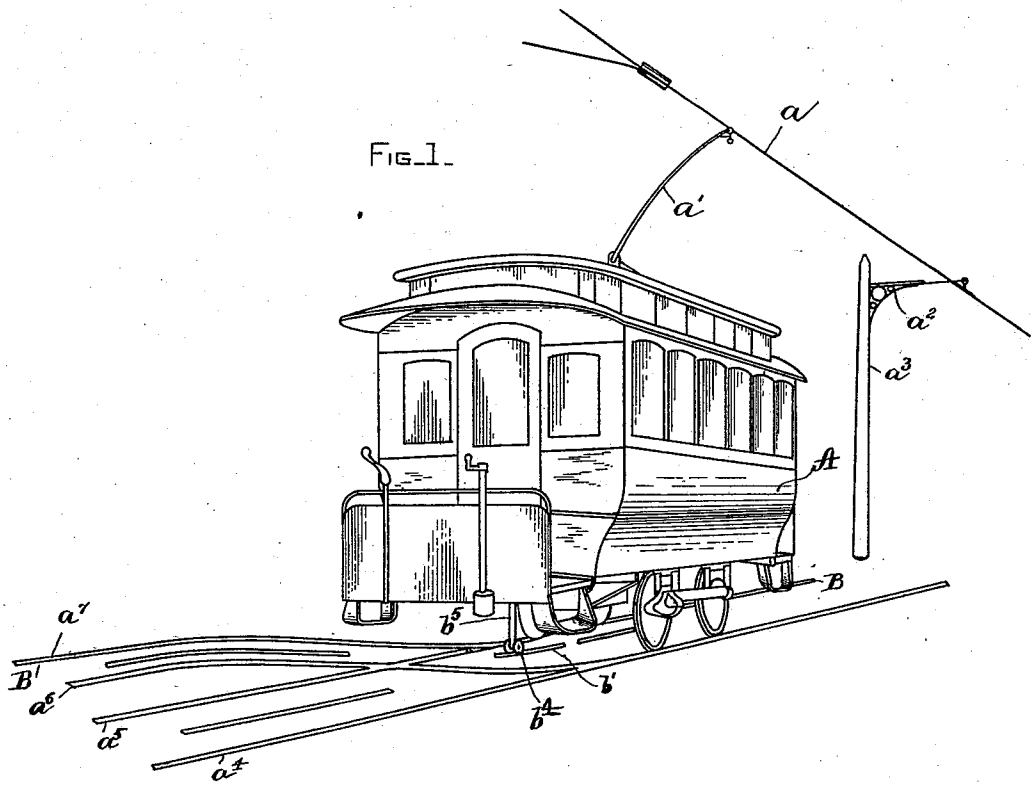
(No Model.) 3 Sheets—Sheet 1.

F. S. PERRIN.

ELECTRIC RAILWAY SWITCH AND TROLLEY.

No. 522,388. Patented July 3, 1894.

FIG. 1.



WITNESSES.

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(No Model.) 3 Sheets—Sheet 2.

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FIG. 2.

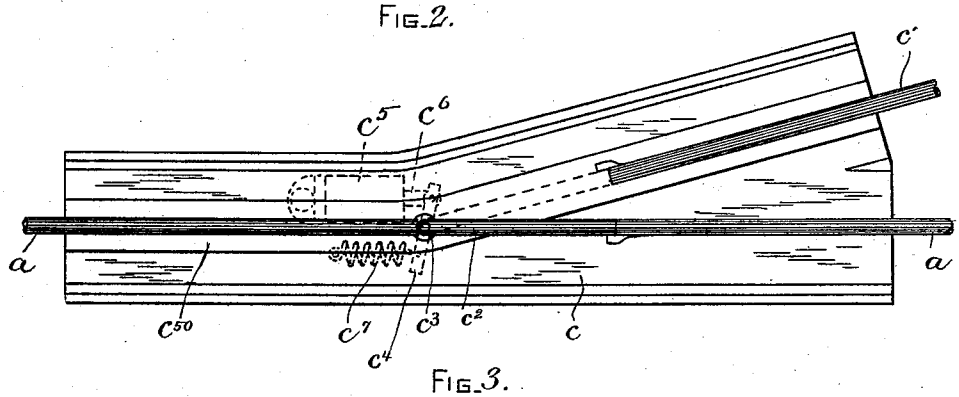
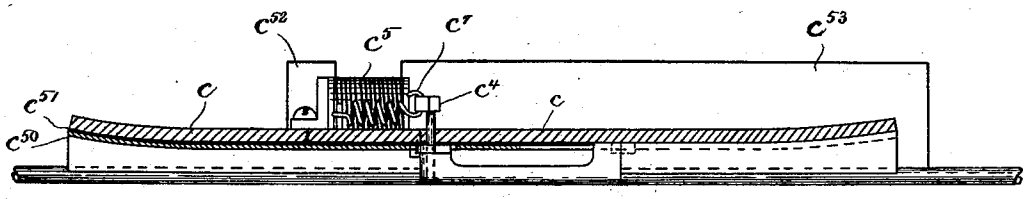


FIG. 3.



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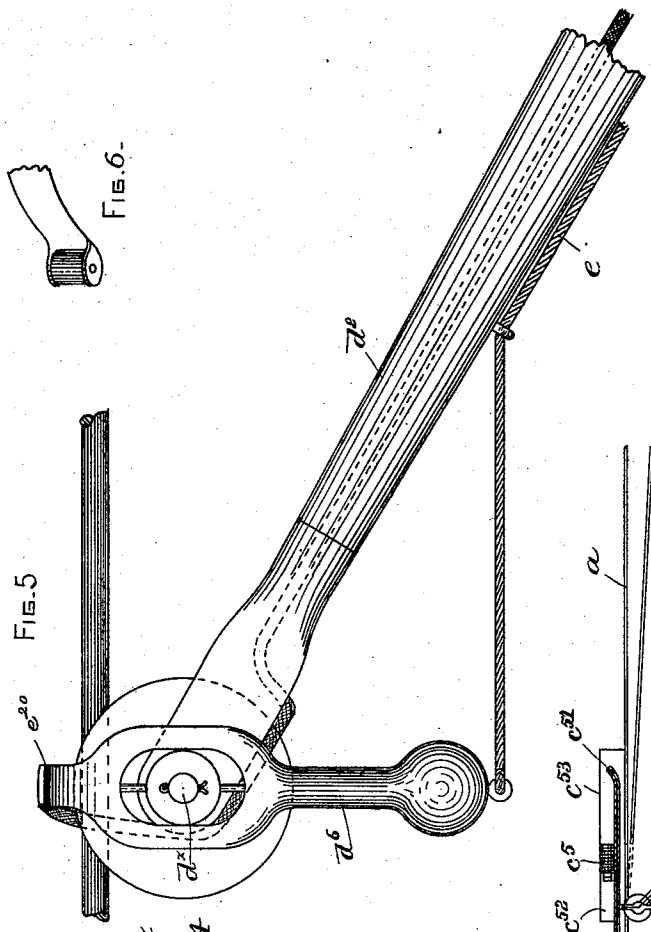

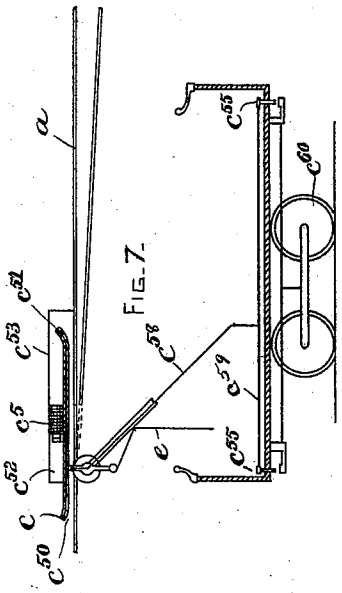

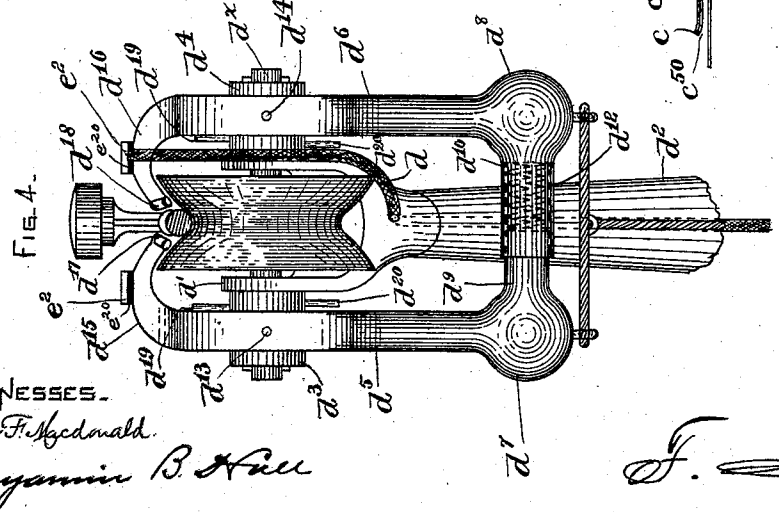

WITNESSES.
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UNITED STATES PATENT OFFICE.

FREDERICK S. PERRIN, OF LYNN, MASSACHUSETTS, ASSIGNOR OF THREE-FOURTHS TO WILLIAM B. BALDWIN, OF NEW YORK, N. Y., GEORGE FINK, OF JERSEY CITY, NEW JERSEY, AND ANTHONY F. BUCHENBERGER, OF BROOKLYN, NEW YORK.

ELECTRIC-RAILWAY SWITCH AND TROLLEY.

SPECIFICATION forming part of Letters Patent No. 522,388, dated July 3, 1894.

Application filed March 12, 1892. Serial No. 424,657. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK S. PERRIN, of Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification.

This invention is an improvement in electric railway systems of any usual or well-known construction, such as now commonly used, and in which the railway car is propelled by a motor supplied with current, derived from a distant point or station by means of an overhead or trolley wire, or from a conductor located in a conduit beneath the surface of the roadbed.

My invention has for its object to provide electric railway systems with switches located in the main conductor and electrically operated, as will be described by means of the current employed to propel the car.

Another feature of my present invention consists in a novel construction of trolley employed in the overhead system of electric railways, the said trolley being constructed, as will be described, to permit the switches forming part of the trolley-wire to be operated from the car; and the said trolley is also preferably constructed so as to prevent it from leaving the trolley-wire.

In accordance with my invention, the main conductor or trolley-wire is provided with one or more switches, by which the trolley-wheel may be diverted from one trolley-wire to another or branch trolley-wire, the said trolley-wire switches being under control of the operator on the car, as will be described. The particular features in which my invention consists will be pointed out in the claims at the end of this specification.

Figure 1, represents a sufficient portion of an overhead electric railway system embodying my invention, to enable it to be understood; Fig. 2, an under side view of a sufficient portion of a main and branch trolley-wire, provided with a switch electrically operated in accordance with my invention; Fig. 3, a longitudinal section of the overhead switch shown in Fig. 2; Fig. 4, a detail in elevation of my improved trolley; Fig. 5, a side elevation of the trolley shown in Fig. 4; Fig. 6, a detail to be referred to, and Fig. 7, a diagram of circuits to be referred to.

Referring to Fig. 1, A represents an electric railway car of any usual or well-known construction, such as now commonly used. The car A, in practice, is provided with an electric motor not herein shown but which may be of any usual or well-known construction, and which is driven by an electric current, taken from a main line trolley-wire a, through the usual trolley-pole a', the trolley-wire a being represented as suspended above the car from the cross-arm a^2 secured to the post a^3, as now commonly practiced in the overhead system of electric railways. The car A is represented as running upon a main line or track B, composed of the rails a^4 a^5, to which is connected a branch line or track B', composed of the rails a^6 a^7. The branch track B' is connected to or disconnected from the main line or track B by a surface switch, which may be of any usual or well-known construction, such as now commonly used on street railways.

My present invention has for one of its objects to provide the trolley wire a, with one or more switches which are electrically operated by the trolley-wire current.

The trolley-wire a, at suitable points in its length, where it is desired the car should be diverted from a straight course, is provided with suitable frogs or switch-plates, substantially such as represented in Figs. 2, and 3, consisting of a main frame c, to which the main trolley-wire a is secured. The main frame c has also secured to it a branch trolley-wire c', and a suitable portion c^2 of the main trolley-wire a is, in accordance with my invention, made movable, it being preferably pivoted on an arm c^3 extended up through the main frame or casting c and provided with a cross-bar c^4 forming the armature of an electro-magnet c^5, the said cross-bar, as represented in Fig. 2, being pivotally connected to the core c^6 of the electro-magnet c^5, and

having secured to its opposite end a spring c^7, by which the movable portion c^2 of the trolley-wire may be maintained in its normal position, to complete the main line trolley-wire a, as represented in Fig. 2. The electro-magnet c^5 may be energized by means of a suitable circuit-terminal consisting, as shown, of a metal strip c^{50} separated from the frame c by insulation c^{51}, and to which terminal the magnet is connected by wire c^{52}, the other end of the said magnet being connected by wire c^{53} to the trolley-wire a, the said magnet being included in a branch or normally open shunt circuit around the motors and the usual rheostats on the car, the said shunt circuit being adapted to be closed by a suitable switch c^{55} shown in Fig. 7, and which may be operated by the foot of the motorman on the car. When the operator wishes to pass from one direction to another, he closes the switch c^{55} in the branch or shunt circuit when the car approaches the overhead switch, so that, when the contact pieces e^2 located on the trolley as will be described, come in contact with the insulated circuit-terminal c^{50}, the shunt circuit through the magnet c^5 will be closed, and its armature attracted, thereby moving the section c^2 of the trolley-wire from its full line position, shown in Fig. 2, into its dotted line position, to open the main trolley-line a and to join the branch trolley-line c' to the main trolley-line. When the insulated contact pieces e^2 on the trolley come in contact with the insulated circuit-terminals carried by the frame c, the current from the trolley-wire is shunted through the magnet c^5 and passes directly to the ground through the switch carried by the car, the circuit being traced as follows in Fig. 7, viz:—from the trolley-wire a, by wire c^{53}, magnet c^5, wire c^{52}, circuit-terminal c^{50}, contacts e^2 on the trolley, insulated wire c^{58} connecting the insulated contacts e^2 to wire c^{59}, switch c^{55} to the rail through the wheels c^{60}. The circuit just described is of less resistance than the circuit through the usual rheostat and motor on the car, and consequently, when the contact e^2 on the trolley-wheel frame comes in contact with the circuit-terminal c^{50}, the motor circuit is completed as described, and the circuit to the ground completed through the magnet c^5. After the car has passed from the main trolley-wire, to the branch trolley-wire the movable portion or switch c^2 is restored to its normal or full line position shown in Fig. 2, by the spring c^7 to again complete the main trolley-line a.

I prefer to employ in connection with my improved system, a trolley-wheel substantially such as shown in Figs. 4 and 5, in which d represents a trolley-wheel of any usual or well-known construction mounted on a shaft $d^\times$ having bearings in the forked arms d' of the usual trolley-pole d^2. In accordance with my invention, the shaft $d^\times$ has loosely mounted on it on opposite sides of the arms d' of the trolley-pole, collars or hubs d^3 d^4 upon which are fitted substantially vertical arms d^5 d^6 provided at their lower portion, as herein represented, with the enlarged portions d^7 d^8 having extended from them substantially at right angles, cylinders d^9 d^{10}, the cylinder d^9 being extended into the cylinder d^{10} and engaging with a spring d^{12} located in the cylinder d^{10}, and which acts to throw the lower portion of the arms d^5 d^6 away from each other. The arms d^5 d^6 are fitted upon the hubs or collars d^3 d^4, so as to revolve thereon as a center, and the said arms are pivotally secured to the said hubs by means of pins or pivots d^{13} d^{14}, by which the said arms may be moved toward and away from each other, as will be described. The arms d^5 d^6 above the hubs or collars d^3 d^4 are provided with curved portions d^{15} d^{16} extended toward each other, and preferably provided at their ends with anti-friction rollers d^{17} d^{18}, which are adapted to bear against the opposite sides of the trolley-wire a, and have their axes inclined so that their upper ends are in advance of their lower ends, when the trolley-wheel is in motion. The hubs d^3 d^4 are provided, as herein-shown, with pins d^{19} d^{20} diametrically opposite each other, the pins d^{19} serving as stops to limit the movement of the curved portions d^{15} d^{16} toward each other, and the pins d^{20} acting as stops to limit the movement of the arms d^5 d^6 toward each other, as will be described. The enlarged portions d^7 d^8 of the arms d^5 d^6 are preferably made solid, to obtain the necessary weight to cause the said arms to hang substantially perpendicular. The pins or stops d^{19} are located on the collars d^3 d^4, so as to prevent the upper portion of the arms from being forced too close together, and the stops or pins d^{20} are so located as to prevent the upper portions from being moved beyond the outer edge of the wheel to prevent the trolley-wire from getting between the wheel and the arms. The anti-friction rollers d^{17} d^{18} are preferably placed upon the upper curved portions d^{15} d^{16} at an angle or on an incline, the angle being such that the upper ends of the rollers are in advance of their lower ends, when the trolley is in motion, so that, when the said rollers are brought in contact with the trolley-wire, they will revolve freely, and thereby reduce the friction, the described inclination of the rollers causing them, when they bear on the trolley-wire, to force the trolley-wire downward and thereby prevent it from leaving the trolley-wheel. The lower ends of the upright arms d^5 d^6 may be brought toward each other by means of the hand-cord e, preferably secured to the enlarged portions d^7 d^8.

The upper curved portions d^{15} d^{16} on the arms d^5 d^6 are provided with the contacts e^2 which may be friction rollers, springs, or other suitable devices to make contact with the insulated circuit-terminals connected to the frame c at the overhead switch, the said

contacts being separated from the arms d^5 d^6 by insulation e^{20} and having connected to them the insulated wire c^{58}, which, as herein represented, is passed down through the trolley-pole and connected to the wire c^{59}, so that when the contacts e^3 are brought into engagement with the insulated circuit-terminals referred to, and the switch c^{55} is closed, the shunt circuit of the magnet c^5 will be closed and the switch operated, as above described.

The construction of the trolley, as herein shown, may, and preferably will be used in connection with the switches, above described, but I do not desire to limit myself in this respect, as a trolley-wheel, such as now commonly constructed, may be employed to operate the said switches.

My improved trolley is especially advantageous, in that it insures a perfect contact at all times between the wheel and the trolley-wire, by reason of the inclined rollers d^{17}, d^{18}, forcing the wire against the wheel, and especially when the trolley-wheel is rounding a curve. So also the trolley-wheel is prevented from leaving the trolley-wire by means of the arms d^5 d^6.

I claim—

1. In an electric railway system, the combination with a trolley-line or wire, and a branch trolley-wire, of a movable switch co-operating with said wires, an electro-magnetic device actuated by the current from the trolley-wire to actuate said trolley-wire switch a fixed circuit terminal connected with said electro-magnetic device, and a contact carried by the trolley arm, substantially as described.

2. In an electric railway system, the combination with a trolley-line or wire provided with a frog or switch, consisting of a main frame and a portion c^2 movably supported on the said frame, of a branch trolley-wire secured to the said main frame, an electro-magnetic device actuated by the current from the trolley-wire to operate the movable portion or switch c^2 a fixed circuit terminal connected with said electro-magnetic device, and a contact carried by the trolley arm, substantially as described.

3. The combination with the trolley wheel, of side-arms whose upper ends are arranged to extend over the trolley-wire and are movable toward and from each other, said arms carrying rollers at their ends.

4. The combination with the trolley-wheel, of side-arms whose upper ends are arranged to extend over the trolley-wire and are movable toward and from each other, and rollers on the ends of said arms, the axes of said rollers being inclined, substantially as described.

5. A trolley comprising in its construction a trolley-wheel, and inclined rollers at the top of said wheel and adapted to extend over the trolley-wire.

6. The herein described trolley, consisting of the trolley-pole, a shaft having bearings in the said pole, a trolley-wheel mounted on said shaft, side arms d^5 d^6 pivotally mounted on the shaft to move in two directions, as described, and having inwardly extended upper portions, means to force the lower ends of the said arms apart, and a flexible connection joining the lower ends of the said arms, substantially as described.

7. The herein described trolley, consisting of the trolley-pole, a shaft having bearings in the said pole, a trolley-wheel mounted on said shaft, side arms d^5 d^6 pivotally mounted on the shaft to move in two directions, as described, and having inwardly extended upper portions, frictional rollers or devices carried by the said inwardly extended portions, means to force the lower ends of the said arms apart, and a flexible connection joining the lower ends of the said arms, substantially as described.

8. The herein described trolley, consisting of the trolley-pole, a shaft having bearings in the said pole, a trolley-wheel mounted on said shaft, collars or hubs on said shaft on opposite sides of the said wheel, arms d^5 d^6 pivotally mounted on said collars, a cylinder d^{10} on one arm, as d^6, a cylinder d^9 on the arm d^5 extended into the cylinder d^{10}, a spring in the cylinder d^{10} acting to force the arms apart, a flexible connection joining said arms, and inwardly extended portions on the upper end of said arms, substantially as described.

9. The herein described trolley, consisting of the trolley-pole, a shaft having bearings in the said pole, a trolley-wheel mounted on said shaft, collars or hubs on said shaft on opposite sides of the said wheel, arms d^5 d^6 pivotally mounted on said collars, a cylinder d^{10} on one arm, as d^6, a cylinder d^9 on the arm d^5 extended into the cylinder d^{10}, a spring in the cylinder d^{10} acting to force the arms apart, a flexible connection joining said arms, inwardly extended portions on the upper end of said arms, and anti-friction devices carried by said arms, substantially as described.

10. In an electric railway system, the combination of a trolley-line or wire having a branch, and an electrically controlled movable switch for said wire and branch, an electrically propelled car, and a circuit-controller carried by the trolley arm and adapted to supply the car propelling current to the electro-magnetic devices controlling said switches, substantially as described.

11. A trolley consisting of a trolley-pole, a shaft having bearings in said pole, a trolley-wheel mounted on said shaft, side arms having inwardly extended upper portions and rollers carried by said arms and arranged to bear on the trolley-wire, the axes of said rollers being inclined substantially as and for the purpose specified, said arms having contact pieces or conductors communicating with a circuit-controlling device carried by the car, substantially as described.

12. A trolley consisting of a trolley-pole, a

shaft having bearings in said pole, a trolley-wheel mounted on said shaft, side arms having inwardly extended upper portions and rollers carried by said arms and arranged to bear on the trolley wire, the axes of said rollers being inclined, substantially as and for the purpose specified.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 27th day of February, A. D. 1892.

FREDERICK S. PERRIN.

Witnesses:
C. F. BROWN,
A. D. HARRISON.