No. 614,124 Patented Nov. 15, 1898.

J. McL. MURPHY.

ELECTRIC SWITCH MECHANISM FOR ELECTRIC RAILWAYS.

(Application filed Sept. 3, 1897.)

(No Model.) 3 Sheets—Sheet 1.

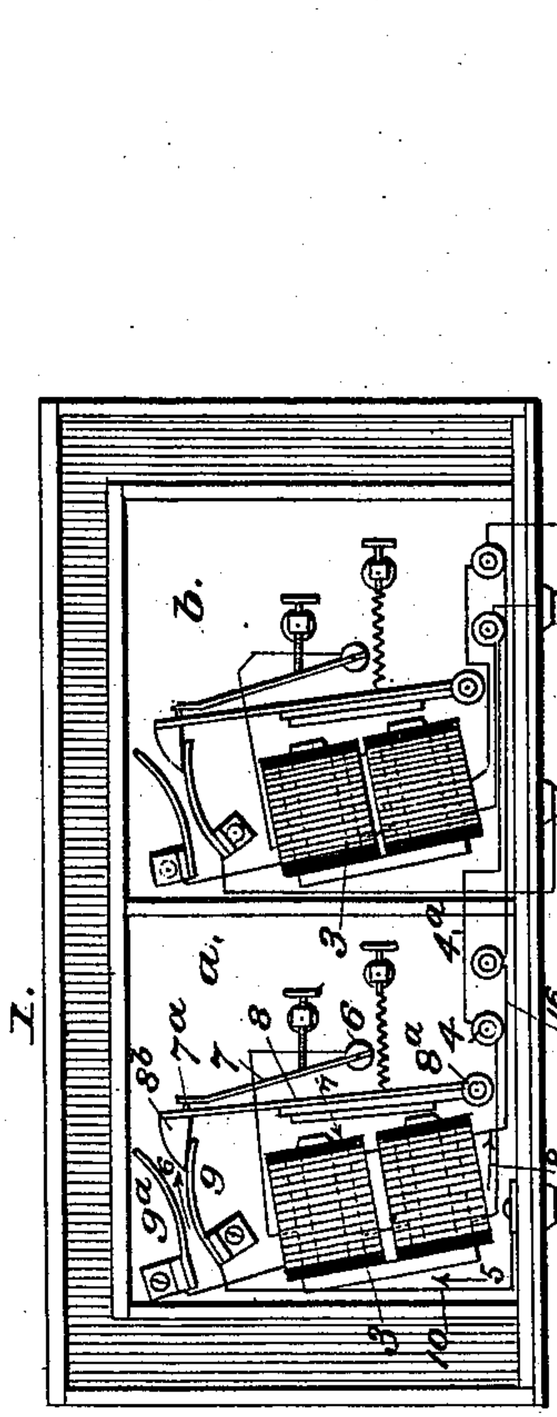


Fig. 1.

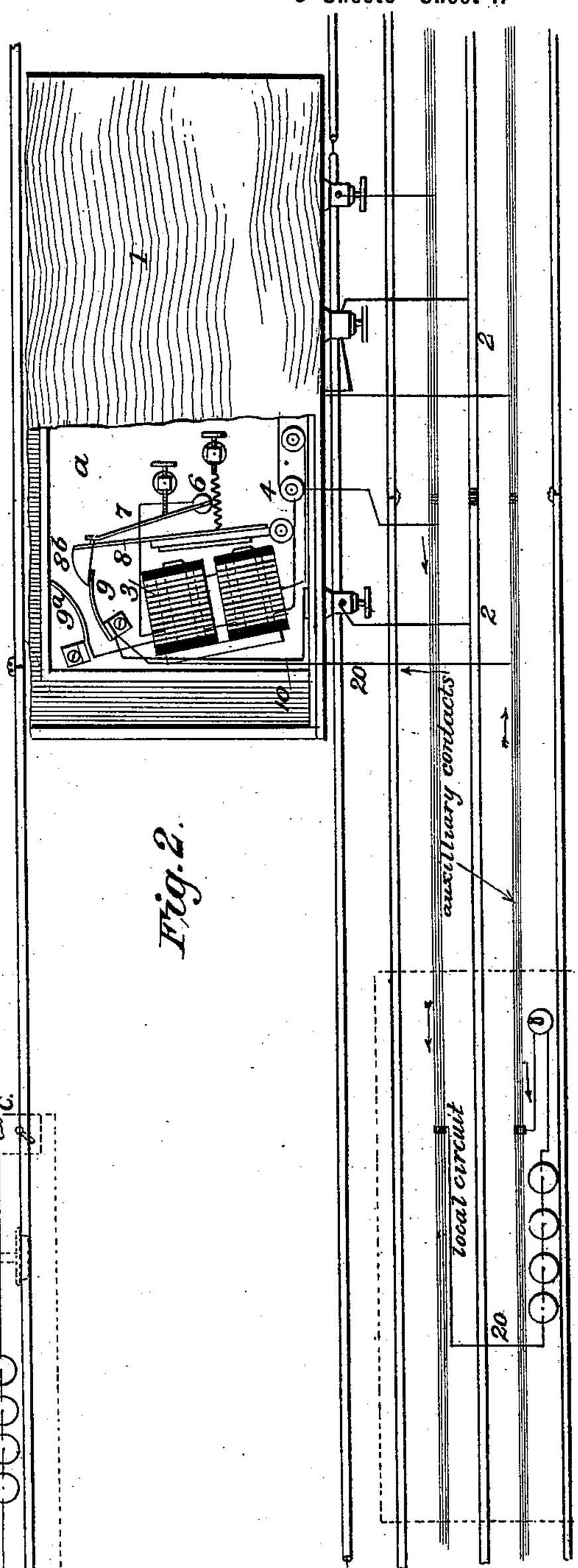
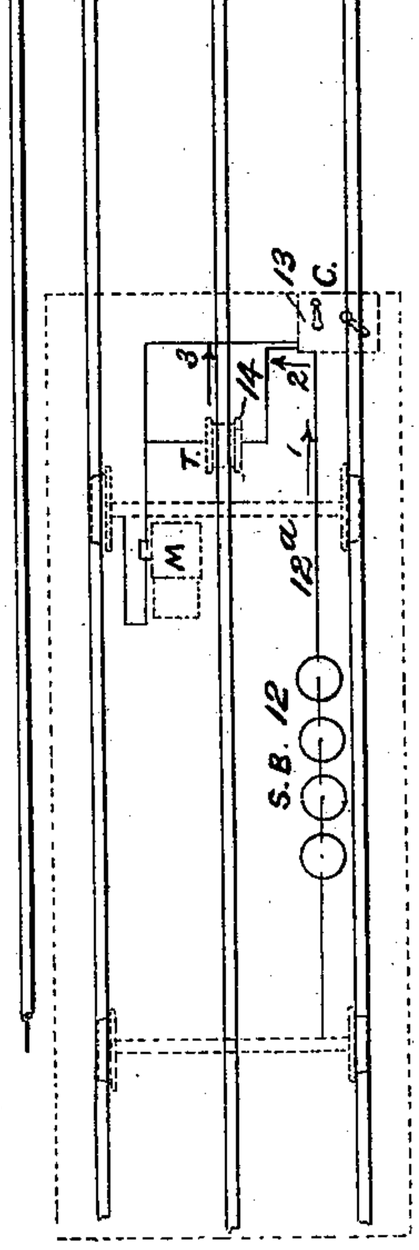


Fig. 2.



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No. 614,124. Patented Nov. 15, 1898.

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ELECTRIC SWITCH MECHANISM FOR ELECTRIC RAILWAYS.

(Application filed Sept. 8, 1897.)

(No Model.) 3 Sheets—Sheet 2.

Fig. 3.

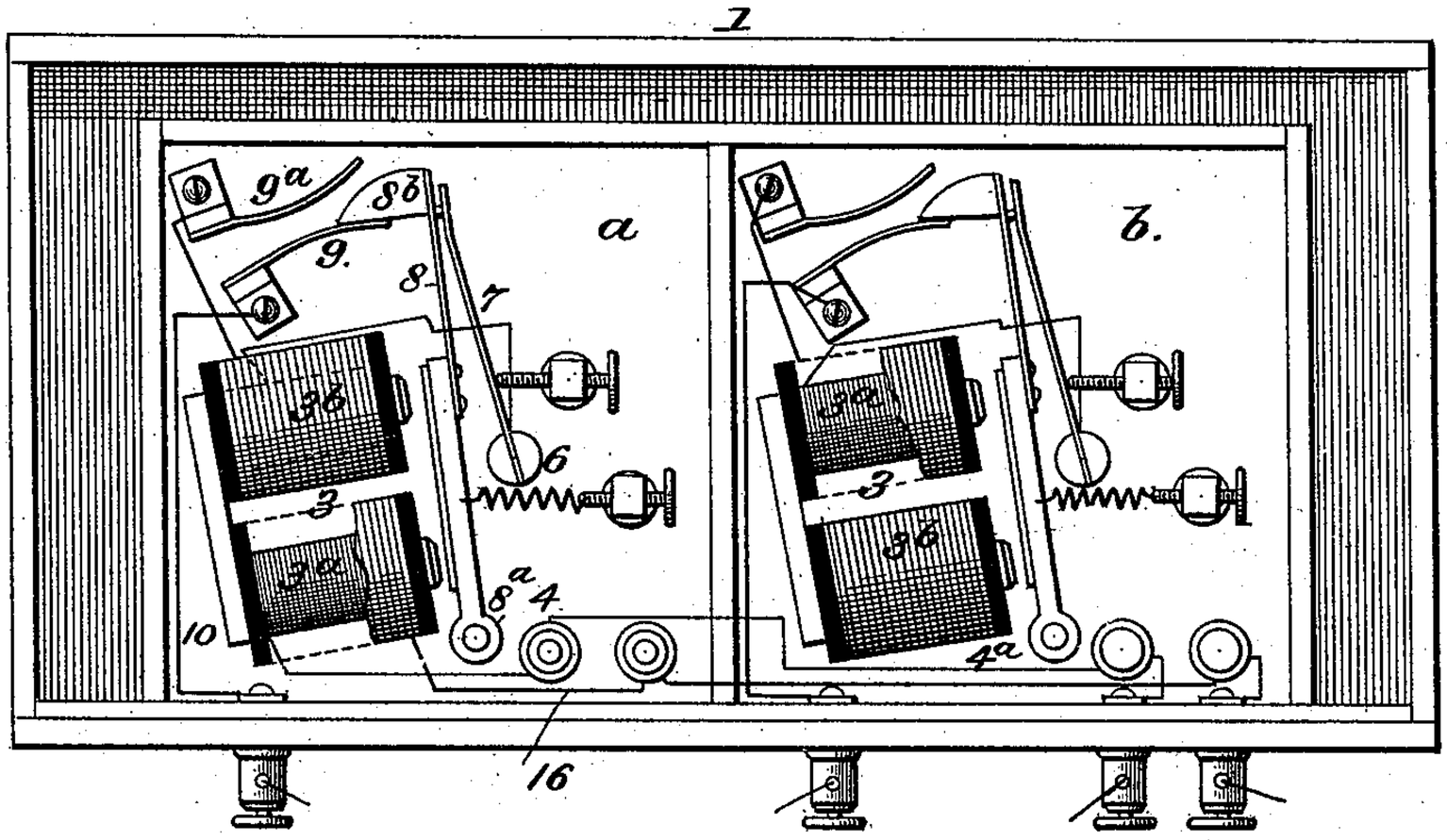


Fig. 4.

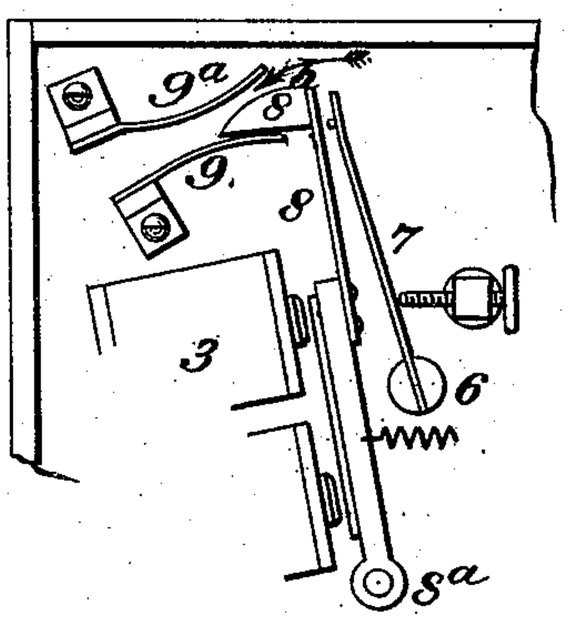
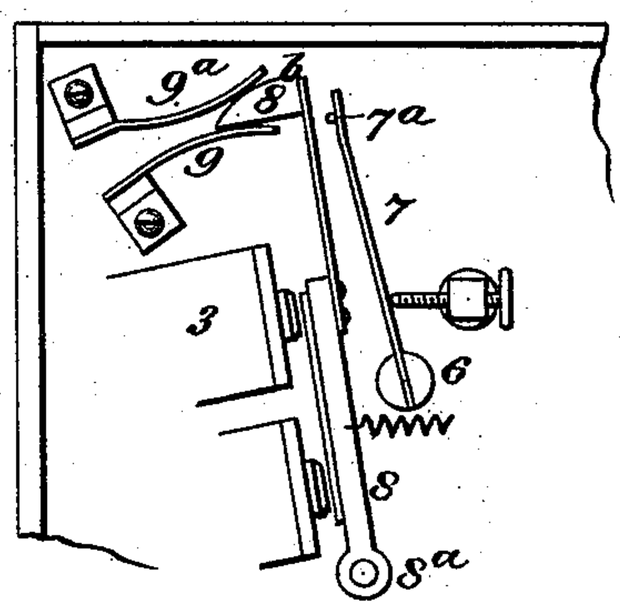


Fig. 5.



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3 Sheets—Sheet 3.

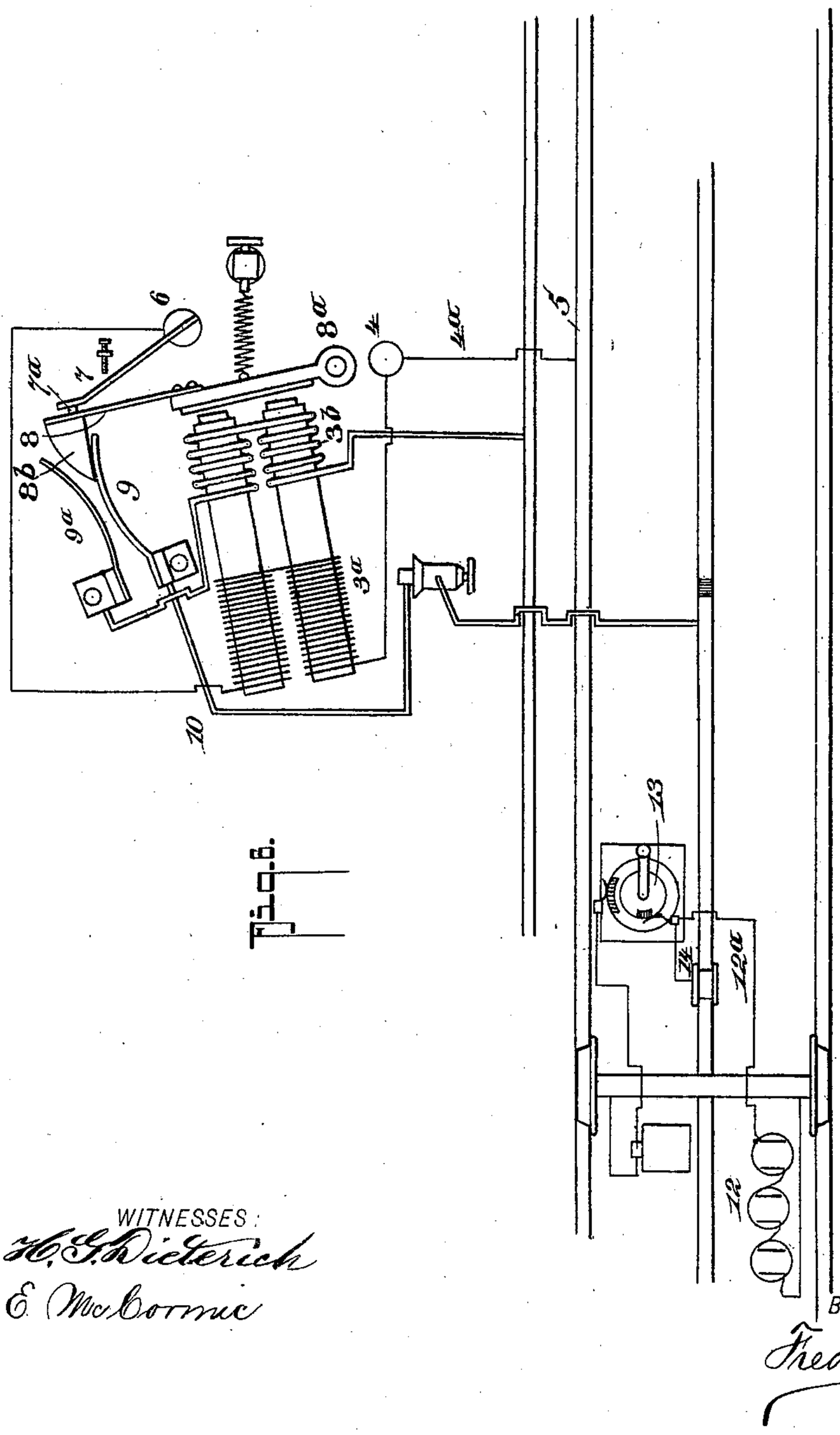

FIG. 6.

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UNITED STATES PATENT OFFICE.

JOHN McLEOD MURPHY, OF TORRINGTON, CONNECTICUT, ASSIGNOR OF TWO-THIRDS TO DAVID F. HALSTED, OF NEW YORK, N. Y., AND WILLIAM M. KEEPERS, OF NEWARK, NEW JERSEY.

ELECTRIC SWITCH MECHANISM FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 614,124, dated November 15, 1898.

Application filed September 3, 1897. Serial No. 650,481. (No model.)

To all whom it may concern:

Be it known that I, JOHN MCLEOD MURPHY, of Torrington, in the county of Litchfield and State of Connecticut, have invented a new and Improved Electric Switch Mechanism, of which the following is a specification.

This invention relates to an electromagnetic switch mechanism more especially adapted for use on surface-contact electric-railway systems to close the line between the sectional conductors and the main or feed line and in which an independent local energy carried on the car is utilized to impart an initial energy to the magnets to set them to complete the circuit between the conductor-rail section and the main line.

Among other objects my invention seeks to provide a switch mechanism of this character in which the armature or contact-making lever devices are so arranged as to render the operation of making and breaking the circuit more positive and uniform and also render the switch practically non-arcing so far as relates to the making and breaking of the main or feed current.

With other objects in view the invention consists in a switch mechanism embodying the peculiar and novel construction and combination of parts, such as I shall first describe in detail and then specifically point out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a diagram illustrating my improved switch devices used in connection with an electric switch having no supplemental sectional conductors, brushes, &c. Fig. 2 is a diagrammatic view illustrating the same in use with a system having supplemental conductor-rails, &c. Fig. 3 is a plan view of my improved switch mechanism. Fig. 4 is a view illustrating the switch-head as having broken the local or energizing circuit and before closing the main-line circuit. Fig. 5 shows the position of the head when the main-line circuit is closed. Fig. 6 is a diagrammatic view illustrating one of the switches, the circuit connecting it with the section-conductor, trolley, and the battery-current, and the controller or cut-out devices.

In the practical application of my improved switch devices I prefer to arrange them as shown in Fig. 1 of the drawings—*i. e.*, in pairs mounted in a suitable box 1, held adjacent the meeting ends of a pair of conductor-rail sections 2 2. I desire it understood, however, that such switch devices may be located at any other suitable point, singly or in clusters, as conditions may make most desirable. In the construction shown the box 1 is formed with two compartments *a b*, in each of which is held a set of switch devices. As each of such devices is constructed and operates like the others, a detailed description of one set will suffice for all.

The box 1 when placed in the ground is hermetically sealed in any suitable manner.

In the preferred construction each switch mechanism embodies a pair of magnets 3, having an inner winding 3^a and an outer winding 3^b. The inner winding has one terminal extended and connected to a post 4, which has a lead 4^a, connected with the ground or tread rail 5, while the other terminal of such winding connects with a post 6 and passes therefrom through the medium of an adjustable spring-contacting plate 7 to the armature or switch lever 8, pivoted at 8^a and having its head 8^b held normally in engagement with one, 9, of a pair of opposing contacts 9 9^a, one of which, 9, connects through the lead 10 with the single sectional conductor-rail 11, as shown. To provide for a perfect electrical contact, the plate 7 has a platinum contact-point 7^a, which engages the lever at the rear of its head.

When used in connection with a system such as disclosed in my other application, hereinafter referred to, the inner magnet-winding or initial circuit is energized by the storage-battery circuit 12 on the car-body, which has its lead 12^a through the controller 13, the trolley 14, and the sectional conductor 11. Thus when the controller is properly adjusted to close the local circuit the circle of current will be in the direction indicated by the arrows 1 2 3 4 5 6 7 8 from the storage battery through controller, trolley sectional conductor, lead 10, switch-lever 8, magnets,

lead 4 to tread-rail. When the magnets are thus energized, the switch-lever will be drawn over and its head made to engage the contact 9^a, which is in electrical connection with the outer windings 3^b of the magnets and which connects through the lead 16 with the feed or line wire 17. At this point it should also be stated the correlation of the contacts 9 9^a, the switch-head 8^b, and the contact-plate 7 is such that the head 8^b will positively break contact with plate 7 before it engages contact 9^a, whereby to positively cut out the battery-circuit from the inner or high-resistance windings before the main circuit is shunted through the low-resistance winding, it being manifest that as the contact of plate 7 with armature-lever 8 is of a minimum surface the same amount of arcing will occur at such point and such leakage as occurs be from the battery-circuit. Thus as the lever-head moves over in the direction indicated by the arrow in Fig. 4 when it reaches the midway position shown its contact with the plate 7 is broken and the local circuit cut out, it being obvious the forward momentum of the lever will carry it over into contact with the member 9^a, which immediately reënergizes the magnets from the main line and holds the switch to its thrown position.

By arranging the switch-head 8^b and contact 9 as shown the head 8^b will at all times be in touch with the contact 9, and in consequence as the armature-lever head is never separate from such contact 9 it follows that when the circuit in the main or feed line is broken and the low-resistance windings and contact 9^a thereby deënergized whatever current may remain in the conductor-section will be immediately grounded by reason of the contact of head 8^b with member 7 through the high-resistance winding 3^a to tread-rail or ground 5. Furthermore, as the head 8^b is always maintained in contact with member 9 a more positive engagement thereof with contact 9^a is thereby effected, which will reduce danger of arcing or leakage of the main-line current by reason of the irregular cutting in of such current with the trolley contact-rail to a minimum.

It will be noticed by reference to Figs. 1 and 3 that the wire 10, which forms the lead for the local circuit from the sectional conductor to the magnets, also forms the lead for the main-line current from the contacts 9 9^a (through head 8^a) to the working conductors. It will also be apparent that by arranging the switch devices to coöperate with a local-circuit system, as shown, the use of supplemental leads—such as auxiliary conductor-rails, brushes, &c.—is entirely dispensed with; furthermore, by providing a switch mechanism as described, to coöperate with a system of third rail and local or storage battery circuit connected, by passing through the controller or rheostat, with the motor that the short-circuiting of the main line will cause the main current to shunt through the local-circuit circle to the batteries and motor.

When used in connection with shunting systems having supplemental conductor-rails, brushes, &c.—such, for example, as shown in Fig. 2—the local circuit, lead 20, is connected to the contact 9, the lead 10 in this case being only used for the main-line circuit, the operation being substantially as before, the making of the local circuit serving to energize the inner windings.

From the foregoing description, taken in connection with the accompanying drawings, it is thought the advantages and complete operation of my improvements will readily appear.

By making the switch a substantially non-arcing one the same will not readily wear out or become inoperative or be burned out, as frequently occurs in electromagnetic switch devices in which the contacting ends must necessarily separate before the breaking of the circuit is effected.

I make no claim in this application of the general arrangement of the switch in combination with the main and the battery circuits, the controller mechanism, and the trolley and motor connections therewith, as such forms the subject-matter of a copending application filed by me, Serial No. 650,482.

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

1. An electromagnetic switch mechanism of the character described, comprising an electromagnet having a high-resistance coil in circuit through its armature-lever to the contact-rail and the ground or return rail, and a low-resistance coil connecting the feed-wire and the conductor-rail; means for energizing the high-resistance coil to throw the armature to close the main-line or low-resistance circuit, and a contact common to both the low and high resistance circuits held in continuous engagement with the armature-switch in its different vibratory movements, as specified.

2. An electromagnetic switch mechanism of the character stated, comprising electromagnets, an armature-switch, a main-line circuit having contacts adapted to be engaged and closed by the shifting of the armature-switch, a local circuit for energizing the magnets to throw the switch, said local circuit having a contact member continuously held in engagement with the switch during its vibrating movement, substantially as shown and for the purposes set forth.

3. In an electromagnetic switch mechanism for electric-railway systems, the combination, substantially as described, of a main-line circuit, a local or energizing circuit, electromagnets having windings in both the local and main circuit, an armature-switch lever, an adjustable connection joining such lever with the local circuit, said connection being arranged to become disconnected from the lever

when such lever is moved by the local or initial energy in the magnets, and contacts in the main line adapted to be electrically joined by the lever as it is drawn over by the initial energy of the magnets, as specified.

4. In an electric switch mechanism as described, the combination with the doubly-wound magnets, the local circuit connected to the inner windings, the main-line circuit connected with the outer windings of such magnets, said main circuits having contacts 9 9^a, of the switch-lever having a head continuously in engagement with the contact 9, and the contact-plate 7, normally held in engagement with the switch, having a limited forward swinging movement therewith and in electric connection with the local circuit, as specified.

5. The combination with the magnets having outer and inner windings, the contacts 9 9^a, the lead-wire 10, connected with the contact 9, the main or feed circuit connected with the contact 9^a, and the outer magnet-winding, the local circuit connected with the inner windings of the magnet, the switch-lever 8 having its head continuously in engagement with the contact 9, the adjustable plate 7 held in contact with the switch and having a limited forward movement therewith, and means for energizing the local circuit, substantially as shown and described.

JOHN McLEOD MURPHY.

Witnesses:
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GEO. F. HILL.