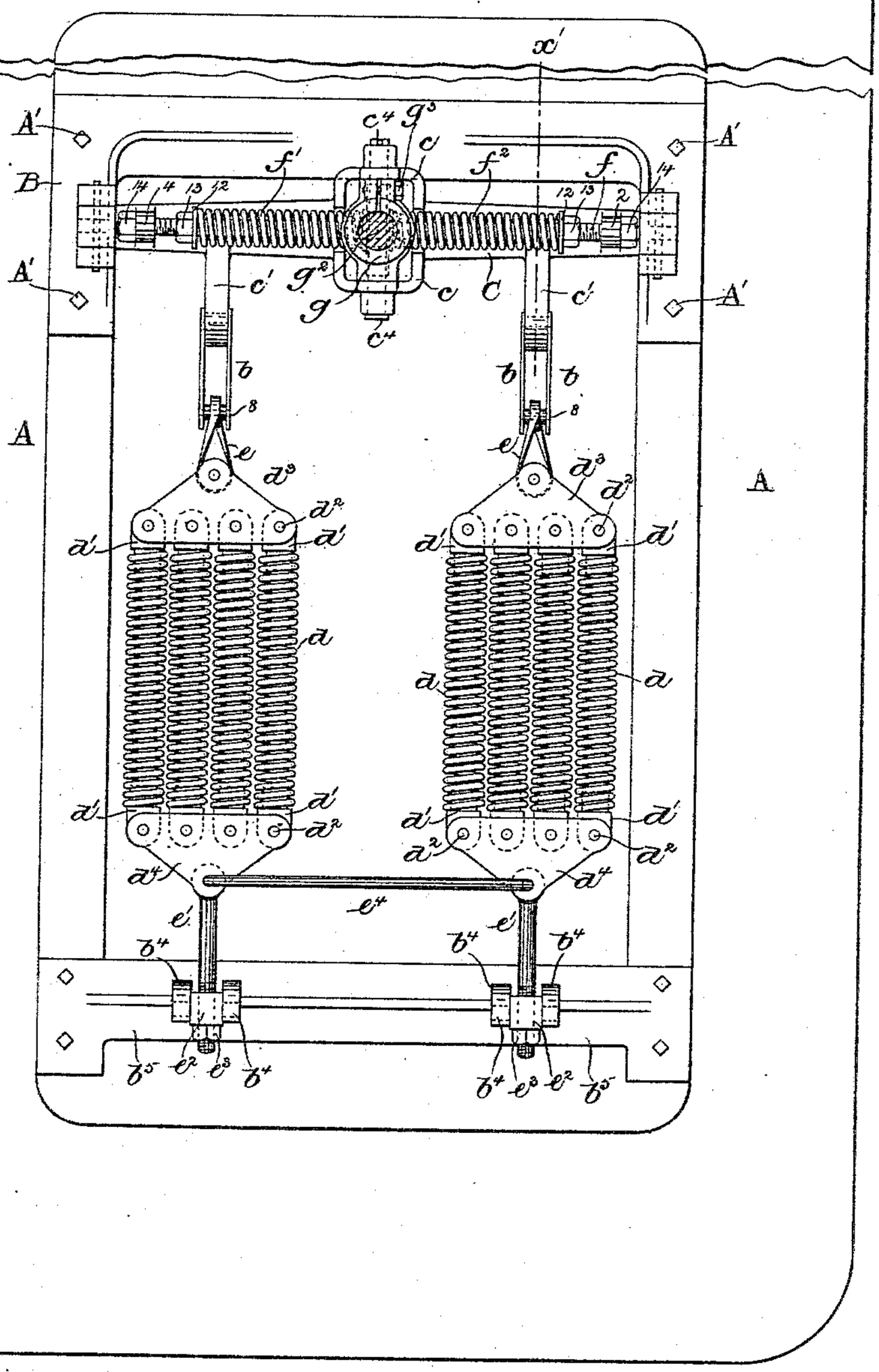
(No Model.) 2 Sheets—Sheet 1.

# J. M. ANDERSEN.

## TROLLEY ATTACHMENT FOR ELECTRIC RAILWAY CARS.

No. 412,157. Patented Oct. 1, 1889.

Fig. 1




Witnesses:
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(No Model.) 2 Sheets—Sheet 2.

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## TROLLEY ATTACHMENT FOR ELECTRIC RAILWAY CARS.

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Fig: 2.

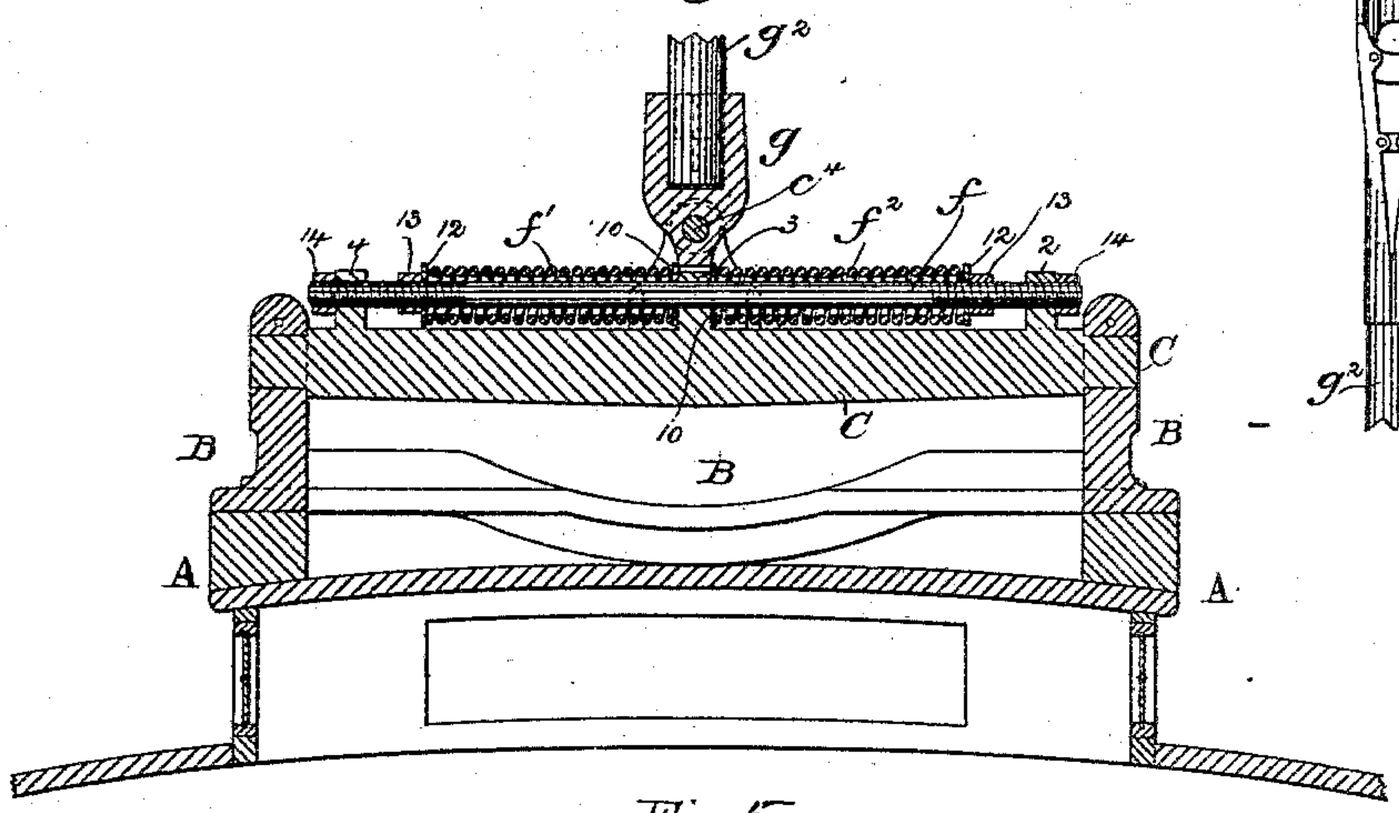



Fig: 7.

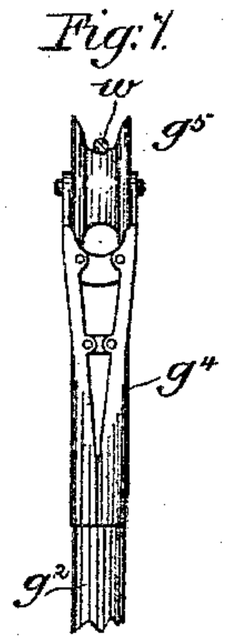



Fig: 5.

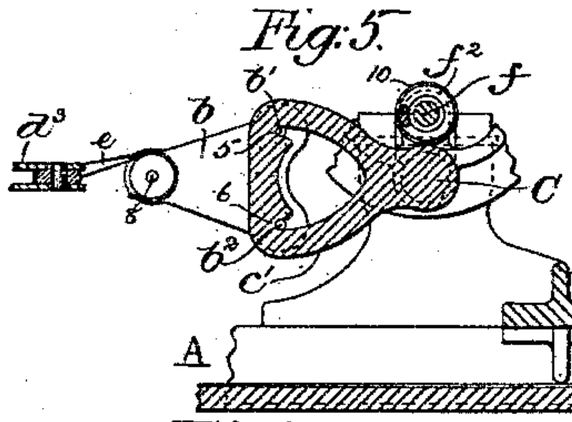



Fig: 4.

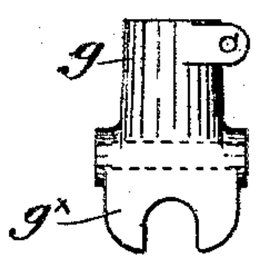



Fig: 3.

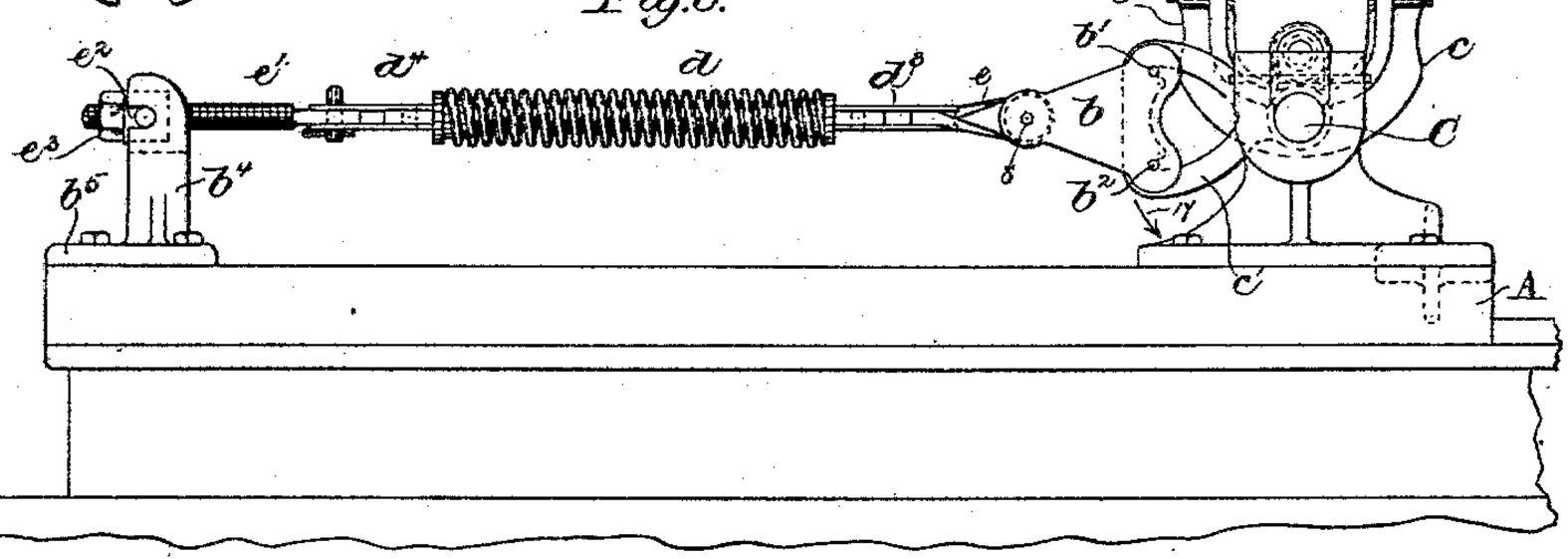



Fig: 6.

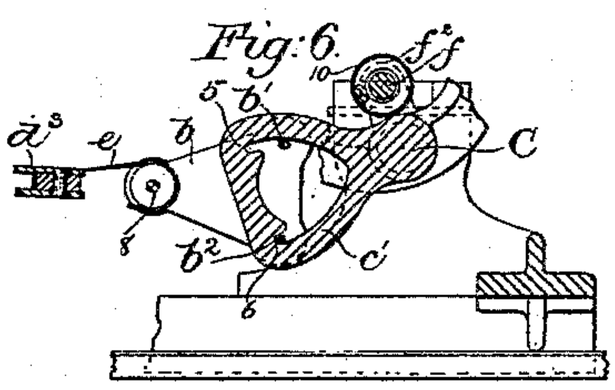
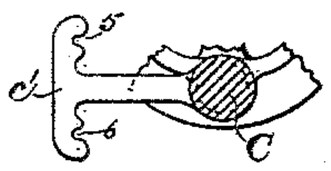



Fig: 8.




Witnesses:
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# UNITED STATES PATENT OFFICE.

JOHAN M. ANDERSEN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO CHARLES L. EDGAR, TRUSTEE, OF SAME PLACE.

## TROLLEY ATTACHMENT FOR ELECTRIC-RAILWAY CARS.

SPECIFICATION forming part of Letters Patent No. 412,157, dated October 1, 1889.

Application filed June 29, 1889. Serial No. 316,031. (No model.)

*To all whom it may concern:*

Be it known that I, JOHAN M. ANDERSEN, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Trolley Attachments for Electric-Railway Cars, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

In operating street-cars by electricity conveyed through a wire or conductor on which runs a trolley-wheel attached to a car much trouble is experienced in keeping the trolley-wheel pressed sufficiently close to the wire or conductor, or in causing the trolley-wheel to follow the wire, notwithstanding differences in tension of the wire or its displacement with relation to the track, and many forms of springs have been used to effect this contact properly; but all are more or less defective.

To insure proper vertical pressure of the trolley-wheel on the wire or conductor, I have provided the car with a stand in which I have mounted a spring-held rock-shaft having ears or projections to form bearings for a trolley-pole holder, the said rock-shaft having an arm or arms extended from it substantially at right angles to the said ears or projections, and having engaging-points (preferably notches) located at opposite sides of a line intersecting the center of movement of the said shaft, the said arm or arms being engaged by heads having pins or projections to enter the said notches, sets of strong springs having great elasticity and power of quick recovery co-operating with the said heads to cause them, in engagement with the arm or arms of the said rock-shaft, to keep the trolley-wheel pressed vertically and snugly against the wire or conductor whenever the trolley-pole is deflected little or much from a perpendicular toward either end of the car.

The lower end of the trolley-pole holder is acted upon by springs, which enable the trolley-wheel running on the wire to move laterally or toward either side of the car when the wire or conductor is displaced or is out of line with the track, and also when the car is running on a curved part of the track.

The trolley-pole has to be pointed toward one or the other end of the car, according to the direction in which the car is to run.

The head and springs referred to act normally to keep the trolley-pole holder in substantially vertical position; but when the said pole is tipped over toward either end of the car then one or the other of the pins or studs of the head (not both) remains in contact with one or the other of the notches in the arm of the said rock-shaft, thus enabling the strain of the said springs to be instantaneously applied to the said arm above or below the center of motion of the said rock-shaft, as the case may be, and this with but the slightest displacement of the trolley-pole from vertical position, the said springs keeping the trolley-wheel against the wire or conductor whatever may be the direction of movement of the car.

My invention in trolley attachments consists, essentially, in a trolley-pole-holding arm having provision for vertical and lateral movement, such movements being controlled by springs, as will be hereinafter described.

Figure 1 in plan view shows part of the top of a car with my improved trolley attachment thereon. Fig. 2 is a section in the line *x*, Fig. 1, the said figure showing part of the trolley-pole. Fig. 3 is a side elevation of the parts shown in Fig. 1, with part of the trolley-pole. Fig. 4 shows the trolley-pole holder detached. Fig. 5 is a partial section in the line *x'*, Fig. 1. Fig. 6 is a detail showing part of the rock-shaft, with its arm and the head, but in a different position. Fig. 7 shows the trolley-pole detached, together with a trolley-wheel at its upper end, the wire or conductor being shown in section; and Fig. 8 is a modification to be referred to.

The car-body A has secured to it firmly by suitable bolts A' a strong metal stand B, having suitable bearings for a rock-shaft C. (Shown as having three lugs 2, 3, and 4, ears *c c*, and arms *c' c'*, the latter projecting from the rock-shaft substantially at right angles to the said ears *c c*.) The arms *c' c'* (shown best in Figs. 3, 5, and 6) have two engaging-points. (Shown as notches 5 6, the notch 5 being above and the notch 6 below the center of the said rock-shaft.) These arms have co-

operating with them a head $b$, containing two pins or studs $b'$ $b^2$, one to enter the notch 5 and the other the notch 6, and when each pin enters the notch opposite to it the parts will be as in Figs. 1 to 3, and the trolley-pole will stand in vertical position. Each head $b$ is acted upon by a set of what I call "pulling-springs" intermediate the head and a rocking block $e^2$, having journals and mounted in ears $b^4$ of a suitable stand $b^5$ fixed to the car at a distance from the stand B.

Each set of pulling-springs is herein shown as consisting of, preferably, a number of strong spiral springs $d$ of great elasticity. (Shown as securely attached at their ends to short rods or plugs $d'$, in turn pivoted at $d^2$ to blocks $d^3$ $d^4$, the block $d^3$ being connected by a link $e$ or otherwise in suitable manner to a pin 8 of a head $b$.) The block $d^4$ has connected to it a screw-rod $e'$, which is extended through the pivot-block $e^2$, and has applied to it a nut $e^3$, by which to adjust the tension of the said pulling-springs.

The two sets of pulling-springs $d$, substantially alike, are connected by a rod or link, as $e^4$.

The lugs 2 3 4 receive loosely within them a screw-rod $f$, surrounded at each side the lug 3 by like springs $f'$ $f^2$, the end of each spring nearest the lug 3 resting against a washer, as 10, while at the opposite end of each spring is a washer 12, which is acted upon by an adjustable nut 13, the rotation of the said nuts on the said screw-rod regulating the effective strength of the said pulling-springs in keeping the trolley-wheel vertically against the wire.

I have shown, as I prefer to use, pulling-springs. The screw-rod $f$ is held in place by nuts 14, screwed upon its ends. The ears or projections $c$ $c$, extended upwardly from the rock-shaft C, receive a pin $c^4$, which constitutes the fulcrum for the trolley-pole holder $g$, the forked lower end $g^\times$ of which (see Fig. 4) is shaped to embrace the lug 3 and come between it and the two washers 10.

The trolley-pole $g^2$ (partially shown in Figs. 2, 3, and 7, and of usual material) is inserted in the socket in the upper end of the holder $g$, where it is clamped by a suitable clamp-screw $g^3$.

The upper end of the trolley-pole $g^2$ has a trolley-frame provided with a trolley-wheel $g^5$, which runs on the usual wire or conductor $w$, the springs $g$ $g^2$ permitting the trolley-holder $g$ to tip, thereby enabling the trolley-wheel to correctly follow along and remain upon and not jump from the said wire or conductor when the car is upon a curved part of the track, or when for any reason the wire is not central with relation to the track.

Normally the pulling-springs $d$ act to keep the trolley holder and pole in vertical position; but when a car is run out upon the track the trolley-pole is bent down toward one or the other end of the car, according to the direction in which the car is to be run, until the trolley-wheel contacts with the wire or conductor.

If the trolley-pole is to be turned over in the direction of the arrow 16, Fig. 3, the rock-shaft C will be turned and move the arms $c'$ thereof in the direction of the arrow 17, carrying the notch 5 of the said arm $c'$ (see Fig. 6) back away from the pin $b'$ and throwing the entire effective strain of the pulling-springs $d$ upon the pins $b^2$ to thus force the trolley-pole in a direction opposite the arrow 16 and the wheel $g^5$ against the wire or conductor $w$. On the other hand, should the operator pull the trolley-pole $g^2$ down forcibly to the right from the position Fig. 3, then the arm $c'$ will be carried up in a direction opposite the arrow 17, and in so doing the notch 6 of the said arm will retire from the spring or stud $b^2$, and the entire strength of the spring will be exerted upon the pins or studs $b'$ in the notches 5 of the arms $c'$. It will thus be seen that the series of very strong pulling-springs—one series, preferably, at each end of the rock-shaft C and at one side thereof—act to keep the trolley-wheel in close contact vertically with the usual wire or conductor, notwithstanding the trolley-pole is inclined toward one or toward the other end of the car; and it will be seen that the trolley-wheel can not leave the said wire or conductor, for the springs $f'$ $f^2$ permit the wheel to move laterally for a distance sufficient to compensate for any deviation of the wire from the center of the tracks.

I do not wish to limit my invention to the exact shape of the arms $c'$ and of the head $b$, and I desire it to be understood that the gist of my invention as to the said arms and head comprehends a loose connection or contact of the said parts above and below a line drawn to intersect the center of the said rock-shaft, whereby the said pulling-springs, when the trolley-pole is turned toward either end of the car, act to keep the trolley-wheel pressed against the wire or conductor—as, for instance, the arm might be shaped as in Fig. 8.

By employing two sets of springs, as $d$, one near each end of the rock-shaft, and by using several springs in each set, I get a more uniform and stronger pull than were but one set of springs used, or were the springs larger and stronger and but one used.

By employing two springs, as $f'$ $f^2$, and causing the forked lower end of the pole-holder to embrace the lug 3 of the rock-shaft between the washers 10 10, which bear against the lug 3, each spring operates independently of the other to aid in keeping the socket in the holder at right angles to the rock-shaft C.

I do not desire to limit my invention to the exact construction of the pulling-springs, or to the exact form of blocks with which they are connected, or to the exact form of connecting devices—such as $e$ $e'$—to unite the springs with the rock-shaft C′ and a fixed part of the car; nor do I desire to limit my invention to the exact number of springs em-

ployed, nor to their exact shape, as instead of the particular pulling-springs *d* herein shown I may use any other well-known equivalent springs capable of operating in like manner.

I should consider it within the scope of my invention if the notches 5 6 were transferred to the head and the pins or studs *b' b²* to the arms *c'*.

I claim—

1. A rock-shaft, as C, having an arm, as *c'*, and a connected trolley-pole holder, combined with a head having pins or projections shaped to engage the said arm, as described, at opposite sides of a line intersecting the said rock-shaft, and springs co-operating with the said head to keep the trolley-pole holder pressed in the direction to keep the trolley-wheel vertically against the usual wire or conductor whatever may be the direction of movement of the car, substantially as described.

2. The stand, a rock-shaft, as C, therein having ears *c*, and a pivoted trolley-pole holder, combined with springs co-operating with the said holder, whereby it may tip on the said rock-shaft to enable the trolley-wheel to move laterally, as required, and follow along and remain upon the wire or conductor notwithstanding differences of curvature between the track and wire, substantially as described.

3. The stand, the rock-shaft therein having arms *c'*, ears *c*, and lugs 2 3 4, the rod *f*, springs surrounding the rod, the pivoted trolley-pole holder having its lower end placed under the control of the said springs, and the trolley-pole and trolley-wheel, combined with the head and the springs connected thereto, as described, to cause the head to draw upon a part of the said arms in all positions of the trolley-pole holder and pole, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHAN M. ANDERSEN.

Witnesses:
BERNICE J. NOYES,
GEO. W. GREGORY.