocked, the movement will be transmitted through the springs c^2 to the members c, and the parts are so arranged with relation to the contact-springs b that such movement will carry the contact members c into engagement with said contact-springs. In order to retain the contacts in engagement for a material length of time regardless of the velocity of the car, the intermediate operating members or levers d are arranged to continue traveling in response to the movement of the actuator a after contact has been made between the members b and the members c, the said members c being provided with shoulders c^3, adapted to bear against engaging surfaces b^{10}, formed on the supplemental frame, the said engaging surfaces being so positioned as to arrest the contact members c after the spring b has been bent or strained sufficiently to insure perfect contact, the said spring, however, not being depended upon to stop the movement of the movable contact member, and consequently not subjected to unnecessary strain. The yielding connection or spring c^2 permits the further independent movement of the intermediate operating member d, the member c being in the meanwhile held in contact with the member b by the action of said spring. In order to maintain the contact even after the actuator has been released by the trolley-wheel and at the same time to cushion the return movement of the parts, the members p are provided with suitable retarding devices to modify the action of the restoring-springs d^3. As herein shown, an escapement-wheel e and pallet f are employed for this purpose, the said escapement-wheel being loosely mounted upon a hub or shaft of the lever d, which is also provided with a ratchet-wheel d^5, coöperating with a pawl e^2, pivotally connected with the escapement-wheel e. In the forward or operating movement of the lever d, therefore, the said ratchet-wheel will travel along past the pawl without rotating the escapement-wheel; but as soon as the said member is released it will become connected with the said escapement-wheel, which being retarded by the pallet will retard the restoring movement of the member d. The contact c in the meanwhile is retained in engagement with the contact-spring b by the action of the spring c^2, the said lever d, however, in its return movement engaging the stop c^4 and restoring the member c to normal position by the continued action of the spring d^3, which is stronger than the spring c^2, so as to overcome the action thereof.

As herein shown, the trolley-wire constitutes part of the circuit controlled by the switch, being electrically connected with the members c through the metallic framework of the device. The other members of the circuit or circuits consist of conductors, shown as connected with the contact b^6. The arrangement of circuits is, however, immaterial so far as relates to

the present invention, which resides in the construction and mode of operation of the switch mechanism. For a better understanding of the invention, however, reference may be made to United States Letters Patent No. 678,135, for an electric signal, granted to me July 9, 1901. It may also be stated that in the construction herein shown the two contacts b^6 are connected with separate conductors, one of which constitutes, in connection with the trolley-wire, one circuit to be controlled when the car is traveling in one direction, while the other constitutes, in connection with the trolley-wire, another circuit to be controlled when the car is traveling in the opposite direction.

It is not intended to limit the invention to the specific construction herein shown and described, since modifications may be made without departing from the invention.

I claim—

1. In an electric switch, the combination with an actuating device; of a movable contact member; an intermediate operating device adapted to be directly acted upon by said actuator; a yielding connection between said intermediate operating device and said movable contact member whereby the movement of the said operating member is transmitted to the contact member; a stop for said contact member, said intermediate operating device being so related to said contact member as normally to continue its movement after said contact member has reached said stop; and means for positively engaging said intermediate operating member with said contact device in the return movement of the former, as set forth.

2. In an electric switch, the combination with a movable contact member adapted to close one set of circuits and a second movable contact member adapted to close another set of circuits; of an actuator common to both of the said contact members and adapted by its movement in one direction to operate one and by its movement in the other direction to operate the other, said actuator being supported independently of said contact members; a stop in the path of said actuator but disconnected therefrom; and means for yieldingly supporting said stop, said means being arranged to offer sufficient resistance to arrest the actuator when it returns to its intermediate position by force of gravity.

3. In an electric switch, the combination with an actuator; of an intermediate operating member adapted to be engaged and moved by said actuator; a traveling contact member pivotally connected with said intermediate member; a spring connecting the said members; and a stop for the said contact member, to arrest the same before the end of the normal movement of said intermediate operating member, substantially as described.

4. In an electric switch, the combination with an actuator; of an intermediate operating member adapted to be engaged and moved by said actuator; a traveling contact member yieldingly connected with said intermediate member; a stop for the said contact member, to arrest said contact member before the end of the normal movement of said operating member; a restoring-spring for said operating member; a retarding device controlling the movement of said operating member during the action of said spring; and a stop for connecting said operating member with said contact member during the retarded return movement of the former, as set forth.

5. In an electric switch, the combination with an operating device; of a contact member; means for yieldingly connecting the contact member with the operating device whereby the movement of the operating device is transmitted to the contact member to save shock due to inertia, the operating device being so adjusted relative to the contact member as normally to continue its movement after contact is made; means for gradually restoring said operating device whereby contact is maintained after said operating device begins its return movement; and means for positively connecting said contact member and said operating device during such return movement, as set forth.

6. The combination with an actuator; of an operating-lever; a contact member having a yielding pivotal connection with said operating lever; an escapement-wheel having a ratchet-and-pawl connection with said operating member; a pallet coöperating with said escapement-wheel; a spring or equivalent restoring device for said operating-lever, and means for positively connecting said operating member and said contact member during the return movement of the former, as set forth.

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

JOHN J. RUDDICK.

Witnesses.

NANCY P. FORD,

HENRY J. LIVERMORE.