

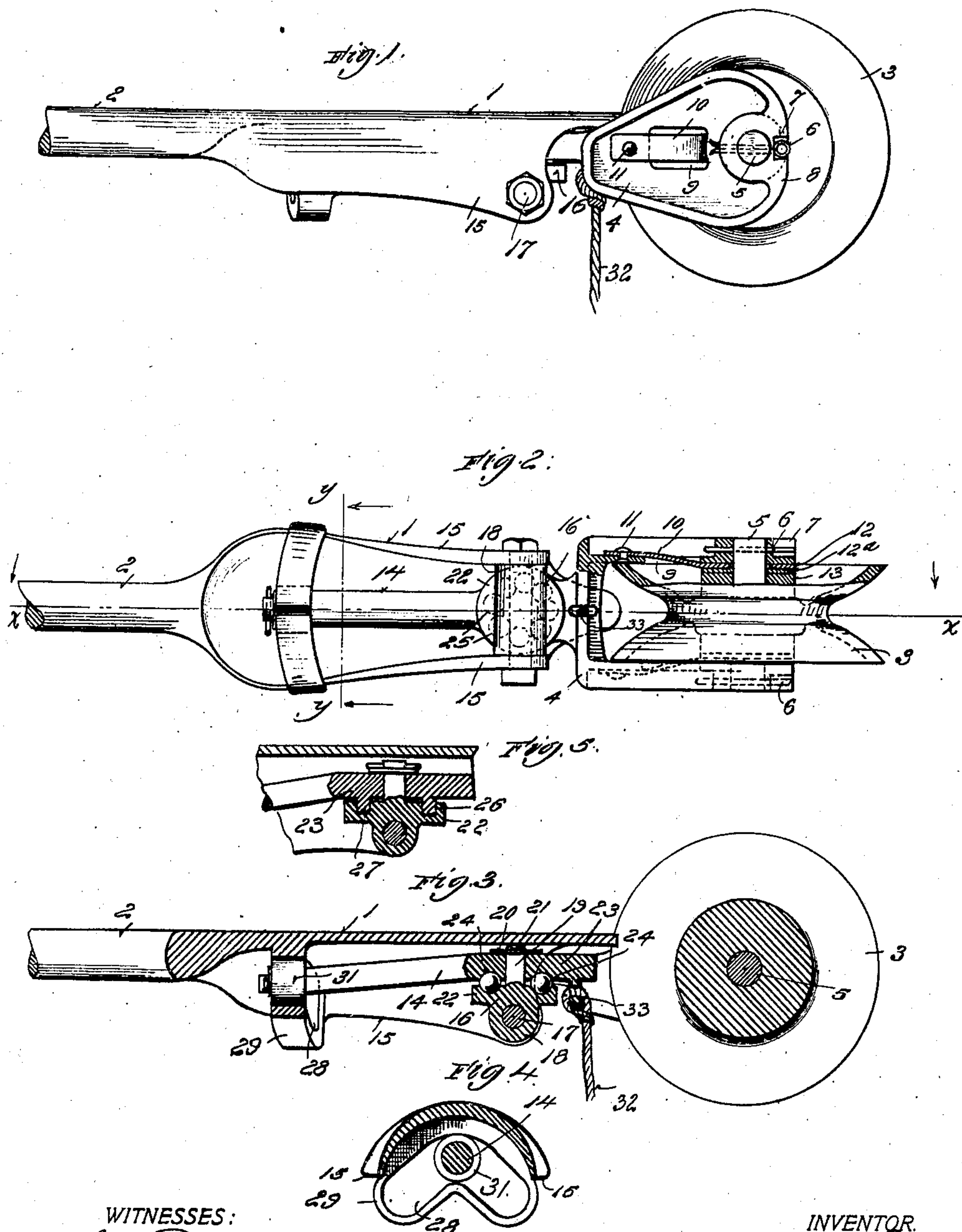
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S. H. LIMBERT.
TROLLEY.

APPLICATION FILED MAY 8, 1902.

NO MODEL.



WITNESSES:

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TROLLEY.

SPECIFICATION forming part of Letters Patent No. 722,862, dated March 17, 1903.

Application filed May 8, 1902. Serial No. 106,442. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL H. LIMBERT, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Trolleys, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to trolleys, and more particularly to that class employed in connection with electric traction-roads, mounted on the end of an upwardly-pressed trolley-pole and bearing on the under side of the wire.

The invention has for its object to provide a connection between the trolley-wheel and trolley-pole of such a character that the wheel will adjust itself to the trolley-wire in rounding curves and in other similar situations, so as to reduce the lateral friction between the wire and wheel and correspondingly reduce the wear of these parts, the wheel maintaining its true vertical position, and means other than springs being provided to impart to the wheel a tendency to return to its normal or central position relatively to the pole.

To these ends my invention consists in certain novel features, which I will now proceed to describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a construction embodying my invention in one form. Fig. 2 is a bottom or inverted plan view of the same, partly in central horizontal section. Fig. 3 is a vertical sectional view taken on the line *x x* of Fig. 2 and looking in the direction of the arrows. Fig. 4 is a detail sectional view taken on the line *y y* of Fig. 2 and looking in the direction of the arrows, and Fig. 5 is a detail sectional view taken on the same plane as Fig. 3 and illustrating a modification.

Referring to said drawings, 1 indicates the trolley-head, having a shank 2, which is adapted to be connected with or forms a part of the trolley-pole, which latter is, as usual, pressed upward toward the trolley-wire by suitable springs.

3 indicates the trolley-wheel, which may be of any approved construction and which is mounted in a harp or yoke 4, having an axle or bearing-pin 5, on which the trolley-wheel

rotates. In the construction shown the pin is secured in position by means of keys or cotters 6, the heads of which lie protected in recesses 7 of flanges 8 on the outer sides of the harp. I have also shown the harp as provided with apertures 9 and with collecting-springs 10, riveted at 11 to the outside of the harp on each side and passing thence through the apertures 9 to the inside of the harp, where their circular ends 12 press against the ends of the hubs 13 of the trolley-wheel and prevent rattling. The flanges 8 surround these parts, so as to protect them from contact with the wire or other portions of the superstructure should the trolley slip from its place. Washers 12^a are preferably interposed between the spring ends 12 and hubs 13.

The harp 4 is provided with a forwardly-extending stem 14, and the head 1 is provided with depending lateral flanges 15, between which the stem lies and is protected. This stem forms a supporting-arm by means of which the harp is connected with the trolley-head, on the under side thereof, the connection being by means of a universal joint 16 of such a character as to maintain the trolley-wheel in a vertical plane, while at the same time permitting it to move both vertically and laterally. To this end there is mounted in the head 1, preferably between the flanges 15 thereof, a pivot bolt or pin 17, which is horizontal and on which is pivoted a sleeve 18, having on its upper side a vertical pivot 19, which passes through the arm or stem 14, which is retained thereon in any suitable manner—as, for instance, by means of a washer 20 and key 21. In order to provide an efficient bearing at this point, I provide the sleeve 18 and arm 14 with disk-shaped enlargements 22 and 23, respectively, and to reduce the friction to a minimum I may provide these bearing-disks with grooves 24, forming raceways for antifriction-balls 25, located therein. A modified form of this bearing is illustrated in Fig. 5, in which the bearing-disk 22 is provided with a groove 26, while the bearing-disk 23 is provided with an annular rib 27, which fits within the groove 26. This affords a superior contact, while at the same time the groove and rib

construction serves as a means for retaining the lubricant in position.

The arm or stem 14 carries the harp and trolley-wheel at its rear end, back of the universal joint 16, said arm or stem extending forward of said universal joint and into an inverted-V-shaped or double-inclined slot 28, formed in a bridge piece or plate 29 on the under side of the trolley-head 1. The arm or stem 14 is preferably provided with an anti-friction-roller 31 to reduce the friction between the stem and the walls of the slot to a minimum. Upwardly-converging bearing-surfaces are thus provided on the head, which serves as a means for returning the trolley arm and wheel to their normal central position.

It will be observed that the pivotal connection between the trolley-arm and trolley-head is in front of the trolley-wheel, so that this latter is a trailing wheel and is, moreover, free to swing laterally upon curves or in similar places, so as to adjust itself to the varying position of the trolley-wire. This swinging is of course independent of the lateral movement of the trolley-pole and serves to maintain the trolley-wheel in parallelism with the wire and to reduce the friction between said wheel and the wire to a minimum, thereby correspondingly decreasing the wear of these parts. It will further be noticed that the wheel maintains itself in a vertical plane during all of its movements. It will also be noted that since the wheel is pressed forcibly against the under side of the wire there is a downward pressure on the wheel and a corresponding tendency at the front end of the trolley-arm to move upward. Owing to the shape of the cam-slot this upwardly-moving tendency of the front end of the arm serves to tend to return said arm and the trolley-wheel to a central position. Moreover, the weight of the harp and trolley being greater than the weight of the forwardly-extending end of the arm, the wheel will always return to its normal or central position when disengaged from contact with the wire, thus materially facilitating its reengagement with the wire when desired. These results are effected without the employment of springs or similar devices, which are necessarily unreliable, being apt to break or to lose their temper and strength when thus employed.

The trolley-controlling cord or rope 32 is preferably attached to the harp in the rear of the joint 16, as indicated at 33, so that a downward pull on the cord will bring the wheel to a central position, and thus facilitate its engagement with the trolley-wire. It may, however, be otherwise attached.

I do not wish to be understood as limiting myself to the precise details of construction hereinbefore described, and shown in the accompanying drawings, as it is obvious that these details may be modified without departing from the principle of my invention.

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

1. In a trolley, the combination, with a head, of an arm pivotally connected to said head by a universal joint, a trailing trolley-wheel mounted in the rear end of said arm, and means on the head, comprising upwardly-converging bearing-surfaces engaging said arm, to cause said arm and wheel to return to their normal central position, substantially as described. 70 75

2. In a trolley, the combination, with a head, of an arm pivotally connected to said head by a universal joint between its ends, a trailing trolley-wheel mounted in the rear end of said arm, and means on the head, comprising upwardly-converging bearing-surfaces engaging the front end of said arm, to cause said arm and wheel to return to their normal central position, substantially as described. 80 85

3. In a trolley, the combination, with a head, of an arm pivotally connected to said head by a universal joint between its ends, and a trailing trolley-wheel mounted in the rear end of said arm, said head being provided with a bridge piece or plate having an inverted-V-shaped slot with which the front end of said trolley-arm engages to return said arm and wheel to their normal central position, substantially as described. 90 95

4. In a trolley, the combination, with a head, of an arm pivotally connected to said head by a universal joint, comprising a horizontal and a vertical pivot, a trailing trolley-wheel mounted in the rear end of said arm and rotating always in a vertical plane, and means on the head, comprising upwardly-converging bearing-surfaces engaging said arm, to cause said arm and wheel to return to their normal central position, substantially as described. 100 105

5. In a trolley, the combination, with a head having lateral depending flanges to form a protective housing, of a trolley-arm pivotally connected to the under side of the head between the flanges, provided with a trailing trolley-wheel at its rear end and with guiding or centering means at its front end, substantially as described. 110 115

6. In a trolley, the combination, with a head provided with a horizontal pivot pin or bolt, of a sleeve mounted thereon and having a vertical pivot pin or bolt, and a trolley-arm mounted on said latter pivot-pin and provided at its rear end with a trailing trolley-wheel and at its forward end with guiding and centering means, substantially as described. 120 125

7. In a trolley, the combination, with a head provided with a transverse horizontal pivot-bolt, of a sleeve mounted on said pivot-bolt and provided with a vertical pivot pin or bolt, and a trolley-arm mounted on said vertical pivot pin or bolt and carrying a trailing trolley-wheel at its rear end and centering means at its front end, said arm and 13

sleeve being provided with opposite bearing-disks provided with grooves or raceways, and antifriction-balls located in said grooves or raceways, substantially as described.

5 8. In a trolley, the combination, with a head, of an arm pivotally connected to said head by a universal joint, a trailing trolley-wheel mounted in the rear end of said arm, means on the head, comprising upwardly-con-
10 verging bearing-surfaces engaging said arm

in front of the joint, to center said arm and wheel, and a trolley-controlling cord or rope connected to said arm in the rear of said joint, substantially as described.

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

SAMUEL H. LIMBERT.

Witnesses:

E. O. HAGAN,
IRVINE MILLER.