

(No Model.)

2 Sheets—Sheet 1.

F. MANSFIELD.
ELECTRIC RAILWAY.

No. 461,685.

Patented Oct. 20, 1891.

Fig. 1.

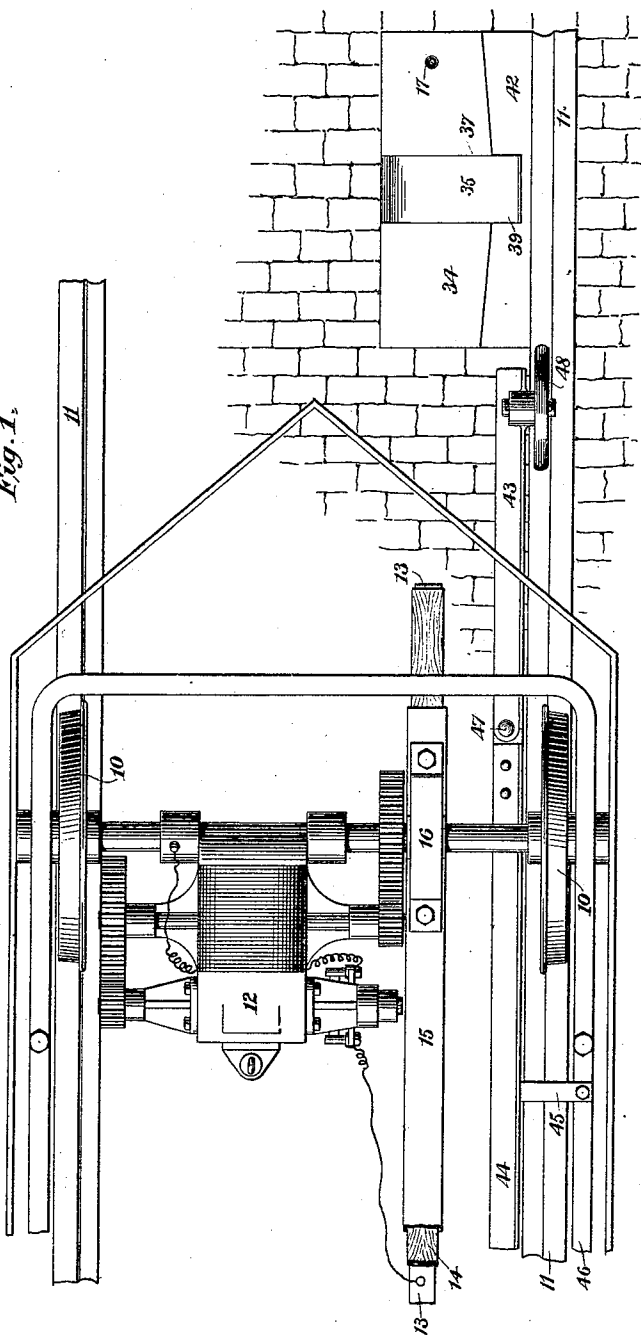
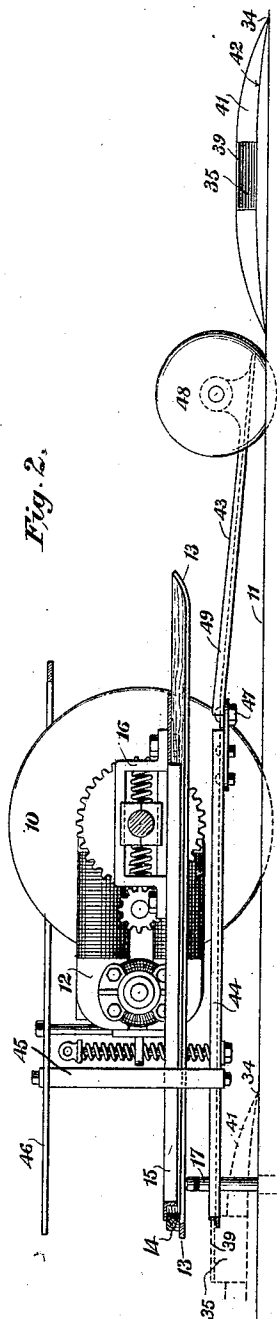


Fig. 2.



Witnesses
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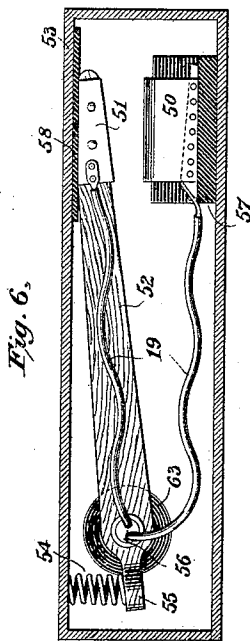
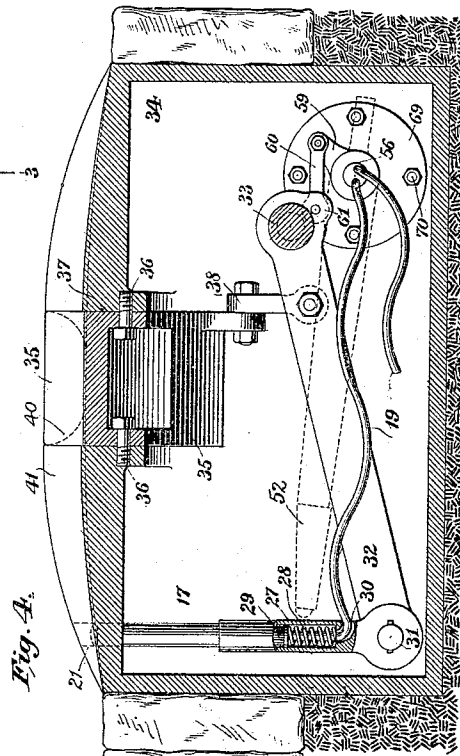
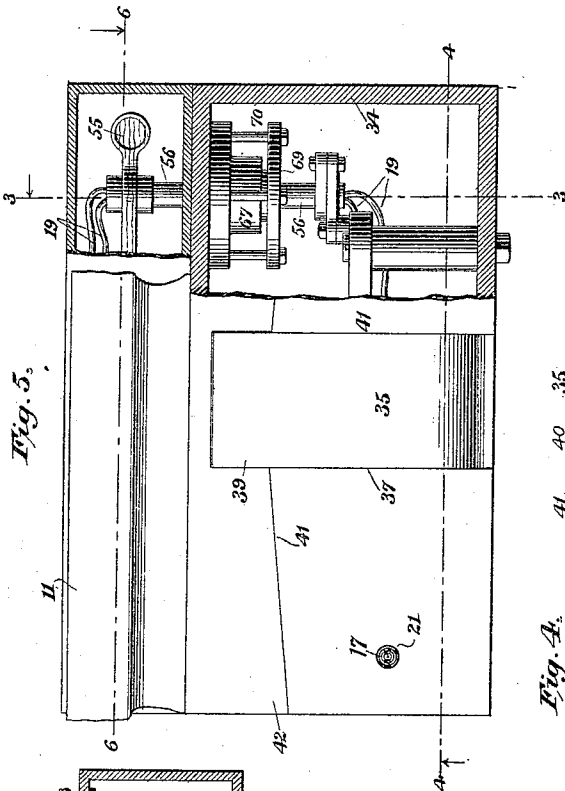


Fig. 7.

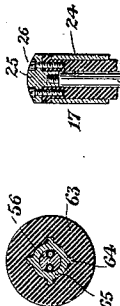
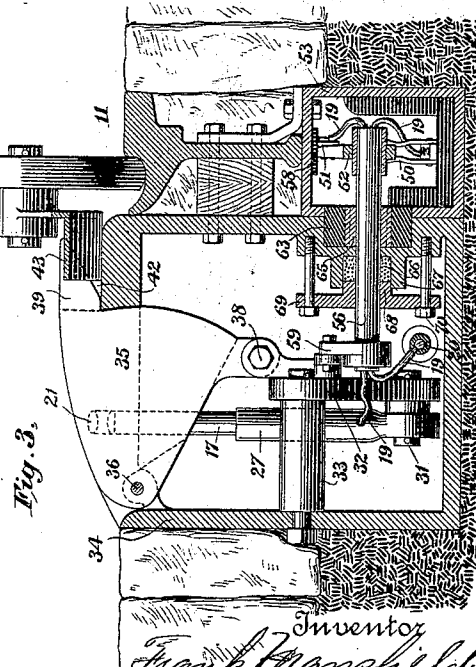
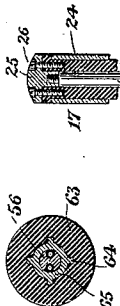


Fig. 8.



Witnesses

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By his Attorneys

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UNITED STATES PATENT OFFICE.

FRANK MANSFIELD, OF NEW YORK, N. Y.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 461,685, dated October 20, 1891.

Application filed November 18, 1890. Serial No. 371,825. (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 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, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to the general class of electric railways as set forth in United States Letters Patents granted to me July 22, 1890, and numbered 432,673, 432,674, and 432,675, respectively; and the invention consists in certain novel arrangements and combinations of the several parts of the railway, all as fully hereinafter set forth, and then pointed out in the claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a top plan view of one end of the running-gear of the car provided with my improvements and also shows in plan one of the boxes or casings containing the branch conductor, the switch, the movable contact, and the operating-lever. Fig. 2 is a side view of the same with one of the car-wheels removed. Figs. 3, 4, and 6 are sectional views of the box or casing containing the movable contact, the branch conductor, and the switch, the sections being taken upon planes indicated, respectively, by the lines 3-3, 4-4, and 6-6 in Fig. 5. Fig. 5 is a top view, partly in horizontal section, of the box or casing containing the branch conductor, its movable contact, and switch. Figs. 7 and 8 are detached views of details hereinafter to be referred to.

Referring to the drawings, 10 designates the wheels of an ordinary car, which travel on a track 11 and are propelled by an electric motor 12, which is in circuit with a contact device or rod 13, suitably suspended from the car. In the present construction this contact-rod 13 is secured to an insulating-piece 14, which is mounted upon the under side of the beam 15, which is swung from the car-axles by means of the hangers 16. This contact-rod 13 extends a little short of the entire length of the car and is always in engagement with one of the movable contacts 17,

which is projected from the casing 34, placed in the road-bed flush with the surface thereof. The movable contacts 17 are each connected by way of an insulated branch conductor 19 with an insulated subterranean main or supply conductor 20, which extends along the road and forms one side of the circuit, the other side thereof being either by way of one of the car-tracks or a similar buried conductor. The boxes 34 are located at equal intervals along the railway and at such a distance from each other as to permit of one of the contacts 17 always being in engagement with the contact-rod 13 on the car. The contact 17 may be vertically projected from the box 34 through the opening 21 a sufficient distance above the surface of the road to engage with the contact device on the car; and it consists in a metallic rod 22, incased by insulating material 23, which is surrounded by a metallic sleeve 24. At the outer-end the rod 22 is provided with a contact cap or plate 25, which is screwed upon the end of the rod, and is also fastened to the insulating material 23 by means of the screws 26. This contact 25 is therefore easily removable in case it becomes worn out and needs replacement, and is completely insulated from the sleeve 24. The lower end of the rod 22 is connected with the flexible conductor 19, which leads by way of a switch to the main conductor, which is embedded in the road-bed. This rod 22, with its connected insulated sleeve 24 and its contact 25, which are all secured tightly together, is mounted within a tubular holder 27, so that it may be slid up and down therein. A spring 28 surrounds the lower end of the rod 22, which projects free, and one end of this spring rests against the bottom of the tubular holder 27, while its other end rests against a stop 29, fixed upon the contact-rod 22, so that the spring always tends to keep the rod and its contact projected from the holder. When the contact is forced against the contact device on the car, the spring 28 is compressed, so that the contact is held in close engagement under a spring-pressure. The holder 27 is formed with a lateral opening through which the flexible conductor 19 extends, and it is mounted loosely upon a stud 31, carried upon the end of the lever or arm 32, which is swung upon a shaft 33, fixed to

the inside of the casing 34. The lever 32 swings vertically on its shaft 33 and serves to project the contact 17 from the box and to return it into the box in an evident manner.

5 The lever or arm 32 is operated by a passing car through the following means: An operating-lever 35 is pivoted at 36 in an opening 37 in the top of the box or casing 34 and is connected by means of a link 38 with the
10 arm 32 at a point intermediate the shaft 33 and the end of the arm. The operating-lever 35 is made of such a shape as to fill the opening 37 in any position of its movement, and thereby prevent any dirt or foreign matter from falling into the box 34 when the lever is elevated. The outer end of this lever,
15 which in the present construction projects toward the adjacent rail 11 and at right angles thereto, is formed with a beveled end 39, which is rounded upon the sides at 40, as indicated more especially in Fig. 4. As the end of this lever has necessarily to project above the surface of the road in order to be seized by the pick-up device on the car, I form the
20 upper surface of the box or casing 34 with the inclines 41, which extend from the ends of the box up to the opening 37, through which the lever moves with a gradual rise, and allow the end 39 of the lever to project into the channel 42, which runs entirely
30 across the top of the box, at one side thereof, near the rail. The operating-lever 35 is caught and raised on its hinge by means of a pick-up device or plow 43, which is mounted upon the end of the supporting-bar 44, which is suspended by means of hangers 45 from the car-frame 46. The plow 43 is pivoted on a vertical pin 47 on the beam 44, which is virtually
35 a horizontal continuation of the inclined plow, and moves under the operating-lever 35 after the same has been raised to its maximum height and has been passed under by the plow. This beam 44 extends from near one end of the car to the other, and may be either
40 provided with but a single plow at the forward end of the car or it may be provided with a plow at each end. The plow 43 is inclined from its attaching-point downwardly, so as to just clear the surface of the road with its end, and
45 it is guided and supported at its outer end by means of a roller or wheel 48, which travels upon the car-track 11. The wheel 48 is located to the outside of the plow 43, which is quite broad and flat and has upon its outer
50 edge a guide-flange 49. As the car moves along, the end of the plow 43 enters the channel 42 of the box, in which the lever 35 is mounted, and the plow is guided under the end of the latter, which is raised thereby, and
55 as the car continues its movement the plow continues to move under the lever, which it gradually elevates, and when the plow has passed from under it the beam 44 comes into play and continues to hold the lever 35 elevated until the car has moved by. The elevation of the operating-lever 35 causes the
60 sliding contact 17 to be projected vertically

so as to strike against the under side of the contact-rod 13, with which it makes a sliding contact throughout the length thereof. In
70 this way each of the movable contacts 17 is projected into contact with the rod 13 upon the car and held in contact therewith while the car is passing over the same.

In order to prevent ordinary surface water
75 from coming in contact with the movable contacts 17 while the same are energized, and thereby short-circuiting the current, I provide each branch conductor 19 with a switch, which operates to close the circuit thereover only
80 when the movable contacts 17 of the conductors are raised to their highest points of movement. This switch consists in a fixed terminal 50 and a movable terminal 51, which is carried upon the end of a swinging bar 52,
85 which is located within a box 53, attached to the side of the casing 34. The switch-bar 52 is acted upon by a spring 54 in such a way that when the terminal 51 is forced into contact with the terminal 50 the spring tends to open
90 it and break the contact, so that a snap action of the switch may be obtained, the necessary motion being derived from the play in the joints. The spring 54 is applied by interposing it between the upper part of the box
95 53 and an extension 55 of the arm 52 beyond the shaft 56, upon which the arm rocks, and serves to reseal the operating-lever 35 and movable contact 17. The terminal 50 is suitably insulated by means of the insulating material 57, and an insulating-plate 58 is arranged upon the inside of the switch-box for the end of the arm 52 to rest against when the switch is opened to its fullest limit. This
100 switch is designed to be operated in connection with the movable contact 17 and the operating-lever 35 in such a way that when the latter is raised the former is projected into engagement with the contact device on the car, and there are various ways in which this
105 may be accomplished. In the present construction the switch is operated by means of the shaft 56, which extends through the side of the switch-box 53 into the box 34, where it is provided with a fixed extension
110 59, which is connected by means of a link 60 with an extension 61 upon the lower side of the swinging arm 32, the parts being so adjusted relatively that when the end of the swinging arm 32 has reached its highest point
115 of movement the switch-bar 52 will have moved downward, so as to close the terminal 51 on 50, thereby completing the circuit over the branch conductor, which leads from the main 20, (see Fig. 3,) through the shaft 56, to the
120 terminal 50, and again leads from a terminal 51 through the shaft 56 to the movable contact 17. The branch conductor 19, which is completely covered with insulating material, passes from the insulated main conductor 20
125 lengthwise through the shaft 56 to the switch in box 53, thence back through the said shaft to the contact device carried by the swinging arm 32. In virtue of the conductors 19 being
130

covered or coated throughout with an insulating material they are well insulated from the switch-shaft 56, through the length of which they pass. At the point where the shaft 56 passes through the side of the box 53 and enters the casing 34 there is provided a soft-rubber block 63, into which extend the projections 64 from the sleeve 65, which is mounted upon and turns with the shaft 56. As the shaft 56 is given a partial turn to operate the switch the projections 64 stretch the soft rubber, so as to make it hug the shaft, thereby maintaining a water-tight joint. In order to further insure the exclusion of any water which may be present in the casing 34 from the switch-box, I provide a rubber sleeve 66, which surrounds the shaft 56 and rests within an annular flange 67 upon the inner side of the casing 34, and this rubber packing 66 is engaged by an annular flange 68 upon a compressed plate 69, which slides on the shaft and is held in position by the bolts 70, the tightening of which serves to force the flange 68 within the flange 67, so as to compress the packing 66.

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, the combination, with a car provided with a contact device, of an insulated main conductor provided with normally-disconnected branch conductors, each having a movable contact, a switch in each branch conductor, adapted to close and connect the same with the main when the contact thereof is moved into engagement with the device on the car, an operating-lever for each branch pivoted in the road-bed and adapted to have its free end raised above the road-bed, said lever mechanically connected with the said contact and the switch, whereby the raising of the lever may project the contact into engagement with the device on the car and connect the branch with the main, and a pick-up plow carried by the car for engaging and raising the operating-levers as the car moves by them.

2. In an electric railway, the combination, with a car provided with a contact device, of an insulated main conductor provided with normally-disconnected branch conductors, each having a movable contact for engaging the said contact device on the car and provided with a switch for connecting it with the main, the said switch comprising a rotary shaft through which the branch conductor is passed, a switch-arm provided with a terminal and a second terminal engaged thereby, connections intermediate the said switch-arm and the movable contact, and means connected therewith for operating the same upon the passing of the car, whereby when the said movable contact is projected the switch may be closed, for the purpose set forth.

3. In an electric railway, the combination,

with a casing or box located in the road-bed flush with the surface thereof and provided with a perforation for the movable contact, of a movable contact mounted within said box or casing and adapted to be projected through the opening thereof, so as to extend above the surface of the road, the said contact comprising a tube mounted upon a swinging arm, a sliding contact mounted within the tube and a spring for holding the contact normally projected from the tube, and a flexible conductor extending into the tube and connected to the sliding contact, for the purpose set forth.

4. In an electric railway, the combination, with a car provided with a contact device, of an insulated main conductor provided with movable contacts normally out of the path of the said contact device, and a pick-up device or plow mounted upon the car for controlling the said movable contacts as the car travels along, the said pick-up or plow provided with a wheel traveling upon a track extending along the railway, for the purpose set forth.

5. In an electric railway, the combination, with a car provided with a contact device, of an insulated main conductor provided with movable contacts for engaging the said device on the car and each provided with a pivoted operating-lever located in the road-bed, a pick-up device or plow for operating successively the said levers and provided with a wheel running on a track extending along the railway, and a bar for moving under the said levers after the same have passed from the pick-up or plow, said bar acting to hold the levers elevated during the passage of the car, substantially as and for the purpose set forth.

6. In an electric railway, the combination, with a car, of a pick-up device or plow, provided with a wheel 48 for guiding it along the railway, and a beam 44, acting in conjunction with the plow, substantially as and for the purpose set forth.

7. In an electric railway, the combination, with a car provided with a contact-rod 13, of an insulated branch conductor provided with movable contacts adapted to engage successively the contact-rod 13, and a pick-up plow 43, provided with a wheel 48 for bringing the said movable contacts in engagement with the rod 13 as the car moves along, substantially as and for the purpose set forth.

8. In an electric railway, the combination, with a car provided with a contact device, of an insulated main conductor provided with movable contacts adapted to be moved successively into engagement with the said contact device as the car moves along, each of the said movable contacts provided with a box placed in the road-bed and having an opening through which the contact may be projected, an operating-lever 35, formed with an end 39 and pivoted in an opening 37 in the box and connected with and controlling the movements of the said contact, and a pick-up device on the car for engaging and lifting the

lever 35, substantially as and for the purpose set forth.

9. In an electric railway, the combination, with a box 34, placed in the road-bed, and a movable contact housed thereby, the upper surface of the box formed with an opening 37, having an incline 41 at each side thereof, and a channel 42 for the pick-up plow to pass through, of a lever 35, pivoted in the opening 37 and connected with the movable contact for operating the same, substantially as and for the purpose set forth.

10. In an electric railway, the combination, with a box 34, provided with openings 21 and 37 and placed in the road-bed, of a movable contact and a branch conductor 19 connected thereto, said contact adapted to be projected through the said opening 21, and an operating-lever 35, pivoted in the said opening 37 in the top of the box and adapted to be raised by mechanism on a moving car and connected with and operating the said movable contact, substantially as and for the purpose set forth.

11. In an electric railway, the combination, with a box 34, placed in the road-bed and containing a branch conductor having a movable contact end adapted to be projected from the box, of an operating-lever 35, pivoted in an opening in the box, a swinging arm 32, carrying the said movable contact and connected with and operated by the said lever 35, a switch located in the branch conductor, and connections intermediate the switch and the arm 32, substantially as and for the purpose set forth.

12. In an electric railway, the combination, with a box 34, placed in the road-bed, a branch conductor 19, located therein and provided with a movable contact end adapted to be projected from the box, and a switch located in the branch conductor for connecting it in circuit with the main when the contact thereof is projected from the box, of a swinging arm 32, carrying the said contact end of the branch conductor, a shaft 56, connected with and controlled by the said arm 32 for operating the said switch, and an operating-lever 35, pivoted in an opening in the box and connected with the said arm 32 for operating the same, substantially as and for the purpose set forth.

13. In an electric railway, the combination, with a box 34, containing a branch conductor 19, provided with a movable contact end adapted to be projected from the box, of a switch in the branch conductor, comprising a terminal 50 and a swinging contact-bar 52, provided with an operating-shaft 56, and connections intermediate the said switch-shaft 56 and the movable contact end of the conductor, whereby the projection of the contact end may serve to close the switch, substantially as and for the purpose set forth.

14. A movable contact comprising a tubular holder 27, a contact-rod 22, surrounded

with insulating material 23, having a sleeve 24 incasing the same, a contact-plate 25, mounted upon the end of the rod 22, and a spring 28 for holding the rod 22 and its connected parts projected from the holder, substantially as and for the purpose set forth.

15. The combination, with a box 34 and the branch conductor 19 located therein, of a box 53, disposed adjacent the box 34 and containing a switch for the branch conductor, and a switch-shaft 56, extending from the interior of the box 34 to the interior of the box 53 and having the branch conductor 19 passing through the shaft, substantially as and for the purpose set forth.

16. In an electric railway, the combination, with a casing and a movable branch conductor housed therein and provided with a pivoted contact adapted to be projected from the casing, of a swinging arm carrying said contact, and a pivoted operating-lever connected with said arm and adapted to be actuated by a passing car for projecting the said contact.

17. In an electric railway, the combination, with a casing provided with an opening for the contact device to be projected through, of a branch conductor located within the casing and provided with a pivoted vertically-movable contact device, a swinging arm carrying said contact device, and an operating-lever pivoted in the casing and connected with and operating said swinging arm and adapted to be operated by a passing car to project the said contact device.

18. In an electric railway, the combination, with a casing formed with an opening for the contact device to move through, of a normally-disconnected branch conductor having a switch therein and provided with a contact device adapted to be projected through said opening, a swinging arm carrying said contact device and controlling the said switch, an operating-lever pivoted in the casing and independent of the said contact device, and a car provided with a pick-up plow for engaging and raising said operating-lever.

19. In an electric railway, the combination, with a movable branch conductor 19, having a free contact end and a casing housing said conductor and provided with an opening through which the free contact end of the conductor may be projected, and means controlled by a passing car for moving said free contact end, of a shaft 56, provided with a contact-bar 52, carrying a terminal plate 51, a terminal 50, located in the said branch conductor, and a spring 54 for holding the contact-bar normally away from the said terminal 50, substantially as and for the purpose set forth.

20. In an electric railway, the combination, with a movable branch conductor, of a swinging arm 32, a tubular holder 27, mounted on said arm, and a sliding contact 17, moving in said holder, a spring 28, seated in the holder

for keeping the contact projected therefrom,
an operating-lever pivoted in the roadway
and connected with the swinging arm 32 for
moving the same, and a car provided with a
5 plow for actuating said operating-lever, sub-
stantially as and for the purpose set forth.

In testimony whereof I have hereunto set

my hand this 10th day of November, 1890, in
the presence of the two subscribing witnesses.

FRANK MANSFIELD.

Witnesses:

W. C. JORDAN,
CHAS. O'REILLY.