(No Model.)

2 Sheets—Sheet 1.

M. J. WIGHTMAN.

TROLLEY FOR ELECTRIC RAILWAYS.

No. 448,173. Patented Mar. 10, 1891.

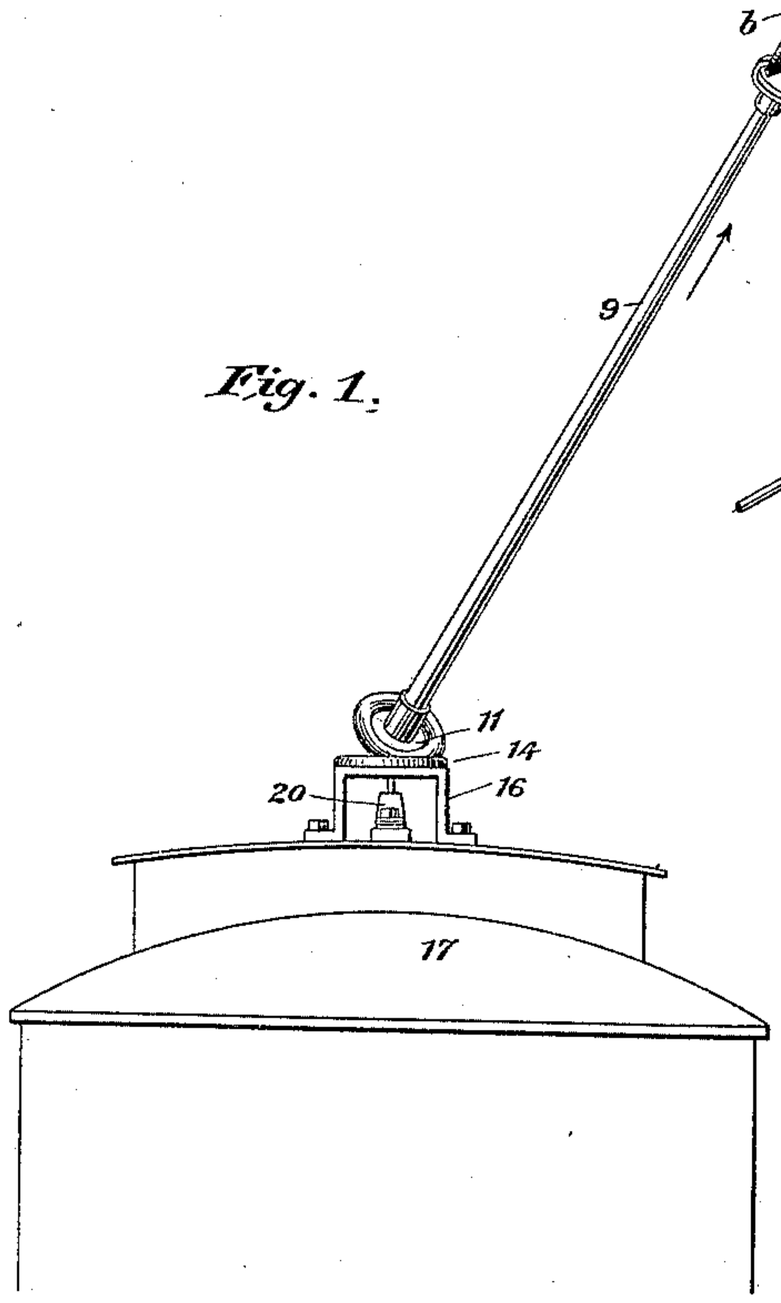


Fig. 1.

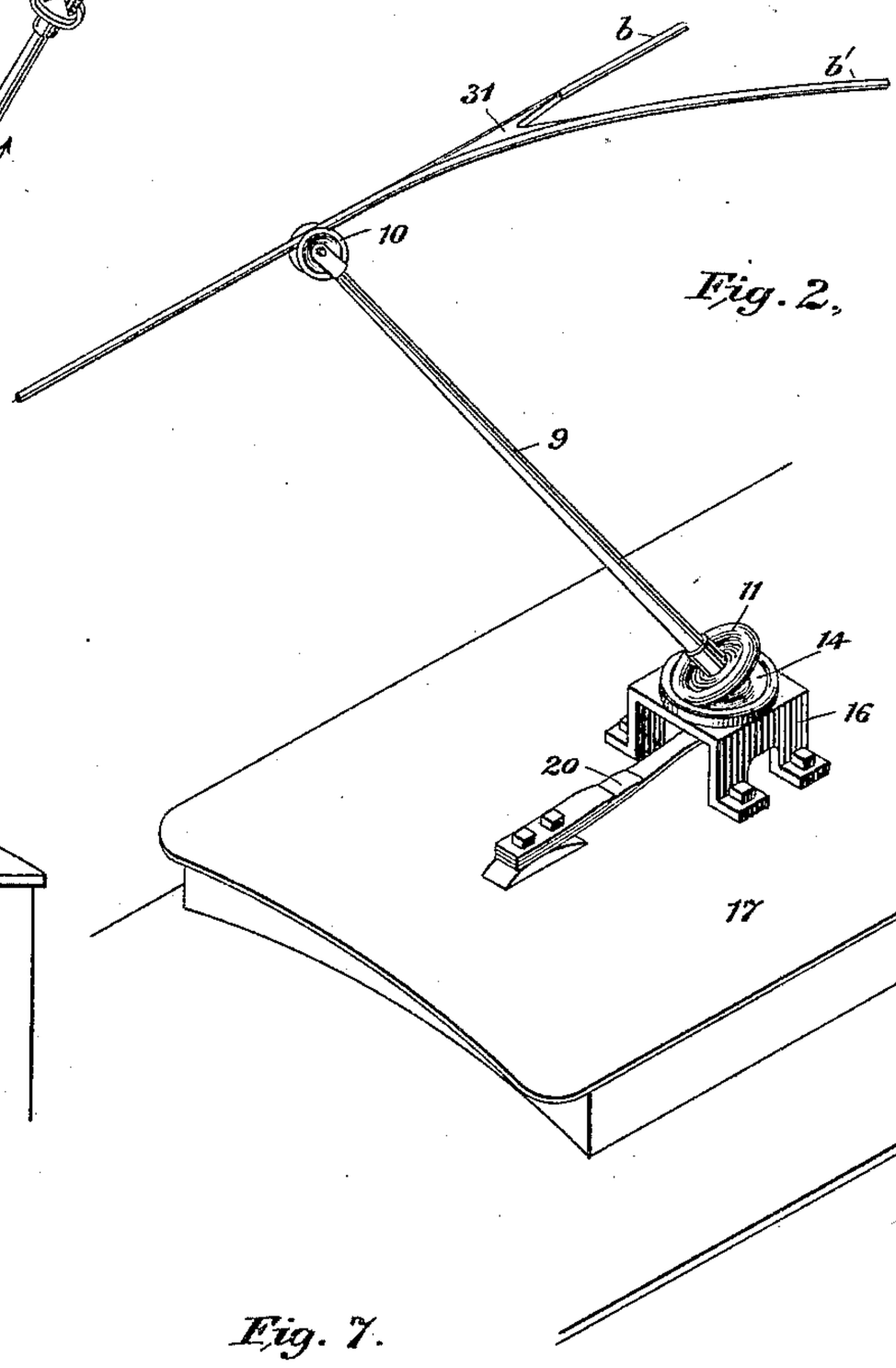


Fig. 2.

Fig. 6.

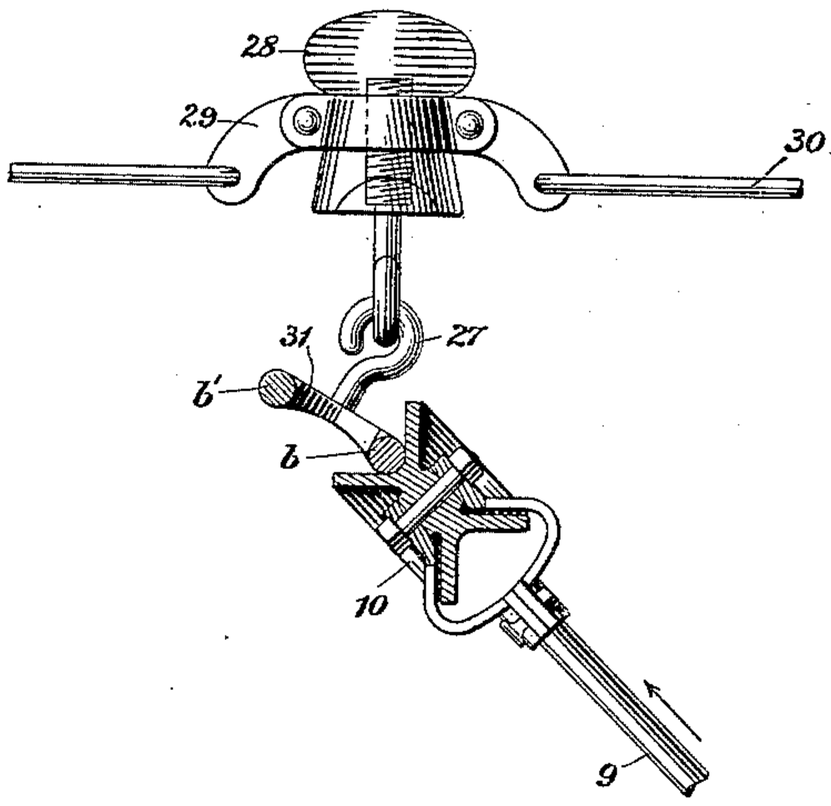
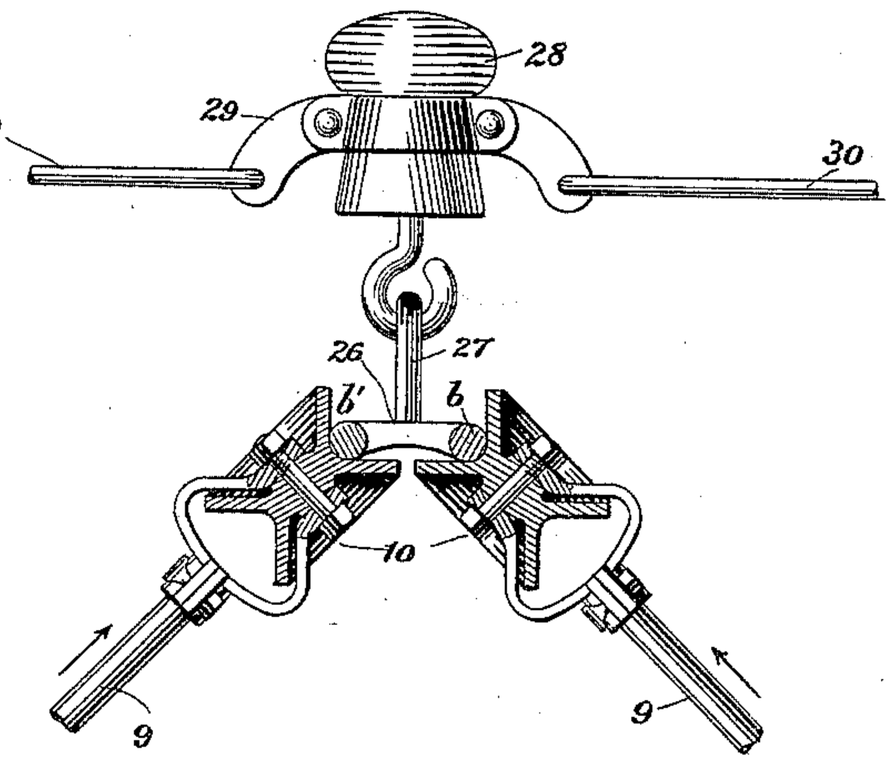


Fig. 7.



Witnesses

Geo. W. Breck.

Henry W. Lloyd.

Inventor

M. J. Wightman

By his Attorneys

Fowler & Fowler

(No Model.) 2 Sheets—Sheet 2.

M. J. WIGHTMAN.

TROLLEY FOR ELECTRIC RAILWAYS.

No. 448,173. Patented Mar. 10, 1891.

Fig. 3.

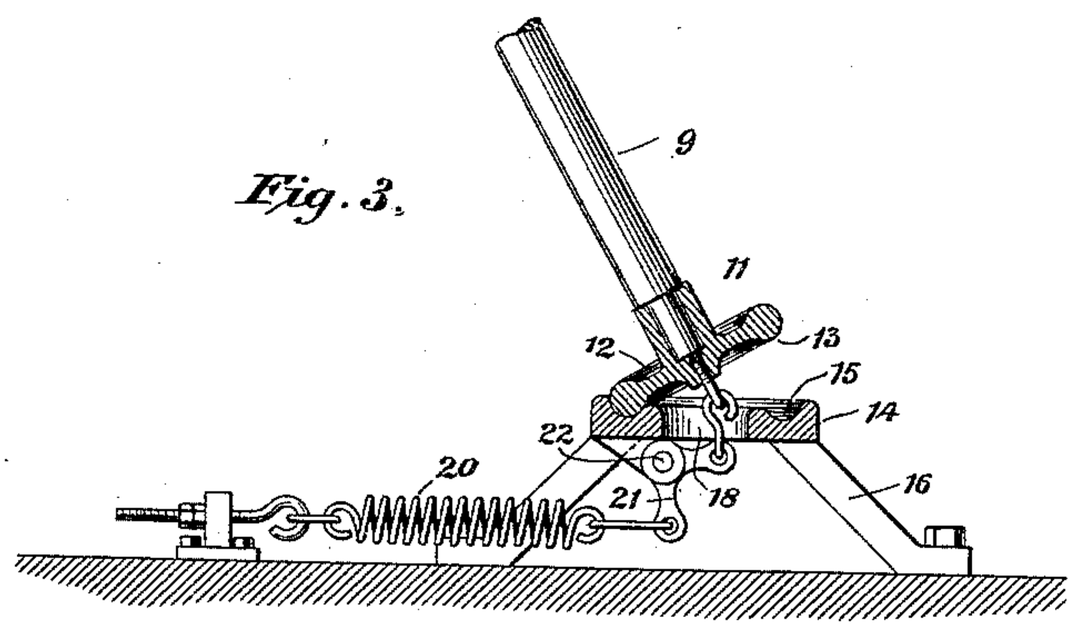


Fig. 4.

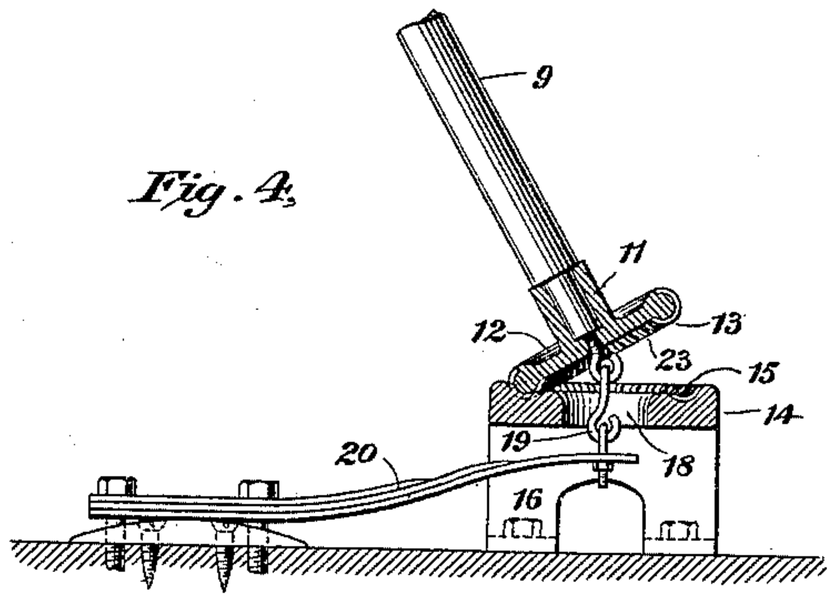
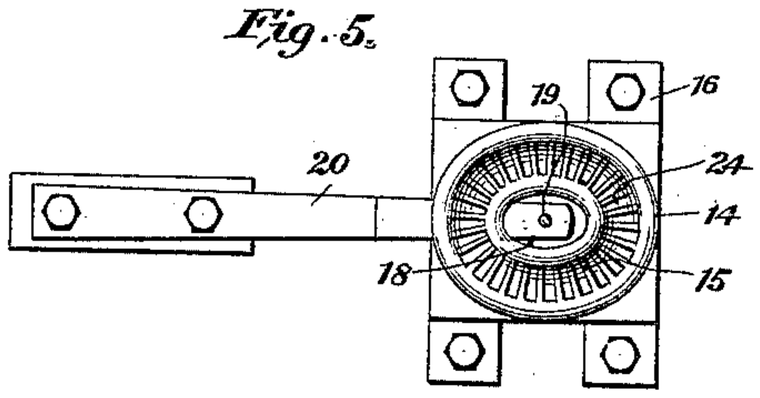


Fig. 5.



Witnesses
Geo W. Breck.
Henry W. Lloyd.

Inventor
M. J. Wightman.
By his Attorneys
Fowler & Fowler.

UNITED STATES PATENT OFFICE.

MERLE J. WIGHTMAN, OF SCRANTON, PENNSYLVANIA, ASSIGNOR TO THE WIGHTMAN ELECTRIC MANUFACTURING COMPANY, OF SAME PLACE.

TROLLEY FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 448,173, dated March 10, 1891.

Application filed August 12, 1890. Serial No. 361,800. (No model.)

To all whom it may concern:

Be it known that I, MERLE J. WIGHTMAN, a citizen of the United States, residing at Scranton, county of Lackawanna, State of Pennsylvania, 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 an electric-railway trolley or current-collecting device and to the suspension of the trolley-wires therefor, the objects of the invention being, principally, to provide a trolley capable of pressing in all directions, so that it may be easily moved over branching-points in the line, and to bring the trolley-wires in a two-wire system very close together, whereby they are rendered more sightly in appearance and whereby the number of suspending devices for the trolley-wires may be greatly reduced.

To these ends my invention consists in the combinations and arrangements of the various parts, all as hereinafter fully described, and then pointed out in the claims.

In the accompanying drawings, illustrating my invention, and wherein like numbers of reference indicate like parts throughout, Figure 1 is an end view of my improved device, shown as mounted upon the top of the car, and Fig. 2 is a perspective view of the same, shown as nearing a branching-point in the trolley-wire. Figs. 3 and 4 are enlarged sectional views of my improved device, the section being taken on a vertical longitudinal plane. Fig. 5 is a plan view of the device shown in Fig. 4 with the trolley-arm and its socket-piece omitted. Figs. 6 and 7 are views taken in the direction of the length of the trolley-wires and of the suspension means for the wires, the trolleys engaging the same being shown in section.

Referring to the drawings, the number 9 designates the trolley-arm, which carries at its upper end the trolley 10. The base of the trolley-arm is provided with a socket-piece 11, which has a curved fulcrum-piece or rim 12 extending therefrom at right angles. This fulcrum-piece 12 is in the present construction made in the form of a disk having a rounded pivoting or fulcrum edge 13, upon which it is adapted to rock on a suitable support 14. The support or bearing-plate 14 is formed upon its upper face with a groove 15, in which is adapted to fit the fulcrum edge or disk of the socket-piece 11. The bearing plate or support 14 is supported upon a suitable bracket 16, secured upon the top of the car 17, and is formed at its center with an opening 18, through which extends a suitable connection 19 to the spring 20, the other end of which is fixed to a suitable point and which may be so arranged that its tension may be regulated, such a regulating device being shown in Fig. 3. The spring 20 is connected to the socket-piece 11 at the center of the bottom thereof, and is so arranged as to always exert a spring-tension upon the same to force it flatly down upon the bearing or support 14. This construction affords a universal joint for the trolley-arm at its point of support, and the arm may be readily inclined in any direction from its vertical position and will always have a spring-pressure exerted upon it, tending to restore it to vertical position. In this way the pressure of the trolley against the trolley-wire will always be in a plane parallel to the wire, and the trolley-wheel will always be carried in a plane parallel to the wire, so that the possibility of derailment is greatly reduced. The trolley-arm may be gyrated about the vertical line and readily inclined in any direction, since the fulcrum disk or edge of this socket-piece is adapted to roll upon the bearing-plate. The point of application of the power exerted by the spring-tension device being at the center of the fulcrum-disk, the fulcrum will be changed in relation to the power-point during the different movements of the trolley-arm. When the trolley-arm is inclined in one direction and then is moved over into an opposite position, the fulcrum-point is changed from one side of the power-point directly to the other. For instance, considering Figs. 2 and 3, if the trolley-arm therein shown be tilted so as to incline in the opposite positions, their fulcrum-points would

be changed from the left-hand side of the power-point to the right.

As the greatest pressure should be in the plane parallel to the trolley-wire and the least in a plane at right angles thereto, I vary the leverage between the arm and the tension device in order to secure this result. In the present construction this is accomplished by making the fulcrum-disk 12 elliptical in outline and shaping the bearing-plate 14 in accordance therewith. By placing the long axis of the disk and plate longitudinally of the car it will be seen that the greatest pressure on the arm will be exerted in a plane parallel to the trolley-wire and the least in a plane normal thereto.

In the forms shown in Figs. 1, 2, 4, and 5 the spring 20 is of a laminated leaf form, and the free end thereof is connected to the socket-piece 11 through means of a link 19, which passes up through the opening in the bearing-plate 14, while in Fig. 3 the spring 20 is spiral in form and is connected to the link 19, which is attached to the socket-piece through the intermediary of a bell-crank 21, which is pivoted at 22 to a fixed point. The trolley-arm is prevented from turning on its axis by means of the teeth 23, formed upon the rounded fulcrum-edge of the disk, and the corresponding teeth 24, formed in the groove of the bearing-plate 14, and with which the former intermesh as the disk is rolled on its edge in the groove.

In a two-wire system the wires may be placed side by side and as near together as will allow the trolleys on each wire to clear each other in passing; as will be understood by referring to Fig. 7, wherein the two trolley-wires *b* and *b'* are placed near together, with a spacing-piece or support 26 fastened between them. A suspending-hook 27, fastened to the spacing-piece 26, is connected loosely to the insulated suspending device 28, provided with a yoke 29, to the ends of which are attached the usual cross-wires 30. As the spring-pressure upon the trolley-arm is in the direction of the adjacent arrows, the trolley-arms can be displaced laterally equally as well as they can be deflected longitudinally, and the trolley-wires can therefore in a double-track system be placed between the two tracks at the minimum distance apart, as shown in the drawings. Since by this arrangement the wires can be arranged only a few inches apart, they can be supported by a common supporting device, so that one insulator will serve for the two wires, which reduces very materially the leakage of the current as well as the expense of the construction. As the trolley-arm presses in all directions and always maintains a parallelism between the trolley-wheel and the wire, the trolley may be readily switched or diverted from one wire to another by arranging the branching-point in the wire to one side of the branching-point in the track, so that the trolley-wheel will be made to run upon the underneath or upon one side or other of the wire, in accordance with the position of the branch in the wire relative to the branch in the track. A branch-point in the trolley-wire is shown in Fig. 2 and also in an enlarged section in Fig. 6. A V-shaped block 31 is secured in the fork of the branch and is fastened to the wires so as to make a firm and even joint. The wire may be supported at the branching-point by providing the block 31 with a hook 27 and attaching the latter to the insulated suspending device 28, as before described. In order not to have the trolley-wire too low or the trolley-wheel too shallow, advantage may be taken of the direction of pressure of the trolley to twist the wires, as shown in Fig. 6, so that the lower flange of the trolley-wheel will have no bearing on its outer edge, as might be the case. If the groove of the trolley-wheel is forty-five degrees and the angle of the trolley-arm is forty-five degrees, then a section of flange at the point of contact would show the lower flange horizontal and the other vertical, as indicated in Figs. 6 and 7.

It is evident that the tension on the trolley could be so adjusted that there would be only longitudinal pressure and that the trolley would not come into a vertical position, but would topple over on one side as soon as the longitudinal pressure had acted to lift the trolley. It is also clear that the lateral pressure on the trolley can be adjusted so that the tendency to topple over sidewise will be overcome and the resulting action of the longitudinal and lateral pressure will bring the trolley into a vertical position. If now, when the trolley is in a vertical position, say, the lateral tension is so adjusted that the trolley will stand in any position in which it is placed laterally, it is evident that there is no lateral pressure, and the longitudinal adjustment being unaltered the tendency of the trolley to recover itself after a displacement longitudinally can only be in one direction—that is, in a plane practically parallel to the wire.

No claim is here made to a trolley-arm having a practically universal joint and provided with a tension device tending to move the arm into vertical position, whereby the direction of pressure between the trolley and the trolley-wire is always in a plane practically parallel to the wire, or to such a trolley-arm constructed so that the leverage between the trolley-arm and tension device varies with the direction of displacement of the trolley-arm from the vertical, or to such a trolley-arm having its joint provided with a plurality of pivotal or fulcrum points, with a spring-tension device connected therewith at a point intermediate the pivotal or fulcrum points, or to a trolley-wire having a branch located to one side of the center line of the track, in combination with a trolley having a trolley-arm provided with a practically universal joint and a spring-tension device tending to force the trolley-arm into vertical position, or to a V-shaped block seated in the fork of a trolley-wire branch for more evenly joining

the wires, or to the suspending device secured to the block seated in the fork of the branch of the wire, for such features form part of another application of mine, Serial No. 361,799, filed August 12, 1890.

Having thus described my improvements in trolley appliances for electric railways, what I claim as my invention, and desire to secure by Letters Patent, is—

1. An electric-railway trolley provided with a trolley-arm having a practically universal joint and provided with a gear to prevent twisting of the trolley-arm.

2. An electric-railway trolley having a trolley-arm provided with a socket-piece and a base or bearing plate upon which it is mounted, so that it may be gyrated, and a spring-tension device attached to the socket-piece for holding it to the base, for the purpose set forth.

3. An electric-railway trolley having a trolley-arm provided with a socket-piece formed with a rim or disk extending at right angles therefrom, a bearing or base plate for supporting said rim or disk, and a spring-tension device for holding the socket-piece to the base, for the purpose set forth.

4. An electric-railway trolley having a trolley-arm provided at its foot with a socket-piece formed with an elliptical-shaped rim or disk extending at right angles thereto, a bearing or base plate conforming to the shape of the rim or disk of the socket-piece for supporting the same, and a spring-tension device for holding the socket-piece to the bearing-plate or base, for the purpose set forth.

5. An electric-railway trolley having a trolley-arm provided with a socket-piece formed with a rim or disk extending at right angles therefrom, a bearing or base plate for the rim or disk to rock on, and a spring-tension device for holding the socket-piece to the base, the said rim or disk and the said bearing or base plate each formed with teeth adapted to mesh with each other to prevent twisting of the trolley-arm.

6. In a support for an electric-railway trolley-arm, the combination, with a horizontally-disposed bearing-plate or base having an opening therein, of a socket-piece for the trolley-arm formed with a rim or disk projecting at right angles therefrom and adapted to rock and roll on the bearing-plate, and a spring-tension device extending through the opening in the bearing or base plate and connected to the socket-piece for holding it thereto, substantially as and for the purpose set forth.

7. In an electric railway, the combination, with two tracks arranged side by side, cars each having a trolley provided with a trolley-arm formed with a practically universal joint at its point of support, and a spring-tension device tending to force the arm into the vertical, so that the direction of pressure between the trolley and the wire may always be in a plane practically parallel to the wire, of suspended trolley-wires for each track arranged close together between the tracks and an insulated supporting-clamp suitably suspended above the wires for supporting both of them, whereby the supporting-clamp may be common to both wires.

8. The combination, with a trolley-arm, of a socket-piece 11, provided with a curved fulcrum edge or disk 12 and a bearing-plate 14, for supporting said edge or disk, and a spring-tension device attached to the socket-piece at the center thereof, tending to hold the socket-piece to the support, substantially as and for the purpose set forth.

9. The combination, with a trolley-arm 9, of a socket-piece 11, provided with a fulcrum disk or edge 12, a bearing-plate or support 14, for supporting the fulcrum-disk, and a spring 25, connected by a link 19 to the center of the base of the socket-piece and tending to hold the same to the bearing-plate 14, substantially as and for the purpose set forth.

10. The combination, with a trolley-arm 9, of a socket-piece 11, provided with a fulcrum disk or edge 12, formed with the teeth 23, a bearing or supporting plate 14, provided with the teeth 24, and a spring-tension device attached to the center of the base of the socket-piece for holding the same to the support, substantially as and for the purpose set forth.

11. The combination, with a trolley-arm 9, of a socket-piece 11, provided with a fulcrum-disk 12, a bearing or supporting plate 14, provided with an opening, a spring 20, a bell-crank lever 21, to one end of which the spring is attached, and a link 19, secured to the bell-crank lever and to the center of the base of the socket-piece, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand, this 5th day of August, 1890, in the presence of the two subscribing witnesses.

MERLE J. WIGHTMAN.

Witnesses:
PIERCE BUTLER,
HORACE E. HAND.