

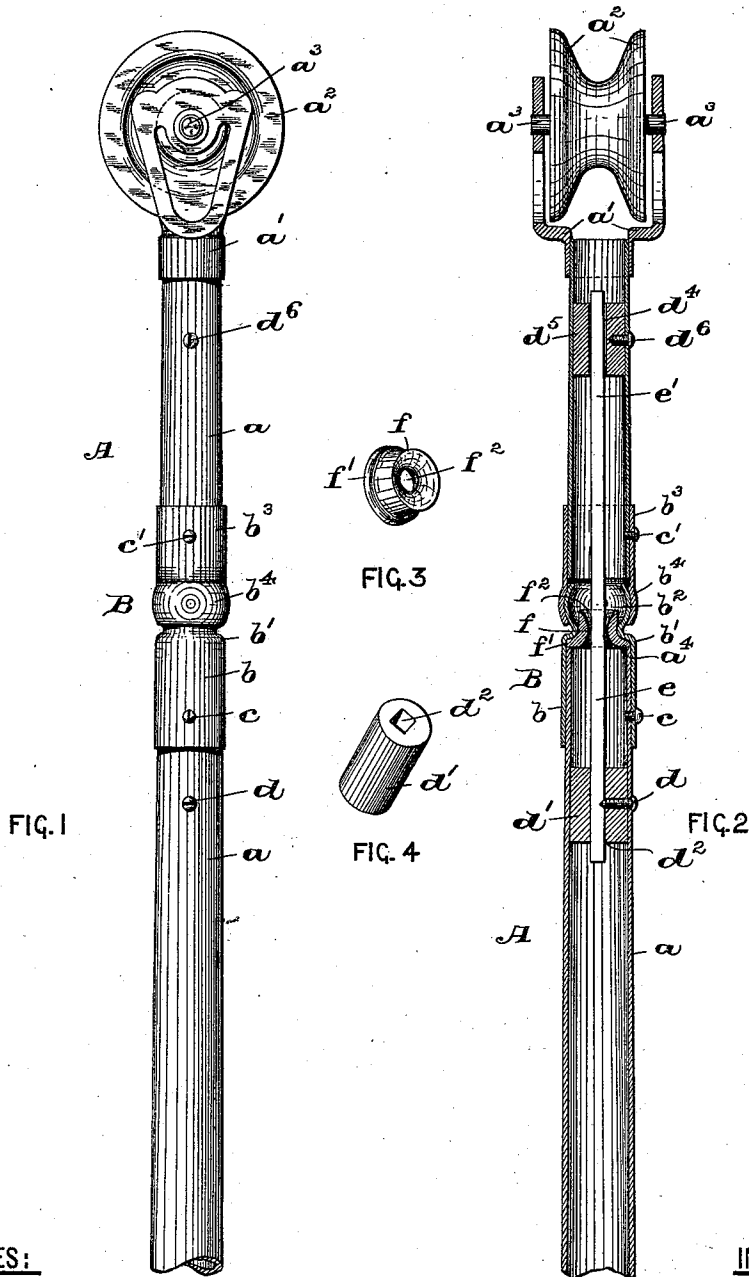
(No Model.)

2 Sheets—Sheet 1.

G. MAAG.  
TROLLEY ARM AND ATTACHMENT THEREFOR.

No. 544,677.

Patented Aug. 20, 1895.



WITNESSES:

Wm. H. Campfield, Jr.  
Walter G. E. Wash.

INVENTOR:

GEORGE MAAG.

BY

Fred C. Fraentzel,  
ATTORNEY

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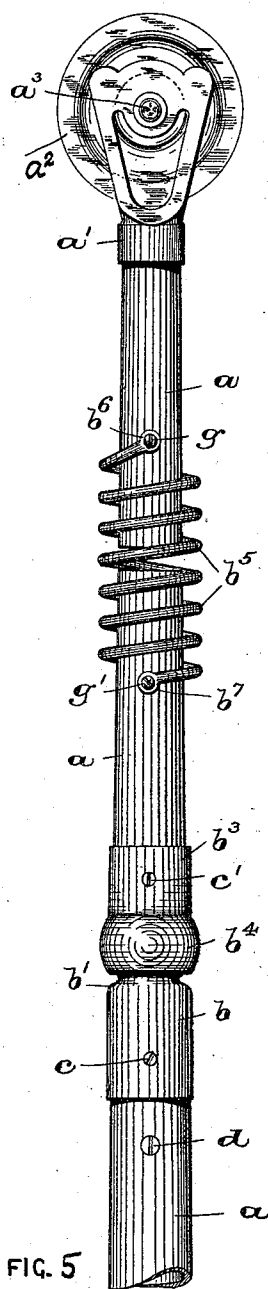


FIG. 5

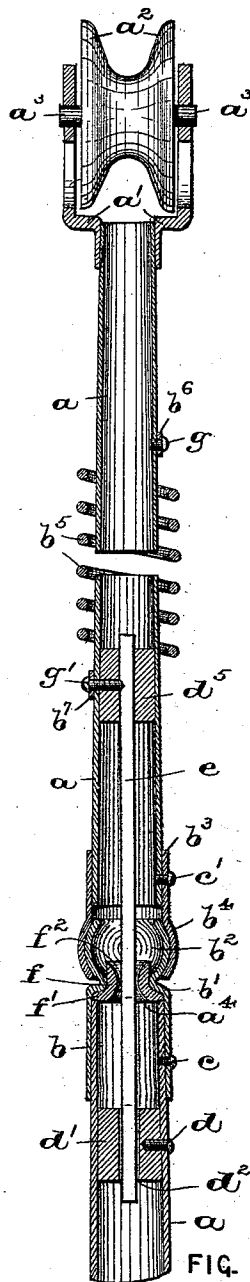


FIG. 6

WITNESSES:

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# UNITED STATES PATENT OFFICE.

GEORGE MAAG, OF NEWARK, NEW JERSEY; JOSEPH AYERS ADMINISTRATOR  
OF SAID MAAG, DECEASED.

## TROLLEY-ARM AND ATTACHMENT THEREFOR.

SPECIFICATION forming part of Letters Patent No. 544,677, dated August 20, 1895.

Application filed December 12, 1894. Serial No. 531,550. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE MAAG, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Trolley-Arms and Attachments Therefor; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in trolley-arms for electric-railway systems provided with a freely-revolving trolley-wheel, which is held in contact with the trolley-wire to transmit current therefrom to the motor in the car.

The invention has for its object to provide a trolley-arm with a suitable device to restrain the trolley-wheel from jumping the trolley-wire, said device serving as a guide to retain the trolley-wheel at all times in its operative contact with the wire. Much difficulty has hitherto been encountered to retain the trolley-wheel in perfect contact with the trolley-wire and to prevent its jumping the wire when passing over switches, cross-overs, or other unevenness, such as passing around curves, and to overcome such difficulties is the principle object of my present invention.

The invention therefore consists, broadly, in the arrangement and construction of a trolley pole or arm formed in sections, connected by a flexible joint or joints, whereby the trolley-wheel on the one section will automatically adapt itself to any unevenness and curves in the wire and will always follow the same without any danger of the displacement of the trolley-wheel therefrom.

The invention furthermore consists in certain other minor arrangements and combinations of parts, such as will be hereinafter more fully described, and finally embodied in the clauses of the claims.

The invention is illustrated in the accompanying sheets of drawings, in which—

Figure 1 is a side elevation of a trolley-wheel and a sufficient portion of the trolley-

arm, comprising therein two sections and a ball-and-socket joint, forming a flexible joint; and Fig. 2 is a longitudinal vertical section of the same, taken at a right angle to the plane of view of the figure illustrated in Fig. 1. Figs. 3 and 4 are perspective views of certain bushings or collars used in the construction illustrated in said Fig. 2. Figs. 5 and 6 are a side elevation and a longitudinal vertical section, respectively, of a trolley-arm, comprising therein three sections connected by flexible joints embodying the principles of my invention.

Similar letters of reference are employed in each of the above-described views to indicate corresponding parts.

Referring to the drawings, A indicates the trolley-arm, comprising therein two or more separable sections *a*, which are connected by a flexible joint B, as will be more fully described hereinafter. The upper end of the upper trolley-arm section *a* is provided with the usual form of forked bearing *a'* to receive a trolley-wheel *a<sup>2</sup>*, journaled on the shaft or axle *a<sup>3</sup>*, which may be of any well-known form or construction, and the trolley-wheel of which bears against the wire in the usual manner.

To maintain at all times a perfect contact of the trolley-wheel *a<sup>2</sup>* with the trolley-wire and to prevent the said wheel from jumping the wire when passing over switches, cross-overs, or when going around curves, I have devised the constructions illustrated herein—i. e., I have formed the trolley pole or arm of two or more sections connected by a flexible connection or connections, whereby the upper section of the trolley pole or arm is movable in any direction upon the lower section of the pole.

As will be seen from Figs. 1 and 2, the flexible joint consists, essentially, of a ball-and-socket joint, the lower sleeve *b* of which is secured to the trolley-pole section by means of a screw or pin *c*. Said sleeve is provided with a suitable shoulder *b'* and terminates in the ball-shaped portion *b<sup>2</sup>*. Embracing said ball-shaped portion *b<sup>2</sup>* is the socket *b<sup>4</sup>* of the sleeve *b<sup>3</sup>*, secured to the upper trolley-pole section *a* by means of a suitable screw or pin *c'*. The arrangement and operation of these parts of the flexible joint B will be clearly

evident from Fig. 2, providing a rotatable movement of the upper section of the trolley-pole on its lower section, whereby the trolley-wheel  $a^2$  readily adapts itself to any unevenness in the trolley-wire.

To produce proper stiffness, but still permit the rotatory movement of the parts comprising the flexible joint, I have secured in the lower trolley-pole section, by means of a suitable screw or pin  $d$ , a collar or bushing  $d'$ , which is provided with a centrally arranged and square hole  $d^2$ . In said hole  $d^2$  of the said bushing is secured the lower end of a square rod  $e$ , of sufficient elasticity to permit its bending or twisting without breaking. Said rod extends up into the upper trolley-arm section and passes into a square hole  $d^4$  in a bushing or collar  $d^5$ , secured in said trolley-pole section by a screw or pin  $d^6$ , substantially as illustrated in said Fig. 2. The upper portion  $e'$  of said rod  $e$  is loosely arranged in said opening  $d^4$  in the bushing  $d^5$ , whereby it is capable of a sliding movement therein. To prevent the edges of the said rod  $e$  from coming in contact with the inner parts of the ball-and-socket joint I have arranged upon the upper edge  $a^4$  and between the inner surface of the shoulder  $b'$  of the sleeve  $b$  of said joint, a bushing or collar  $f$ , the shoulder  $f'$  of which is firmly held by said parts, and said bushing is provided with a centrally-arranged hole  $f^2$ , the sides of which are curved, substantially as illustrated. If desirable, the trolley-pole may be made in three or more sections  $a$ , which can be connected by the coiled spring  $b^5$  or the ball-and-socket joint, as will be clearly evident from an inspection of Figs. 5 and 6. The operation of the parts is precisely the same as that of the parts comprising the constructions illustrated in said Figs. 1 and 2. It will be evident that the flexible joint B may be arranged in any suitable portion of the trolley-pole, near the top or near the bottom thereof, as may be desired.

I do not limit myself to the particular form and construction of the various parts herein shown and described, as it will be clearly obvious that the same may be varied without departing from the scope of my invention.

Having thus described my invention, what I claim is--

1. A trolley arm, composed of tubular sections, a flexible joint connecting said sections, a flexible rod within said sections, and means for securing said rod in position in said sections, substantially as and for the purposes set forth.

2. A trolley arm, composed of tubular sections, a ball and socket joint connecting said sections, a flexible rod within said sections, and means for securing said rod in position in said sections, substantially as and for the purposes set forth.

3. A trolley arm, composed of tubular sections, a flexible joint connecting said sections, a flexible rod within said sections, and means for securing said rod in position in said sections, consisting essentially, of collars or bushings  $d'$  and  $d^5$ , substantially as and for the purposes set forth.

4. A trolley arm, composed of tubular sections, a ball and socket joint connecting said sections, a flexible rod within said sections, and means for securing said rod in position in said sections, consisting essentially, of collars or bushings  $d'$  and  $d^5$ , substantially as and for the purposes set forth.

5. The herein described trolley arm, consisting essentially, of tubular sections, as  $a$ , a flexible joint connecting said sections, collars or bushings  $d'$  and  $d^5$  in said sections, a flexible rod arranged in holes in said bushings, and a bushing, as  $f$ , all substantially as and for the purposes set forth.

6. The herein described trolley arm, consisting essentially, of tubular sections, as  $a$ , a ball and socket joint connecting said sections, comprising therein the sleeves  $b$  and  $b^3$ , a shoulder  $b'$  on said sleeve  $b$ , a bushing  $f$  arranged and held in position on the upper edge of one of said trolley pole sections and by the inner edge of said shoulder  $b'$ , a flexible rod  $e$ , and means for securing the same in position within said trolley-pole sections, substantially as and for the purposes set forth.

7. The herein described trolley arm, consisting essentially, of tubular sections, as  $a$ , a ball and socket joint connecting said sections, comprising therein the sleeves  $b$  and  $b^3$ , a shoulder  $b'$  on said sleeve  $b$ , a bushing  $f$  arranged and held in position on the upper edge of one of said trolley pole sections and by the inner edge of said shoulder  $b'$ , a flexible rod  $e$ , and means for securing the same in position within said trolley pole sections, consisting essentially, of collars or bushings  $d'$  and  $d^5$ , substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 8th day of December, 1894.

GEORGE MAAG.

Witnesses:

FREDK. C. FRAENTZEL,  
EMIL BEYER.