(No Model.) 2 Sheets—Sheet 1.

C. J. VAN DEPOELE.

SUSPENDED SWITCH AND TRAVELING CONTACT FOR ELECTRIC RAILWAYS.

No. 424,695. Patented Apr. 1, 1890.

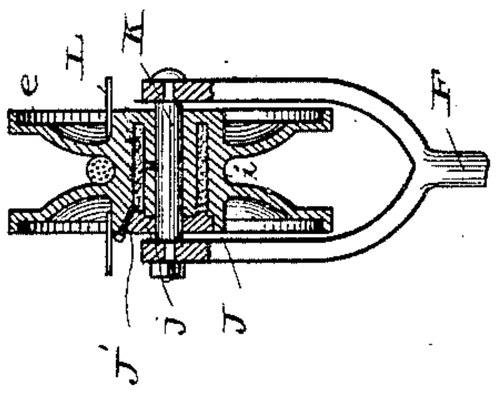

Fig. 3.

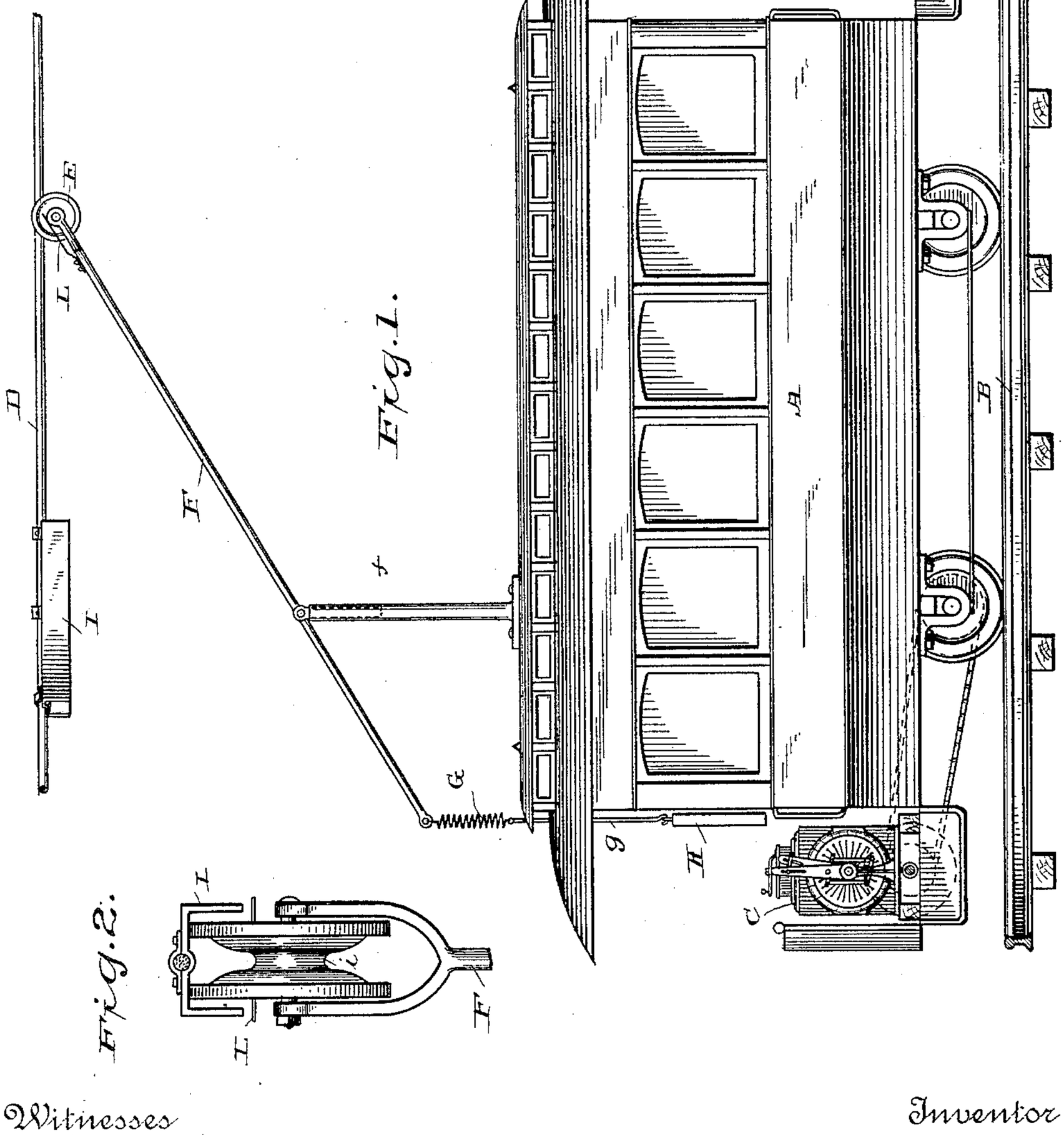

Fig. 1.

Fig. 2.

Witnesses
H. A. Lamb
C. L. Sturtevant.

Inventor
Charles J. VanDepoele
By Frankland & Jarman,
Attorney

(No Model.) 2 Sheets—Sheet 2.

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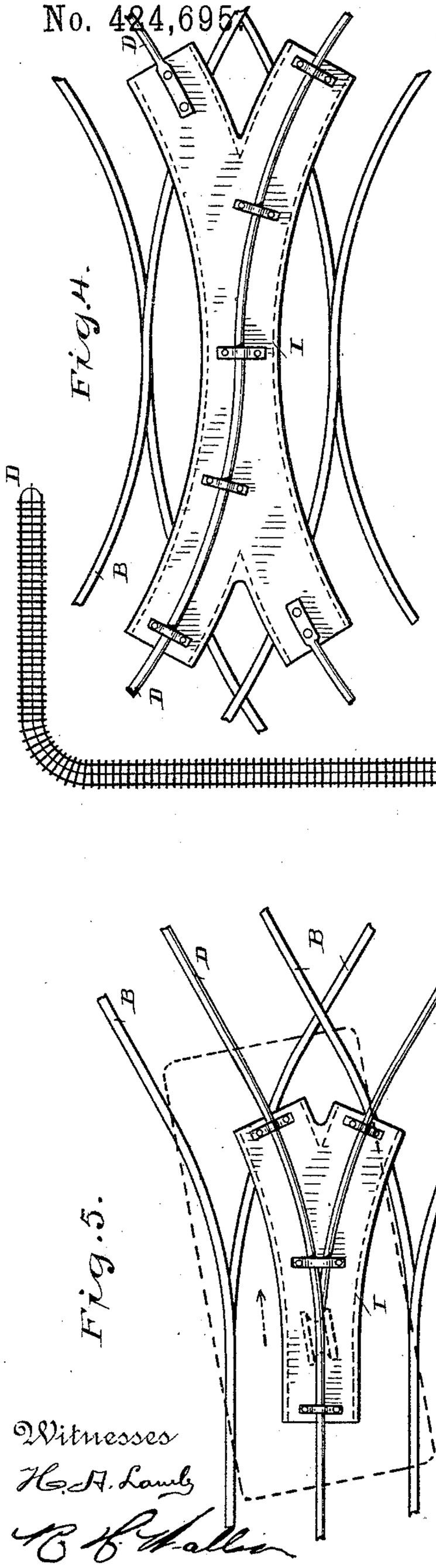

Fig. 4.

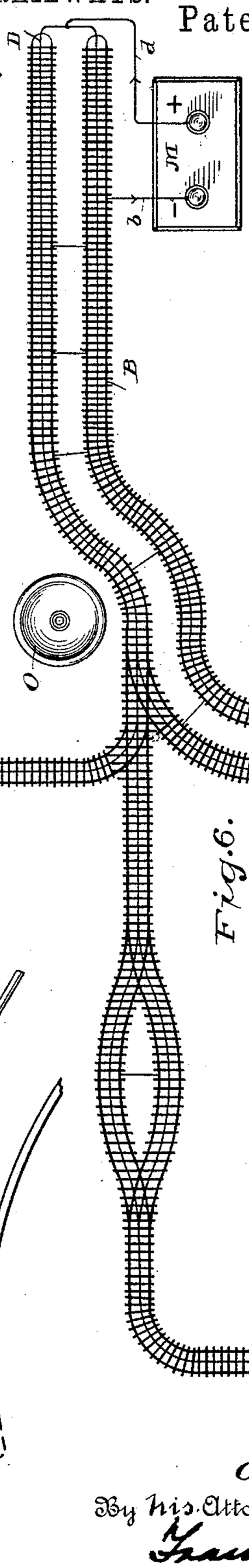

Fig. 5.

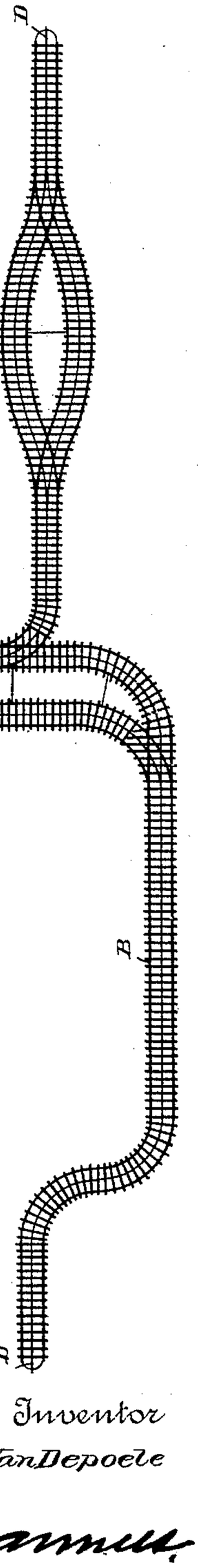

Fig. 6.

Witnesses
H. A. Lamb
C. F. Wallace

Inventor
Charles J. VanDepoele
By his Attorney
Frankland Jarnell

UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

SUSPENDED SWITCH AND TRAVELING CONTACT FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 424,695, dated April 1, 1890.

Original application filed March 12, 1887, Serial No. 230,649. Divided and this application filed October 22, 1888. Serial No. 288,759. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. VAN DEPOELE, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Suspended Switches and Traveling Contacts for Electric Railways, of which the following is a description.

This application is a division of Serial No. 230,649, filed March 12, 1887.

My present invention relates to electric railways of the class in which a suspended conductor is used to convey the working-current, a traveling contact carried by the car being employed for taking off the current for use in operating the motor by which the car is propelled. The return-circuit is preferably completed through the rails of the track.

My invention consists in certain devices and their relative arrangement by means of which a contact device carried by a rod or pole extending from the car and pressed upwardly into contact with the conductor is switched from one line to another correspondingly with the vehicle.

To illustrate my invention I have shown it applied to a contact device of this description, which forms the subject-matter of my application, Serial No. 230,649, of March 12, 1887, and while I do not intend to claim, generally, in this application a contact device of this construction, I have made claims herein to certain details thereof which are of especial value in connection with my improved switching devices, but which are not essential features of the contact device itself, considered without reference to the switch.

I also make claims in this application to a switch-plate particularly designed for the arrangement which forms the principal subject-matter of this application.

More particularly my invention consists in a track-switch for the vehicle, a conductor-switch for the contact device or "trolley," as it is termed, and the trolley itself attached to the vehicle, these elements being so arranged relatively to one another that in operation the vehicle reaches the track-switch and is diverted laterally before the trolley reaches the conductor-switch, whereby the trolley, which partakes of the lateral movement of the vehicle, has imparted to it a laterally-moving tendency before its switch is reached, and it therefore passes through the switch in the proper direction, corresponding to the movement of the vehicle.

My invention also consists in various details of construction and arrangement, which will be hereinafter pointed out.

In the accompanying drawings, Figure 1 is a side elevation of a car provided with my improved contact devices and otherwise embodying my invention. Fig. 2 is an enlarged detail showing the contact-wheel in position in the switch-box. Fig. 3 is a sectional detail showing the construction of the contact-wheel. Fig. 4 is a top plan view of a portion of track, showing the conductor, the switch-box, and the rails. Fig. 5 is also a plan view, and is similar to the preceding with the addition of a car shown in dotted lines. Fig. 6 is a diagrammatic representation of an electric-railway system.

Similar letters denote like parts throughout.

The car A is supported upon the track B and provided with a motor C, which is connected with the wheels thereof in any of the methods already described by me.

D is the suspended working-conductor.

E is the traveling contact-wheel, and F is a hinged arm supported upon a post *f*, secured to or extending upward from the roof of the car.

To the lower end of the arm F is attached a spring G, to the lower extremity of which is secured a cord which passes downward through suitable grooves or over suitable rollers, and is provided with a weight H, which serves to hold the spring down and keep the contact-wheel E always pressed up against the under side of the conductor D. At the same time the spring will instantly yield to allow the wheel to pass under the switch or any obstruction, and while the arm F is movable laterally with respect to the vehicle the spring and weight will constantly tend to restore the arm to its normal central position and assist in causing the contact-arm to par-

take of the lateral movement of the vehicle. Being held in position by the weight, the wheel has a much greater range of action, and moreover, the motor-man can at any time lower the contact-wheel by raising the same, rendering the arrangement very convenient for many purposes.

In order that the contact-wheel E shall be compelled to pass from one conductor to a branch or one attached thereto leading in a different direction, I provide the inverted open-bottom metallic boxes I, which are formed with branching compartments and constructed in the form of switches, conforming to the curves and angles of the track-switches by which the direction of the car is controlled. These boxes are in the form of open smooth curved passages and are free from obstructions within, so that the contact-wheel E, which is slightly depressed on meeting the end of the switch-box, may roll freely therethrough and move laterally therein in the desired direction without hinderance.

Fig. 2 shows how the tips of the wheel-flange are received on the under surface of the switch-plate, and how that the depending edges or ribs on the side of the plate are separated a distance greater than the thickness of the contact-wheel, so that the latter is movable freely therein.

The conductors D follow the line of the track or tracks and are preferably located centrally above them and at points where the tracks diverge or join the main line switch-boxes I are placed, the conductors D coming to the said boxes and being firmly attached to the top or bottom thereof, so that were there no other support provided the said conductors would sustain the box in its proper position, which is directly over the ground or track switch.

The switch-box I may take almost any shape and may be made of thin sheet metal or of cast metal, as is most convenient; but I prefer the castings.

The contact-wheel E itself is a large deeply-grooved pulley formed with thickened or flanged edges *e* and a deep central groove *i*. The hub of this wheel is further provided with an annular recess or groove J, in which is packed cotton wicking or other absorbent material, the groove being closed by a front plate *j*, which is provided with an oil-hole J′ and suitable screw for closing the same. There is also an oil-hole extending from the groove J to the axis of the wheel, so that one filling will serve to lubricate the wheel for many hours.

The arm F is of a length that will place the contact-wheel E about over the rear pair of wheels of the car, and the position of the post *f* and the length of the arm F itself will therefore vary with the length of the body of the car, the particular proportions shown being only by way of illustration. The arm F is hinged and should in most instances be also pivoted to the top of its post *f*, although a reasonable amount of looseness in the hinged joint will answer the purpose of the pivot an prevent binding or straining at that point du to the swaying of the vehicle or deflection c the conductor. The outer end of the arm is forked and provided with an axle-bolt E passing through the hub of the contact-whee E. A fender-spring L is also attached to th arm F, and passes on each side of the whee E as far as its hub, and, in case of detachmen of the wheel from the wire D, prevents its ge ting caught between the hub of the wheel an the forks of the arm F, rendering it an eas matter for the motor-man, by raising th weight H, to lower the contact-wheel and re place it again in operative position. It als prevents any transverse wire being caught i the angle between the arm and the wheel.

In the diagram, Fig. 6, M is the generating station furnishing the electric current for op erating the motors on the cars, which curren passes to the suspended conductors D by wa of conductor *d*, returning to the station b way of the track B and conductor *b*. The pos sibilities of operation with my improved switc are shown in this diagram, which represent an actual installation in the city of Montgom ery, Alabama, the principal curves and sev eral additional switches being necessitate by reason of a large public fountain O. Th electric switches I are to be placed directl over—that is to say, above—their counter parts. The track-switches and the contact wheel, as before stated, are to be located s that as the front portion of the car swings i the desired direction as the front wheels pas the track-switch the contact-arm will be de flected and the direction of the wheel E cor respondingly changed while still on th straight wire, so that on reaching the switch box the wheel will be depressed and pas thereinto and naturally pass through and ou of the proper compartment thereof. Th switch-boxes I, being connected directly t the conductors D, are similarly charged, an when the wheel E is passing therethroug the current passes through the box I an thence into the contact-wheel through it flanges *e*, passing thence through the arm F or a separate conductor to the motor C. Sinc there are no moving tongues or springs o points to catch or impede the progress of th wheel when three or four grooves, as the cas may be, exist in one switch-box, the whee will intersect the grooves and pass along i the desired direction and go through withou any difficulty whatever, its direction being previously indicated by the movement of th front portion of the car. Thus it will be seen that by locating my traveling contact-whee in the position shown or one equivalent there to I obviate all the difficulties of switching from conductor to conductor and with th smallest possible amount of special construc tion.

I believe myself to be the first to devise thi arrangement of contact device and switches whereby the lateral movement of the vehicl

is first imparted to the trailing contact-arm and the contact-wheel is then flexibly, yet without interruption of contact, drawn into the switch and guided thereby into engagement with the desired branch conductor, and I intend herein to claim, broadly, any relative arrangement of track-switch, conductor-switch, vehicle, and contact device by means of which the former switch will act in advance of the latter and the vehicle impart a lateral tendency to the trailing contact by the time it engages with the conductor-switch.

The contact-carrying arm described in the present application possesses substantial practical advantages over any other means yet proposed for establishing moving contact between a vehicle and a stationary supply-conductor, in that by the use of a hinged flexibly-mounted arm much greater freedom of movement is compatible with the maintenance of a positive mechanical connection and electrical contact between the vehicle and supply-conductors.

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

1. The combination, with crossing or branching overhead wires, of a plate along the top of which said wires pass, and deflecting-ribs at the lower side of said plate at its extremities.

2. The combination, with an overhead conductor arranged to receive a traveling underneath contact, of a switching device secured to and depending from the conductor.

3. The combination, with an overhead wire for receiving an underneath contact, of a switch-plate attached to the wire in about the same horizontal plane as the wire.

4. The combination of a track having switches, an overhead conductor above the track and having switches, and a car on the track provided with a contact-carrying arm arranged to engage the conductor at a point in rear of the front wheels of the car.

5. In an electric railway, the combination of a track having suitable switches, an electric conductor suspended above said track and having switches located above the track-switches, and a car on said track provided with an upwardly-extending arm carrying a contact-wheel arranged to engage the suspended conductor at a point in rear of the front wheels of the car, substantially as described.

6. In an electric railway, the combination of an electrically-propelled car, a supply-conductor suspended over the line of travel of the car, a swinging arm mounted upon the car and carrying a contact device at its free end, said contact arranged to bear against said conductor, suitable switching devices upon the track traversed by the wheels of the car, and corresponding switches on the suspended conductor located above those on the track and arranged to engage the contact devices, substantially as described.

7. In an electric railway, the combination of a track having suitable switches, an electric conductor suspended above said track and having switches located above the track-switches, a car on said track provided with a swinging arm carrying a contact-wheel arranged to engage the suspended conductor, and switches at a point in rear of the front wheels of the car, whereby the contact-wheel is directed through the proper part of the suspended switch, substantially as described.

8. In an electric railway, the combination of a switch or turn-out on the track and a corresponding one on the overhead line, the same being so arranged relatively that the car will reach the switch or turn-out before the trolley does, substantially as described.

9. In an electric railway, a switching device for suspended conductors, comprising two or more branching compartments or ways corresponding to the direction of the track, and of the main and branch conductors, and secured to the said suspended conductors, substantially as described.

10. In an electric railway, a switching device for suspended conductors, consisting of an open-bottom box formed with two or more branching compartments corresponding to the direction of the track and arranged to be secured to the conductor, substantially as described.

11. The combination, with an overhead line-wire, of a grooved contact device pressed against the wire and receiving the wire between the flanges of the groove, and a guiding switch-plate connected to the wire against which the said flanges bear in passing from one line to another.

12. In an electric railway having an electric conductor suspended above the track, a switching device supported by the conductor and formed with downwardly-open compartments or ways corresponding with the direction of the track, said ways being substantially flat at their upper sides to form paths for the flanges of the contact-trolleys, substantially as described.

13. In an electric railway, a switch for suspended conductors, consisting of a box formed with branching compartments corresponding with the branches of the conductor, and of the track-switches and secured to the said suspended conductors, substantially as described.

14. In an electric railway, a switch for suspended conductors, consisting of a box formed with branching compartments corresponding with the branches of the conductor, and of the track-switches, and secured to and depending from the said suspended conductor, substantially as described.

15. In an electric railway, the combination of a car, a conductor suspended above the line of travel of the car, a contact-carrying arm pivotally supported on top of the car and provided at its outer end with a contact-roller engaging the under side of the suspended conductor, and a weighted spring at

or near the inner end of the arm for maintaining said upward contact, substantially as described.

16. In an electric railway, the combination of a car provided with a pivoted arm, as F, having a contact at its outer extremity, a tension-spring, as G, attached at its inner extremity, and a vertically-moving weight connected to said spring for holding the same in operative relation to the arm throughout its entire range of movement, substantially as described.

17. In an electric railway, the combination of the car having suitably-pivoted arm F, carrying a contact-wheel at its outer extremity, a spring G, secured to its lower extremity, and a connection extending from said spring and provided with a weight at its lower end, substantially as described.

18. In an electric railway, the combination, with suitable contact-carrying arm, of the grooved contact-wheel, and the fender-spring L, substantially as described.

19. In an electric railway, the combination, with branching overhead conductors, of an upwardly-pressed contact-arm carrying a grooved wheel embracing the conductor, and a switch-plate at the branching point adapted to receive the tips of the wheel-flanges, and provided with depending ribs, between which the wheel is free to move laterally to engage with one of the branch conductors.

20. In an electric railway, the combination, with an overhead switch-plate having depending ribs, but open at its extremities, of main and branch conductors extending from its two extremities, respectively, a vehicle, an upwardly-pressed contact-arm attached to the vehicle and tending to move laterally therewith, and a track-switch for the vehicle located so as to operate in advance of the conductor-switch.

21. In an electric railway, the combination, with main and branch overhead conductors, of a vehicle, an intermediate contact-arm thereon movable laterally with respect thereto, a spring tending to return the arm to its normal central position, a guiding-switch at the branching point of the conductor, and a track-switch for the vehicle located so as to operate in advance of the conductor-switch, whereby the lateral tendency of the contact device at the branching point is imparted to it by the vehicle, while its outer extremity is flexibly guided by the overhead switch from main to branch conductor.

22. In an electric railway, the combination, with main and branch conductors, of a vehicle, a contact-arm thereon having vertical and lateral spring-pressure, a switch-plate for the conductors, and a track-switch for the vehicle located so as to operate in advance of the conductor-switch, whereby the lateral tendency of the contact device at the branching point is imparted to it by the vehicle, while its outer extremity is flexibly guided by the overhead switch from main to branch conductor.

23. The combination, with branching overhead conductors, of a vehicle having a laterally-swinging contact-arm pressed upward to engage the conductors, and a switch-plate at the branching point having depending sides, but open at its extremities, the interior width of the plate between the sides being greater than the thickness of the contact-wheel, whereby the wheel is free to move laterally with relation to the main conductor and engage one of the branching conductors.

24. In an electric railway, the combination, with branching line-conductors, of a track-switch, a vehicle, an intermediate contact-arm swinging laterally with respect to the vehicle, but provided with a spring tending to restore it to its normal central position, and a lateral deflecting-switch at the branching point of the conductors, whereby the extremity of the contact-arm may be flexibly guided from main to branch conductor.

25. In a branching electric railway, the combination of a track-switch, an overhead conductor-switch, and a vehicle having a rearwardly-extending contact-arm, whereby the track-switch will operate in advance of the conductor-switch.

26. In a branching electric railway, the combination, with a vehicle, of a track-switch, an overhead conductor-switch, and a contact-arm extending upward from the vehicle to the conductor, and so located relatively to the length of the vehicle and the two switches that the lateral movement of the vehicle will give a corresponding movement of the contact device on the conductor-switch.

27. In a branching electric railway, the combination, with a vehicle, of a track-switch, a contact device consisting of a trailing spring-pressed arm having a grooved contact-piece embracing the conductor and guided thereby, the said arm being jointed to the car and tending to move laterally therewith, and an overhead conductor-switch adapted to engage the contact-piece and whereby the extremity of the arm is flexibly guided from main to branch conductor.

28. In a contact device, the combination with a contact-wheel, of a supporting-arm therefor having a fender for the wheel to prevent its engagement with overhead wires in case of derailment.

29. The combination, with wheel E, of supporting-arm F, provided with a fender around the wheel to prevent its engagement with overhead wires in case of derailment.

30. The combination, with a contact-wheel for an overhead conductor, of a supporting arm therefor having a fender bridging the angle between the wheel and arm.

31. In an electric railway, the combination with an overhead conductor and a vehicle, of an intermediate contact device consisting of a trailing arm having a grooved contact-wheel

at its outer end and moving laterally relatively to the vehicle, but provided with a spring tending to retain it in its normal central position.

32. In an electric railway, the combination, with an overhead conductor and a vehicle, of a trailing contact-arm guided at its outer end by the overhead conductor, and movable laterally relatively to the vehicle, but having a normal centralizing tendency by means of a spring or weight.

33. In an electric railway, the combination, with an overhead conductor and a vehicle, of an intermediate contact device consisting of an upwardly-pressed trailing arm having a grooved contact-wheel at its outer end by which it is guided by the conductor, the said arm being free to swing laterally relatively to the vehicle, but tending to remain in its normal central position by means of a spring or weight.

34. The combination, with a vehicle and an overhead conductor, of a trailing contact-arm guided normally by the conductor, but having a spring-connection with the vehicle tending constantly to maintain it in a definite position, while at the same time it is free to swing laterally with respect to the vehicle against the pressure of the said spring.

35. In an electric railway, the combination, with an overhead conductor and a vehicle, of an intermediate contact device consisting of a rearwardly-extending arm guided at its outer extremity by engagement with the conductor and movable laterally relatively to the vehicle, but having a spring or weight tending to restore it to its normal central position.

In testimony whereof I hereto affix my signature in presence of two witnesses.

CHARLES J. VAN DEPOELE.

Witnesses:
D. M. BARTON,
J. W. GIBBONEY.