No. 776,802. PATENTED DEC. 6, 1904.

J. J. RUDDICK.

TROLLEY OPERATED ELECTRIC SWITCH.

APPLICATION FILED MAR. 28, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

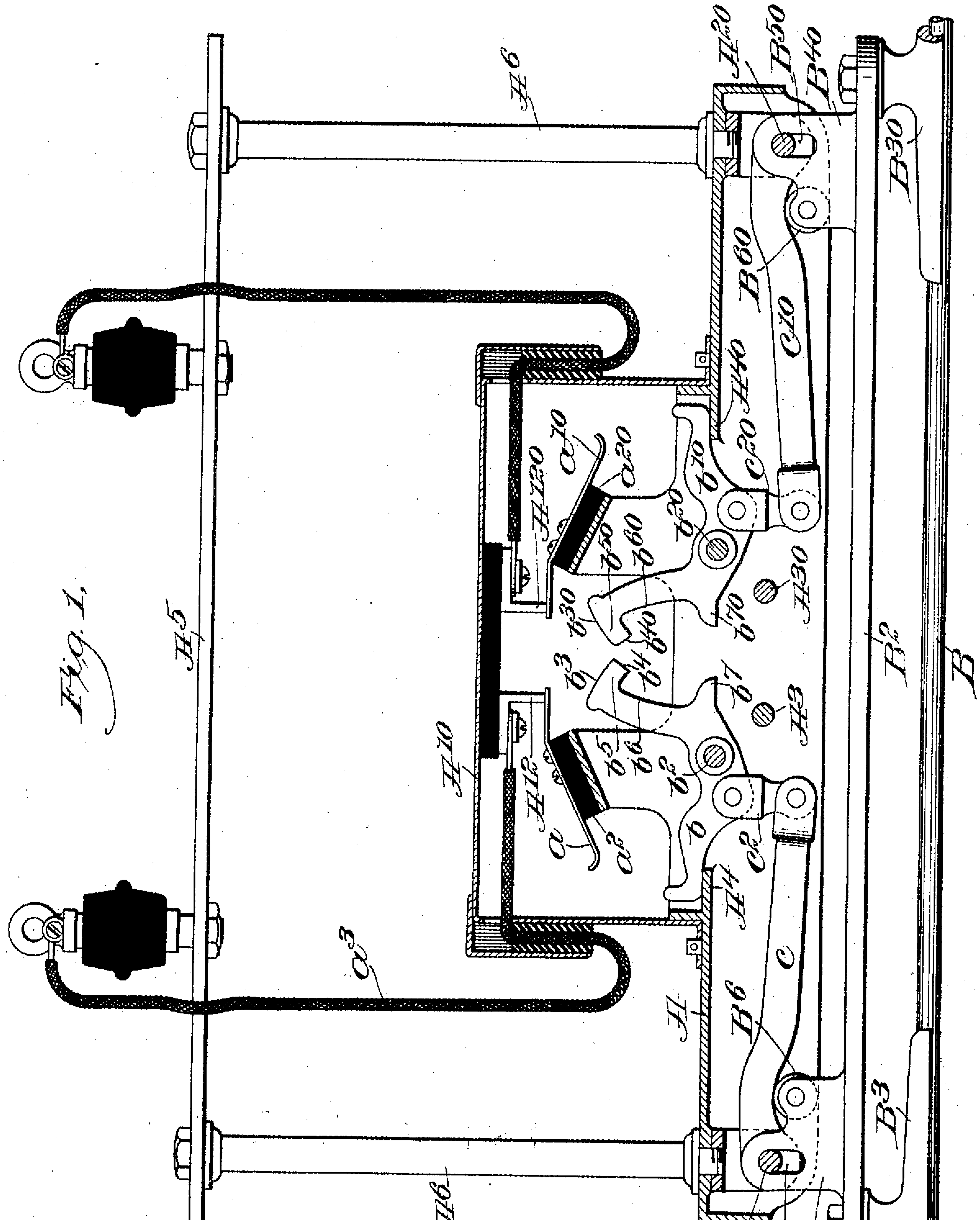

Fig. 1.

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Margaret E. Sweeney.

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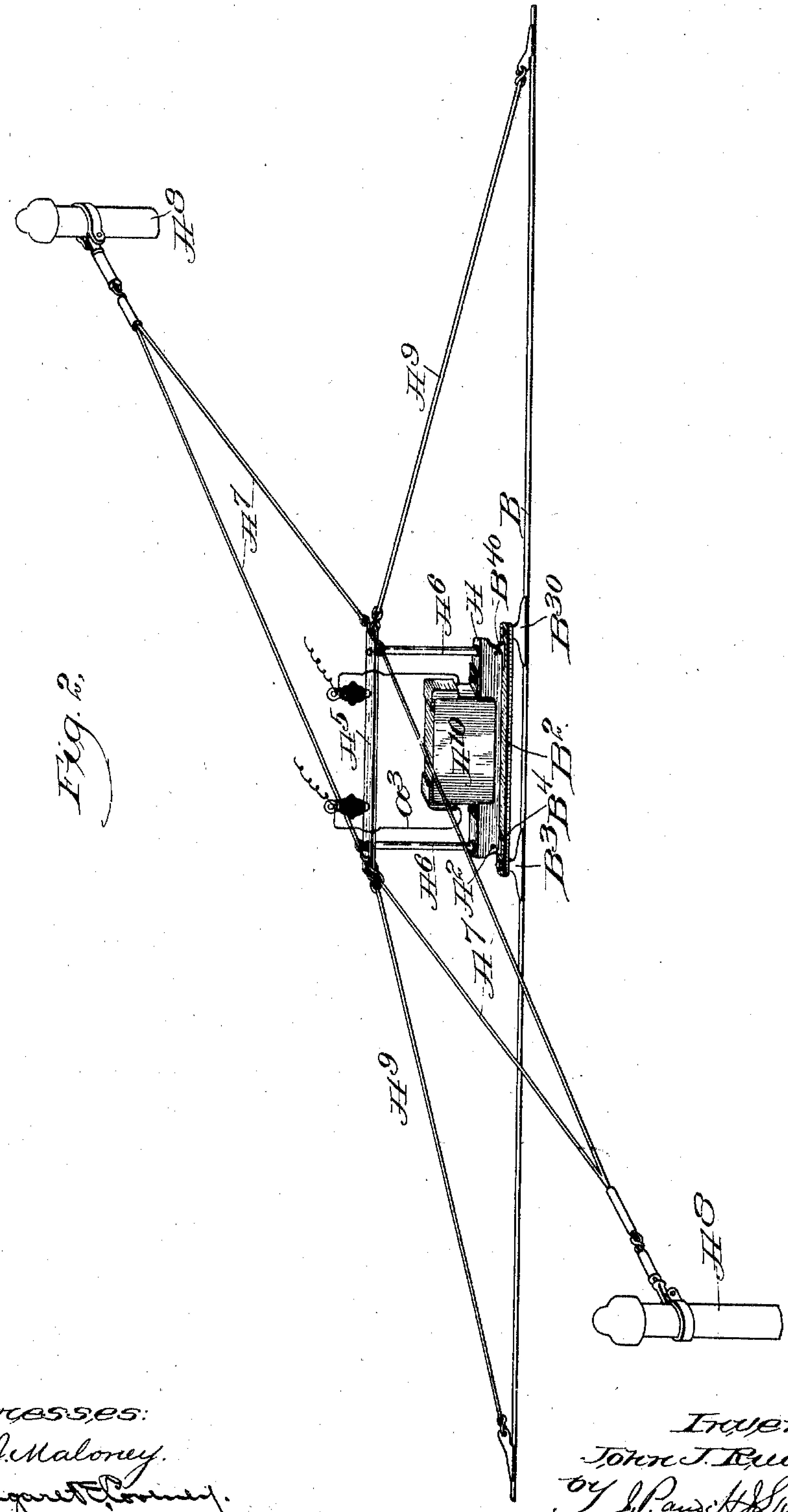

Fig. 2,

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No. 776,803. Patented December 6, 1904.

UNITED STATES PATENT OFFICE.

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

TROLLEY-OPERATED ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 776,803, dated December 6, 1904.

Application filed March 28, 1904. Serial No. 200,231. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. RUDDICK, a citizen of the United States, residing in Newton, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Trolley-Operated 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 a trolley-operated electric switch adapted to be used in connection with block-signal systems for electric railways, and is embodied in a switch which is operated in response to the movement of the trolley-wire itself under the influence of the trolley as it travels along the same.

The object of the invention is to obtain a switch which will be positively operated without the employment of any abutment or actuating member in the path of the trolley, the use of such an abutment being objectionable not only on account of the liability of breakage if a car is moving rapidly, but also on account of the tendency to throw the trolley-wheel off the wire.

A further feature of the invention consists in arranging the switch so that one set of contacts will be closed in response to the movement of a car in one direction and a different set of contacts closed in response to the movement of a car in the opposite direction, and the device is further arranged so that the two sets of contact members in this construction are interlocking, the operation of one member preventing the operation of the other, while the other member in turn is caused to serve as a locking device for the member first operated, so as to prolong the contact, and thereby insure the proper operation of the mechanism in the signal-boxes.

Figure 1 is a side elevation of a signaling device embodying the invention, including a portion of the trolley-wire, the support and casing for the switch members being shown in section; and Fig. 2 is a view, on a smaller scale, showing the means by which the switch is suspended.

One of the members of the switch embodying the invention consists of a fixed contact a, which is suitably mounted upon a support A, suspended from a cross-wire or pull-off wire by any suitable or usual means, such as are commonly employed in overhead-trolley construction. This member a, which is herein shown as a spring mounted on a block a^2 of insulating material, is insulated from the support and arranged to be connected with an insulated signal-wire a^3, the signaling-circuit being completed through the support A and a movable switch member b, which is herein shown as pivoted at b^2 to the said support and in electrical connection therewith.

The circuits are not herein shown, as the signaling system forms no part of the present invention, it being obvious that any system in which a circuit is closed in response to the passing of a car may be provided with the switch forming the subject of the present invention. In the construction shown the trolley-wire constitutes one conductor of the circuit and is in electrical connection with the switch member b through the support A.

For the closing of the circuit by means of the switch the upward movement of the trolley-wire B in response to the upward pressure of the trolley as it passes along the said wire is utilized, and for this purpose the trolley-wire at the point where it passes the switch instead of being directly suspended from the cross-wires is suspended independently, as from the member A, with which it has a loose or lost-motion connection, so that as the said trolley-wire is forced upward it will move upward with relation to the support A.

As herein shown, the trolley-wire B is provided with a weight B^2, shown as a bar of iron provided with ears B^3 B^{30} at opposite ends, to which the trolley-wire is directly connected. The said weight B^2 is provided at opposite ends with upwardly-projecting lugs B^4 and B^{40}, each of which has an elongated slot (B^5 and B^{50}) surrounding a projection A^2 A^{20} from the member A, so that said projection affords a support for the trolley-wire, although said trolley-wire is free to move upwardly with relation to said support when

acted upon by the trolley, as previously stated. In said upward movement the trolley-wire B is arranged to act upon the movable switch member b, so as to rock the same upon its pivotal connection with the support A and bring it into contact with the fixed contact member a. In the construction shown the weight B^2 is provided with an engaging member, such as a roll B^6, which is adapted to engage the under side of a lever or arm c, pivoted to the support A and connected, as by a link c^2, with the movable contact member b. The roll or engaging member B^6 is close to the fulcrum of the lever c, so that a slight upward movement of the trolley-wire with relation to the support A will produce a considerable movement of the member b, said movement being sufficient to carry the said member b into contact with the member a.

In the construction herein shown the switch members are duplicated, so that one circuit will be closed by a car traveling in one direction, while a different circuit is closed by a car traveling in the opposite direction, and the two switch members are arranged to interlock, so that it is impossible for both circuits to be closed at the same time. For this purpose the support A is shown as provided with an additional stationary contact member a^{10}, mounted on an insulating-block a^{20}, with which coöperates a second movable contact b^{10}, pivoted at b^{20}.

The movable contact b^{10} is connected, by means of a link c^{20}, with a lever c^{10}, similar to the lever c, and is arranged to be acted upon by a member B^{60}, similar to the member B^6, previously described.

It is essential in this construction that only one set of contacts should be closed at a time, and it is desirable, moreover, that the contact should be maintained during an interval of one or more seconds in order to insure the proper operation of the signaling mechanism. For this purpose the movable contact members b and b^{10} are arranged to coöperate with each other, the one which has first been moved preventing an effectual operation of the other, while the other subsequently acts as a locking device to keep the one first moved in contact until the trolley has passed completely beyond the switch.

As herein shown, the member b is provided with an engaging portion b^3, which in the very first movement of the member b travels into the path of a surface b^{40}, formed on the switch member b^{10}, so that any upward movement of the trolley-wire transmitted through the lever c^{10} is stopped and rendered ineffectual by the engagement of the surface b^{40} with the surface b^3. The surface b^{40}, however, is shown as formed upon a projection b^{50}, which is in the nature of a hook, and below the projection b^{50} is another engaging surface, b^{60}, and the lifting of the trolley-wire at the left-hand end carries the member b far enough to make a firm contact with the member a and at the same time to cause the surface b^3 of said member to travel completely beyond the surface b^{40}, so that when the trolley acts upon the lever c^{10} it will rock the member b^{10} far enough to cause the surface b^{60} to engage the surface b^3 and the hooked portion b^{50} to overlie the end of the surface b^3, thus maintaining the member b in contact with the member a. The engagement of the surface b^3 with the surface b^{60} prevents the member b^{10} from moving far enough to make contact with the member a^{10}, so that the member b constitutes a stop for the member b^{10} and the member b^{10} constitutes a lock for the member b, the result being that contact between the members a^{10} and b^{10} is prevented and contact between the members a and b is maintained until the trolley has passed completely beyond the weighted section. The member b is provided with the parts b^4, b^5, and b^6, corresponding to the parts b^{40}, b^{50}, and b^{60}, above described, and coöperating with the member b^{10} when the car is approaching in the opposite direction, while the member b^{10} has a part b^{30} corresponding to the part b^3.

In order to prevent either of the switch members b and b^{10} from being moved too far, the support A is provided with stops A^3 and A^{30} to coöperate with projections b^7 and b^{70}, respectively, these parts coming into engagement with each other when the movable contacts have been carried far enough to make good electrical connection with the fixed contacts. The movable contacts are further supported in their normal positions by means of shoulders A^4 and A^{40}, formed in the support A.

In the operation of the device above described—assuming, for example, that a car is traveling toward the right—the upward pressure of the trolley will lift the engaging member B^6 before it lifts the engaging member B^{60}, and in so doing will throw upward the lever c and carry the contact member b into engagement with the contact a. The passing of the trolley, however, will almost immediately cause the upward movement of the lever c^{10}; but the surface b^{60} will then engage the surface b^3, thereby preventing the movement of the contact member b^{10} into contact with the member a^{10}, and at the same time the projection b^{50} will drop over the end of the lever b, thereby locking the same and holding it in its contacting position until the trolley has passed wholly beyond the switch, so that the wire is no longer held up at either end.

In order to obviate the necessity of placing the two points of support for the trolley-wire at a considerable distance apart to insure the upward movement of one in advance of the other, the supporting member A is herein shown as made in two sections, the upper section A^5 being connected with the lower section by means of rods A^6, and the said upper section is directly connected with the cross-wires A^7, which extend across from the posts A^8,

Fig. 1. The upper section A^5 is connected at each end, by means of a wire A^9, with the trolley-wire at a point some distance away from the switch, the result being that the upward movement of the wire caused by the trolley in passing the point of connection with the wire A^9 tends not only to lift the said wire, but to tilt the switch box or support A, so that as the wire moves up the end of the switch-box nearest the trolley tends to move down, the result being that the lever first reached is acted upon before the upward movement of the wire can effect the other lever.

As herein shown, the switch mechanism is provided with an inclosing case or cover A^{10}, which is provided with metallic contact-pieces A^{12} and A^{120}, the said contact-pieces when the cover A^{10} is in place being in electrical connection with the springs a and a^{10}, respectively.

While the construction hereinbefore described constitutes a practical embodiment of the invention, it is obvious that modifications may be made without departing from the invention, and it is not intended to limit the invention to such specific construction and arrangement. Furthermore, the operation of a switch by the upward movement of the trolley-wire itself in response to the pressure of the trolley is believed to be broadly new.

What I claim is—

1. In a trolley-operated switch, a fixed contact member; a movable contact member; a trolley-wire; means for transmitting the movement of the trolley-wire, caused by the pressure of the trolley, to said movable contact member; and a locking device for said movable contact member, also operated by the trolley-wire.

2. In a trolley-operated switch, a fixed contact member; a movable contact member; a support for said fixed and movable members; a locking device for said movable contact member; and a trolley-wire suspended from said support, but movable with relation thereto to operate said movable contact member and said locking device consecutively.

3. In a trolley-operated switch, a fixed contact member; a support therefor; a movable contact member pivotally connected with said support; a lever pivotally connected with said support and with said movable contact member; and a trolley-wire independently suspended, and adapted to engage said lever.

4. In a trolley-operated switch, two fixed contact members; a support for said fixed contact members; movable contact members to coöperate with said fixed members, and also connected with said support; and a trolley-wire loosely suspended from said support at two points, and thereby movable with relation to said support to operate the said movable contact members, the points of suspension being some distance apart.

5. In a trolley-operated switch, the combination with two fixed contact members, and a support therefor; of two movable contact members pivotally connected with said support, and provided with interlocking portions; and a trolley-wire suspended from said support, and having engaging members to coöperate with said movable contact members.

6. In a trolley-operated switch, the combination with two fixed contacts, and a support therefor; of two movable contacts pivotally connected with said support, and provided with engaging portions whereby the preliminary movement of one of said members prevents the effectual operation of the other; and means operated by a passing trolley for producing consecutive operations of said members.

7. In a trolley-operated switch, the combination with two fixed contacts and a support therefor; of two movable contacts pivotally connected with said support; shoulders formed on said support to engage said members; levers pivotally connected with said support and with said members at points between their pivotal connections and the shoulders aforesaid; and a weighted trolley-wire suspended from said support, and having a lost-motion connection therewith.

8. In a trolley-operated switch, the combination with two fixed contact members; of two movable contact members provided with interlocking portions; and means for operating one of said movable contact members in advance of the other.

9. In a trolley-operated switch, the combination with fixed contact members; of a support therefor; movable contact members pivotally connected with the lower portion of said support; suspending means connected with the upper portion of said support; a trolley-wire suspended from said support, but movable with relation thereto; and means for connecting the upper portion of said support with the trolley-wire.

10. In a trolley-operated switch, a fixed contact member; a movable contact member; a support for said members; and an independently-supported trolley-wire to operate said movable contact member.

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

JOHN J. RUDDICK.

Witnesses:

MARGARET E. COVENEY,

HENRY J. LIVERMORE.