

(No Model.)

2 Sheets—Sheet 1.

F. MANSFIELD.

CLOSED CONDUIT FOR ELECTRIC RAILWAYS.

No. 488,738.

Patented Dec. 27, 1892.

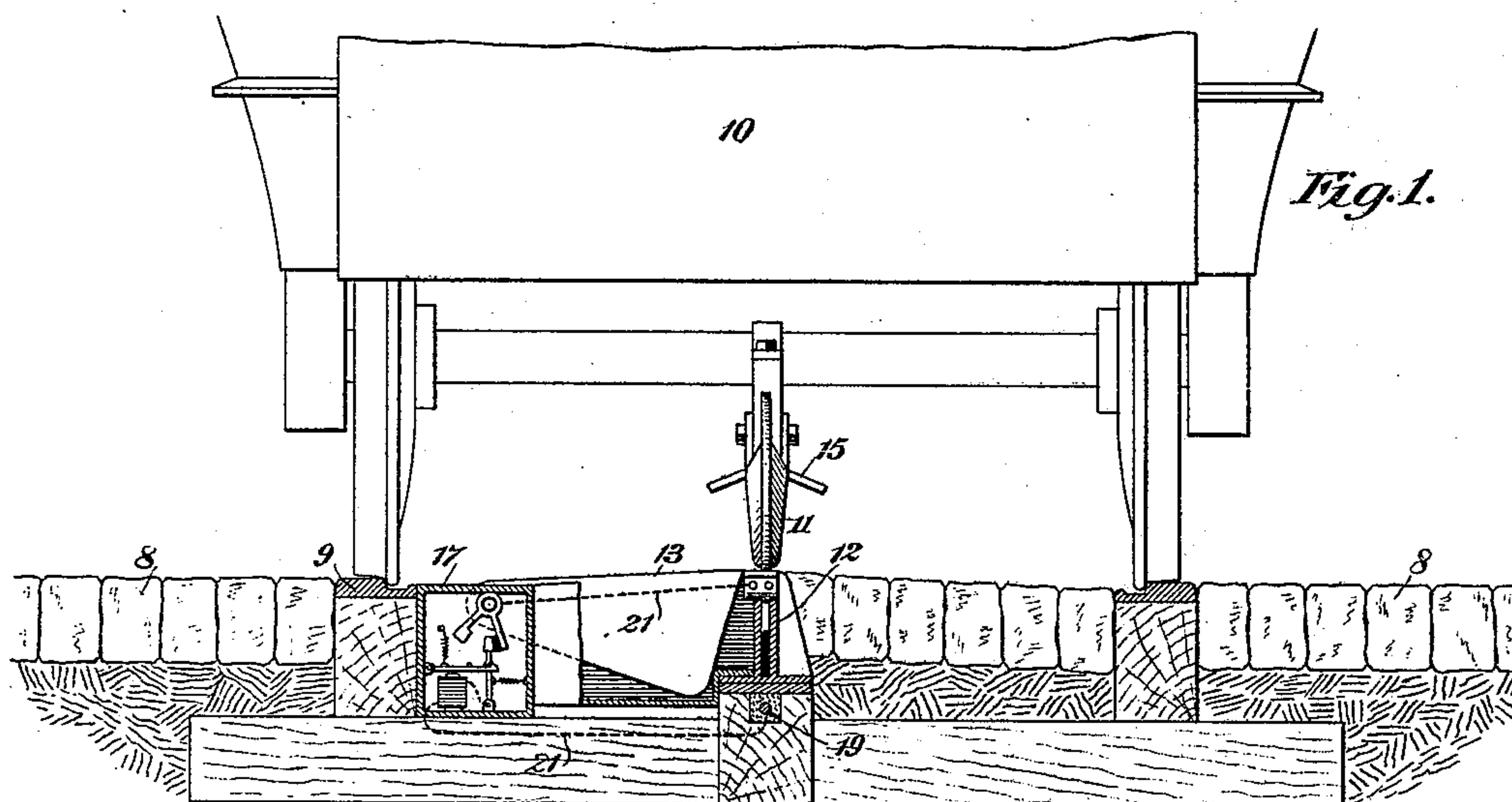


Fig. 1.

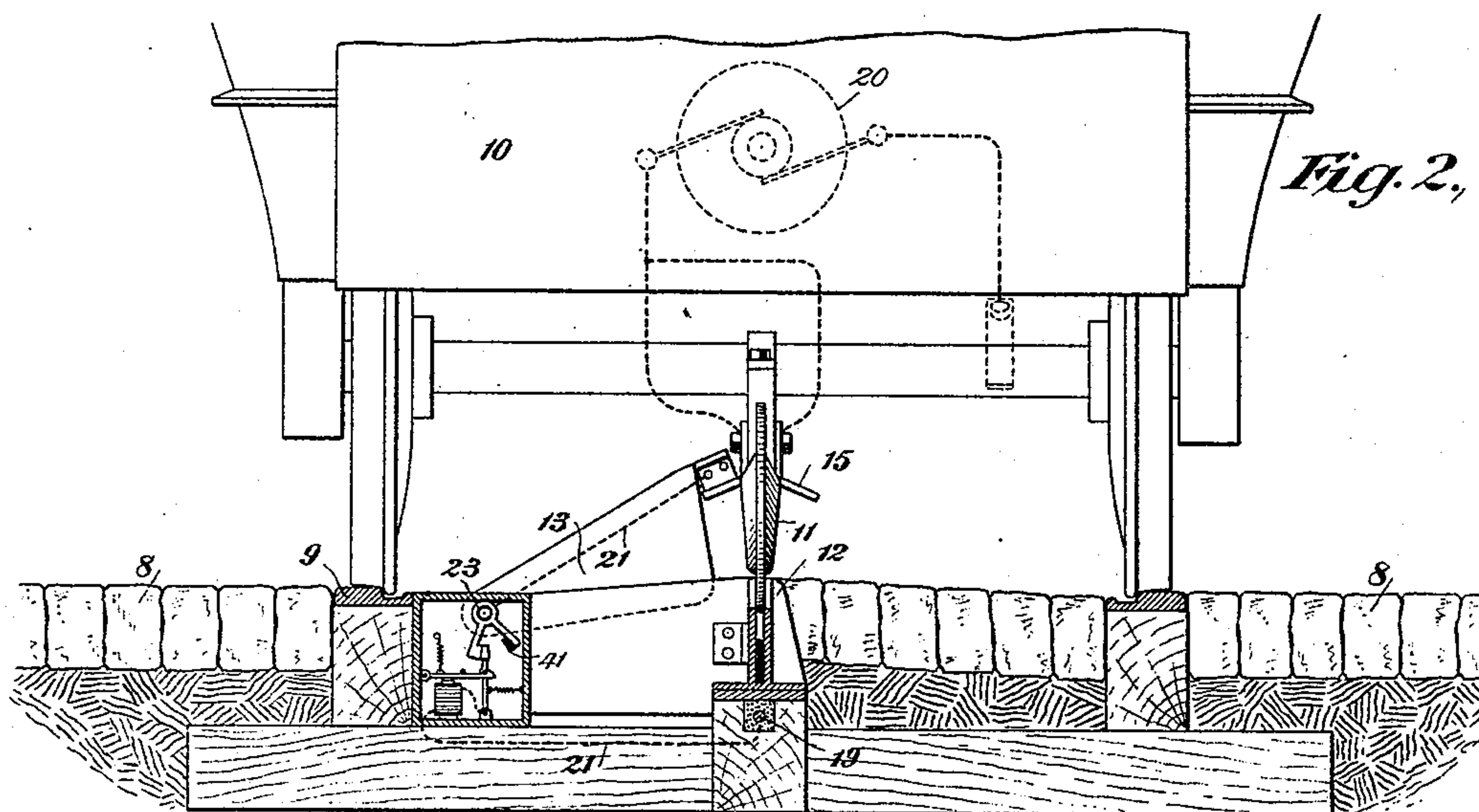


Fig. 2.

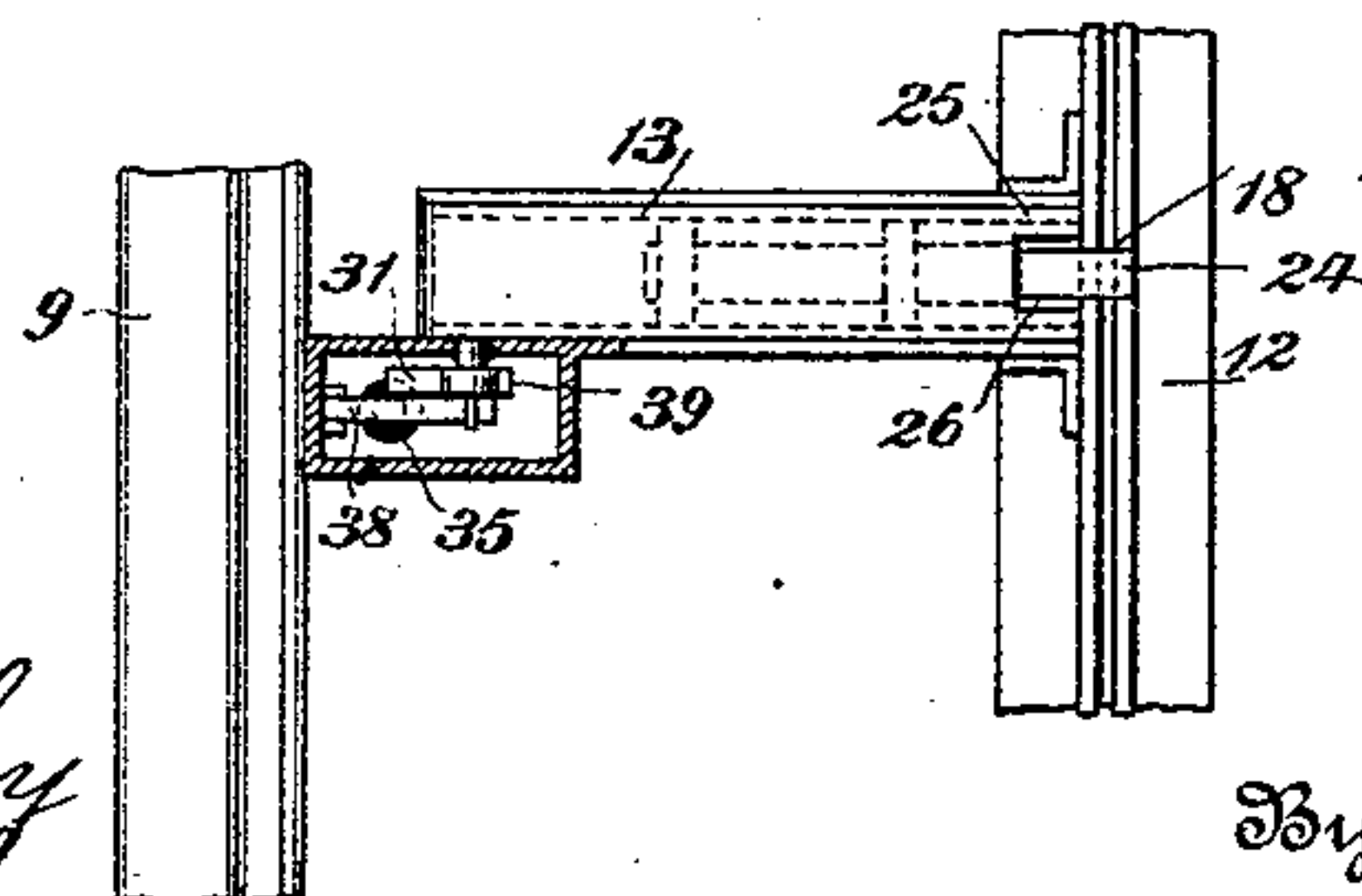


Fig. 3.

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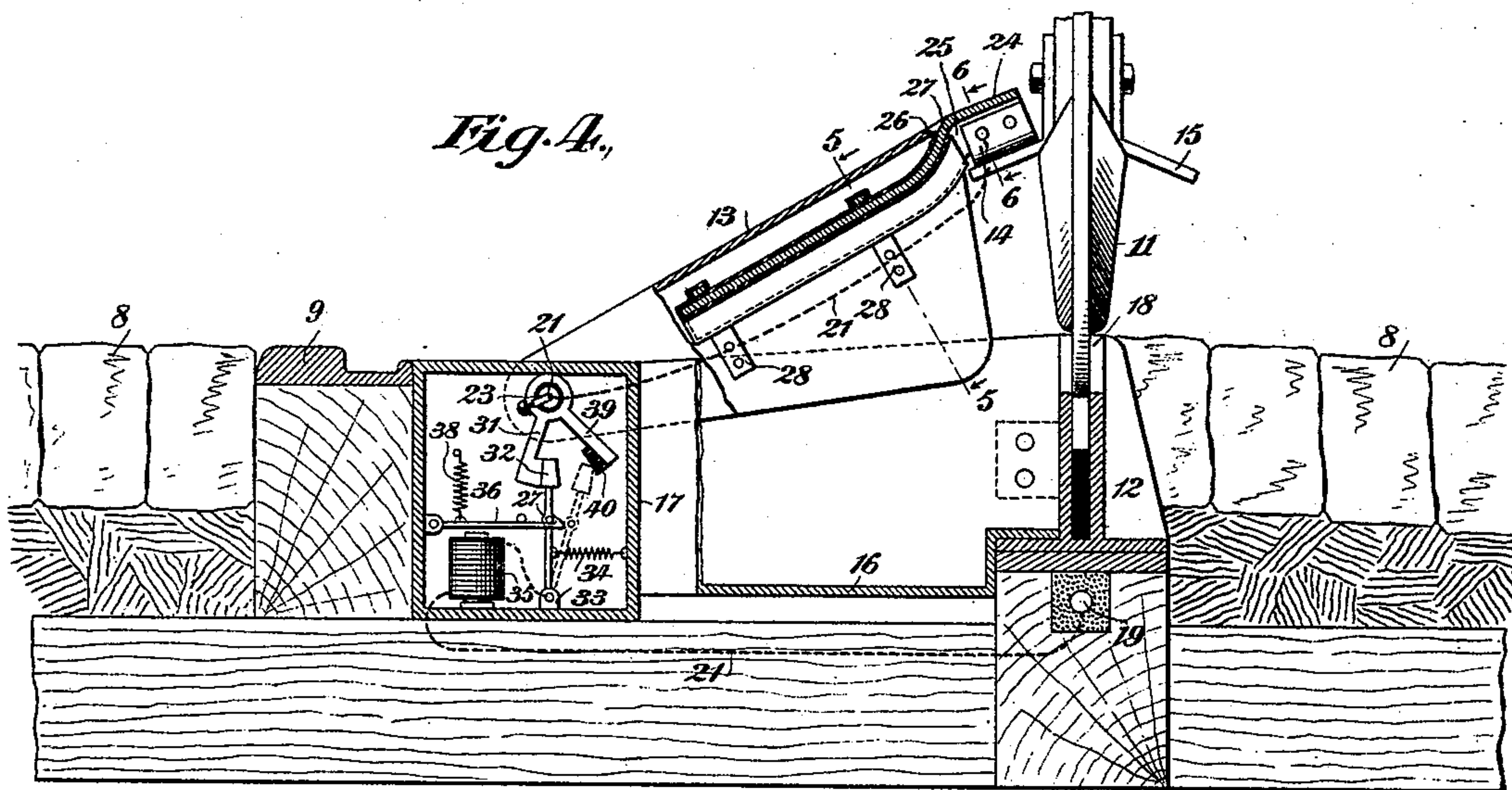


Fig. 6.

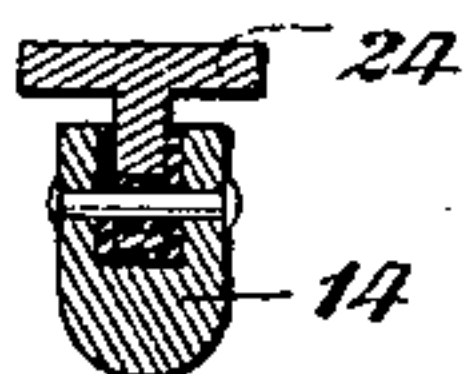
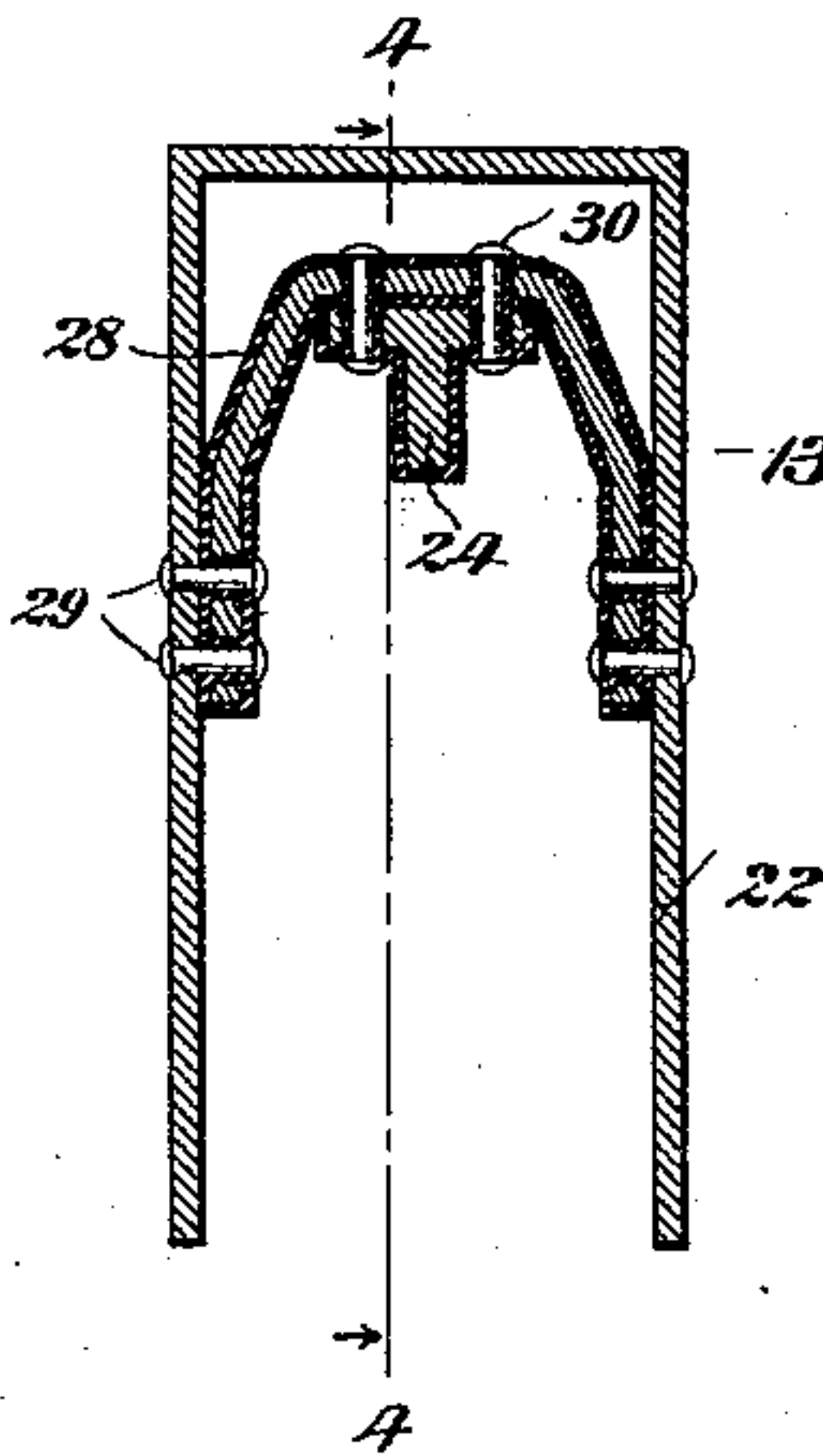


Fig. 5.



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UNITED STATES PATENT OFFICE.

FRANK MANSFIELD, OF NEW YORK, N. Y.

CLOSED CONDUIT FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 488,738, dated December 27, 1892.

Application filed October 1, 1891. Serial No. 407,389. (No model.)

To all whom it may concern:

Be it known that I, FRANK MANSFIELD, a citizen of the United States, residing at New York, county and State of New York, have
5 invented certain new and useful Improvements in Electric Railways, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same,
10 reference being had to the accompanying drawings, forming part of this specification.

My invention relates to electric railways of the class described in United States Letters Patent, granted to me July 22, 1890, and numbered 432,673, 432,674 and 432,675.
15

The invention has reference more particularly to the swinging contact lever, the switch controlled thereby for connecting the branch conductor with the main and disconnecting
20 it therefrom, and to a snap-off device for automatically breaking the circuit over the branch conductor, when traversed by an excessive amount of current, all as hereinafter fully described and then pointed out in the
25 claims.

In the accompanying drawings illustrating my invention, and in which like numbers of reference designate like parts throughout; Figure 1, is a view of my improved railway,
30 together with the lower portion of a car provided with a plow or device for picking up or raising the contact lever into contact with circuit-completing devices on the car. The road-bed, switch-box and conduit for the pick-up
35 device, being shown in section on a vertical plane extending transversely the road-bed. Fig. 2, is a similar view to Fig. 1, with contact-lever shown in elevated position with the switch closed. Fig. 3, is a top-plan view of a
40 portion of a rail, and conduit, the contact-lever and the switch,—the casing of which latter is in horizontal section to show the interior thereof. Fig. 4, is an enlarged view of parts shown in Fig. 2, with the contact-lever
45 shown in section on a plane indicated by line 4—4 Fig. 5. Fig. 5, is a view in section taken on a plane indicated by line 5—5 Fig. 4. Fig. 6, is a view in section on a plane indicated by line 6—6 Fig. 4.

50 Referring to the drawings 8 designates the road-bed 9 the track rail over which passes

the car 10, carrying a plow or pick-up device 11, the lower end of which travels through the conduit 12, and which serves to engage and raise the contact lever 13, so that the contact plate 14, bears against the circuit-completing bar 15, which is fixed upon the car and slides under said contact, as the car moves along.

The casing or housing 16, for the contact-lever 13, and the box 17 of the switch, which are shown as cast together, are set in the road bed, as shown, so that they lie flush with the surface of the road. Obviously the switch box may be set below the surface of the road
60 if preferred, but such an arrangement would render the interior of the switch-box less accessible than in the present construction. One end of the casing 16, fits against or into the adjacent side of the conduit 12, which is
70 formed with a transverse notch 18, receiving the end of the contact-lever 13, when the same is down or closed. The contact end of lever 13, extends across the slot of the conduit 12, as is clearly shown in the drawings,
75 and this permits the inclined plow or pick-up 11, to run underneath the end thereof and thereby gradually elevate it into contact with the circuit-completing bar 15, on the car, in order to complete the circuit from the insulated main conductor 19, to the motor 20 on the car—the path of the circuit being from the main 19, by way of the branch conductor 21, which includes the switch and snap-off device hereinafter to be described, to the contact plate 14, thence over the circuit-completing bar 15, to the motor, and via the car-axle and wheel to one of the rails which may serve as a return conductor in the usual well known manner.
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I will now describe my present improvements beginning with the contact-lever 13. This lever comprises a shell or rigid metallic hood 22, of an inverted U-shape in cross section and which is mounted fast upon a suitable
95 insulated shaft 23, which is set across the outer end of the casing 16, and projects into the switch box 17, and serves to control the switch as hereinafter described. This shell 22, is constructed so as to fill the opening in the top of the casing 16, through which the contact-lever swings, when the same is in open
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or closed position, thereby preventing foreign matter, such as dirt, from falling into the casing.

Within the shell 22, is an arm 24, which projects beyond the end thereof toward the conduit where it is provided with a metallic contact plate or shoe 14, which is suitably insulated therefrom and is connected directly to the switch by means of the branch conductor 21, which, like the main conductor, is completely insulated, so that in the event of the road being covered by surface water, the current will not be short circuited, even when the contact lever is elevated. The inner end of the main part of the hood or shell 22, extends considerably short of the side of the conduit in order to allow ample clearance therebetween, while the upper part of such end is slightly extended, as at 25, (see Figs. 3 and 4,) and this extension makes a tight joint with the side of the conduit when the lever is closed. The free end of the arm 24, which is somewhat narrower than the shell or hood inclosing it, projects through a notch 26, formed in the extended end 25, of the hood, and is of sufficient length to reach through the notch 18, of the conduit and lie across the slot thereof so as to be readily engaged and raised by the pick-up device 11, on the car. This arm 24, is made of spring metal and is bent slightly at 27, in order that the upper surface of the free end thereof which projects through the notch 26, may come flush with the top of the inclosing hood 22, and the conduit, when the lever is closed down, and in this way the free end of the arm 24 fills up the notch or opening 26 and prevents dirt or rubbish from finding its way into the casing 16, and thereby interfering with the movements of the lever 13. This arm 24, which is of a T-shape in cross section is secured in fixed position within the hood 22, by means of the yokes or brackets 28, 28, which span the interior of the hood, as shown in Fig. 5, and are securely fixed to the same by means of suitable rivets 29, the arm itself being fastened to the brackets by similar rivets 30. The main part of this arm, as well as the supporting brackets 28, are covered with an insulating material, as clearly indicated in the drawings, to prevent the current from escaping to ground. The shell 22, thus serves to support the arm 24, as well as to house it and prevent the insulating material from being broken or chipped off. This construction affords a strong rigid arm that is thoroughly insulated. As the arm is resilient it will bear with spring pressure upon the circuit-completing device on the car when it is elevated in contact therewith, and will thereby maintain a close contact, and in this way guard against sparking between these parts. The shaft 23, upon which the contact lever 13 is mounted, is arranged to control the switch in the branch-conductor and which is located within the switch-box 17. This switch comprises a contact 31, which is insulated from the shaft 23, and is connected with the insu-

lated contact plate 14, on the end of the arm 24, directly, by means of the conductor 21, as indicated by dotted lines. The contact 31, moves in fixed relation to the shaft and describes a short arc in its range of movement, as will be understood by comparing the relative positions of the parts when the switch is open (see Fig. 1) and when it is closed (see Fig. 2.)

The second contact 32, of the switch consists in a rod pivoted at 33, standing upright and provided with a spring 34, which normally tends to draw the contact away from vertical position into the inclined one shown in dotted lines Fig. 4. This second contact 32, is connected with the main conductor 19, by branch 21, in which is included an electro-magnet 35, for controlling, what I term, a snap-off device, as will now be described. The latch 36, is arranged to engage with the pin 37 on the pivoted contact 32, in such a manner as to hold it in vertical position and against the action of the spring 34. The latch 36, is controlled by the armature of the magnet 35, in such a way that when the magnet is traversed by a given amount of current its armature will be unaffected and the latch remains locked to hold the contact 32, in proper position to be engaged by the switch-contact 31, when the contact lever 13, is elevated. The armature 36, of the magnet, is so adjusted as to only be attracted to unlatch or release the contact 32, to the action of its spring, when the current passing over the branch-conductor and the included magnet, exceeds a given amount, or the normal. When this occurs the spring 34, will draw the contact to one side, as indicated in broken lines in Fig. 4, and place it out of reach of the other switch contact 31, thereby breaking the circuit and preventing the burning out of the apparatus as would be likely to occur in the case of an excessive or abnormal current passing over the branch. In the present construction the latch 36 is merely an extension of the armature of the magnet 35, thereby simplifying the construction. However, any preferred form of latch may be used to lock the contact 32 in position, and may be so arranged as to be under the control of the magnet 35.

In order to automatically reset the switch I provide a finger or push device 39, which is controlled by the shaft 23, in such a way as to force the contact 32, from the dotted line position, in Fig. 4, into the full line or upright position, and allow the latch 36 to snap into engagement with the pin 37, on the contact, thereby resetting the contact. This resetting device 39, in the present construction, projects from the collar by means of which the contact 31, is mounted on the shaft 33, it being formed integral with such parts. These parts 31 and 39 lie substantially in the same plane and form with each other an angle of about sixty degrees, so that the contact 31 engages one side of the contact 32 in completing the circuit and the finger 39 engages

the opposite side thereof, in resetting the switch. The finger 39, is provided with a piece of insulation 40 to engage contact 32, and it may be made separate from the contact 31, and its collar if preferred. Of course this resetting device 39, may take different forms, for this part of the invention consists broadly in automatically resetting the switch by the closing down of the contact lever 13.

From the above description and by reference to the hereinbefore mentioned patents, the operation of the invention will be readily understood. By means of the plow or pick-up device on the moving car, the contact lever 13, is gradually raised from its normal or lowermost position into an elevated position, as shown in Figs. 2 and 4, when it is engaged by the circuit-completing bar 15, which then slides under the contact-plate of the lever, which latter is then gradually lowered into its normal position. Another contact-lever is raised and placed in circuit before the first mentioned one breaks the circuit, in order to continually keep the motor on the car supplied with current. The branch conductor 21 is normally disconnected at the switch from the main conductor, and the circuit is not completed over the contact lever until the same is raised into about its highest position. In this way the exposed contact of the lever is kept inert until raised into nearly its highest position, thereby preventing the possibility of a short circuit by means of surface water, as all parts of the apparatus are thoroughly insulated. The armature of magnet 35, is adjusted in such a way as that it will hold the pivoted contact 32 within reach of the contact 31 so long as a given amount or the normal current traverses the same. In the event of an excess of current passing over the switch, the magnet 35, will attract its armature and cause the contact 32, to move out of engagement with its fellow contact 31, thereby breaking the circuit. Upon the contact lever being lowered into its normal position the resetting device 39, will automatically reset the switch.

Having thus described my improvements in electric railways what I claim as my invention and desire to secure by Letters Patent is;

1. In an electric railway of the class described, the combination with a swinging-hood or shell provided with interior brackets suitably insulated therefrom, of an insulated arm secured to said brackets within the shell and having one end projecting therefrom and provided with a contact-plate.

2. In an electric railway, the combination with a branch conductor having a switch and an electro-magnet located therein in series, said switch including a pivoted contact having its normal or operative position controlled by said magnet and thrown out of such position upon the passage of an excessive amount of current over the magnet, of a swinging contact lever included within the branch-conductor and controlling the said switch.

3. In an electric railway, the combination with a branch conductor having a switch located therein, and a contact-lever also located therein and controlling the switch, of an electro-magnet for indirectly controlling one of the switch contacts and moving it out of operative position upon the passage of an excessive amount of current over the switch, said switch and magnet arranged in series and a resetting device controlled by the movements of the said contact-lever and acting to reset said contact when the lever is moved into its lowest position, for the purpose set forth.

4. In an electric railway, the combination with a branch conductor having a switch located therein having a pivoted contact, tending to move out of operative position, and an electro magnet having its armature holding said contact in operative position during the passage of the normal current thereover, of a swinging contact lever provided with a shaft carrying a contact of the switch and a resetting or push device controlled by said shaft and acting to reset the said pivoted contact into operative position when the contact lever is lowered, for the purpose set forth.

5. In an electric railway, the combination with a branch-conductor having a switch located therein and comprising a pivoted contact provided with a spring tending normally to draw it out of operative position, and an electro-magnet included in said branch, and having its armature engaging said pivoted contact and normally holding it in operative position against the action of its spring and releasing it upon the passage of an excessive amount of current thereover, of a swinging contact lever having a shaft carrying one of the contacts of the switch and serving to close the switch when the lever is elevated and a resetting-finger mounted upon the said shaft and engaging said pivoted contact after the same is thrown out of operative position and moving the same into operative position upon the lowering of the contact lever.

6. In an electric switch, the combination with a pivoted contact tending normally to move out of operative position, and an electro-magnet included in the circuit and having its armature engaging the said contact and holding it in operative position during the passage of the normal current over the magnet, of a second movable contact and a resetting device or finger moving in fixed relation with said second contact and engaging and resetting the pivoted contact when the said second contact is moved in one direction.

7. In an electric railway, of the class described, a swinging contact-lever 13, comprising a swinging hood or shell 22, and an insulated arm 24, mounted within the hood and projecting therefrom, and provided with an insulated contact-plate 14, substantially as and for the purpose described.

8. In an electric railway of the class described, the combination with a car provided

with a pick-up device or plow and a circuit-completing device, of a swinging contact lever 13, comprising a swinging hood or shell 22, formed with a notch 26 at its upper free end, and the arm 24 mounted within the hood with the end thereof projecting through the notch 26, and carrying an insulated contact-plate substantially as and for the purpose set forth.

9. In an electric railway, the combination with a swinging contact-lever and a movable contact 31, moving in fixed relation therewith of a pivoted contact 32 normally tending to move out of the range of movement of the said contact 31, and an electro-magnet having its armature engaging and holding the said contact 32 within the range of movement of said first contact, and releasing it to move out of such position upon the passage of an excessive amount of current over the switch, substantially as and for the purpose set forth.

10. In an electric switch, the combination with two movable contacts and means for forcing them apart upon the passage of an excessive amount of current over the switch, of a resetting device controlled by the movement of one of said contacts, whereby the other said contact may be reset in operative position upon the movement of the said contact connected with the resetting device.

11. In an electric switch, the combination

with the movable contact 31, of a pivoted contact 32, provided with means for moving it out of reach of the said contact 32 upon the passage of an excessive amount of current over the switch, and a resetting device or push-piece 39, moving in fixed relation to the said contact 31, and adapted to engage and reset said contact 32, substantially as and for the purpose set forth.

12. In an electric switch, the combination with a movable contact 31, and a pivoted contact 32, provided with a spring 34, tending normally to move it out of reach of the contact 31, an electro-magnet 35 having its armature engaging and holding the said contact 32, within reach of the contact 31, and releasing it so as to move out of reach thereof upon the passage of an excessive amount of current over the switch, and a push finger 39 moving in fixed relation to the contact 31, and acting to engage and reset the said pivoted contact 32, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand, this 30th day of September, 1891, in the presence of the two subscribing witnesses.

FRANK MANSFIELD.

Witnesses:

WILLIS FOWLER,
ROBT. C. TAYLOR.