No. 688,486. Patented Dec. 10, 1901.

E. B. ROBERTSON & S. N. DOLE.

TROLLEY CONTACT POLE.

(Application filed July 12, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

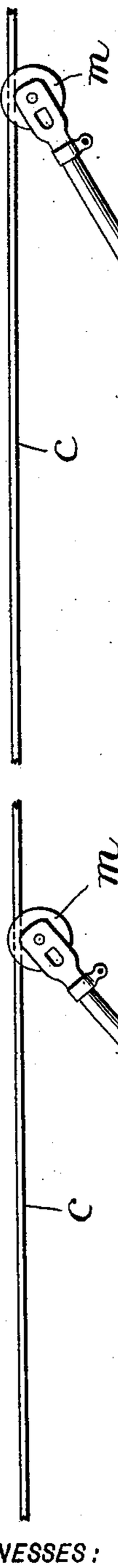


Fig. 2.

Fig. 6.

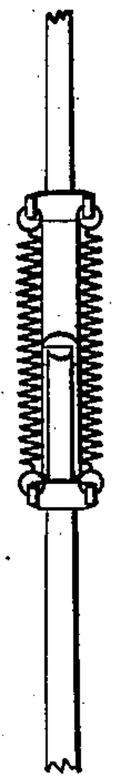


Fig. 7.

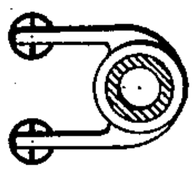
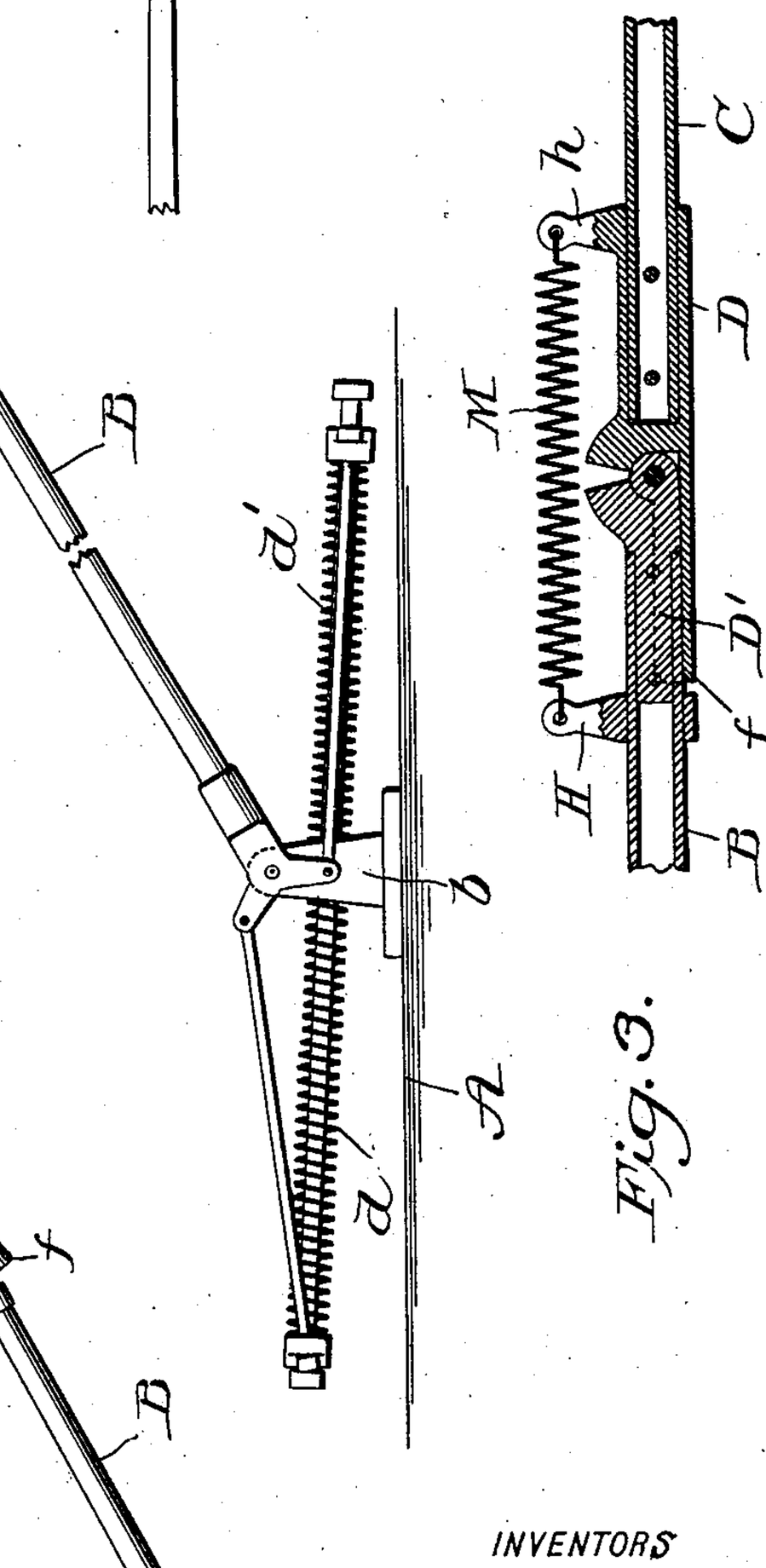


Fig. 3.



WITNESSES:

A. V. Groupe

C. E. Parker

INVENTORS

Ernest B. Robertson

Samuel N. Dole

by A. V. Newton

ATTORNEY

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Fig. 4.

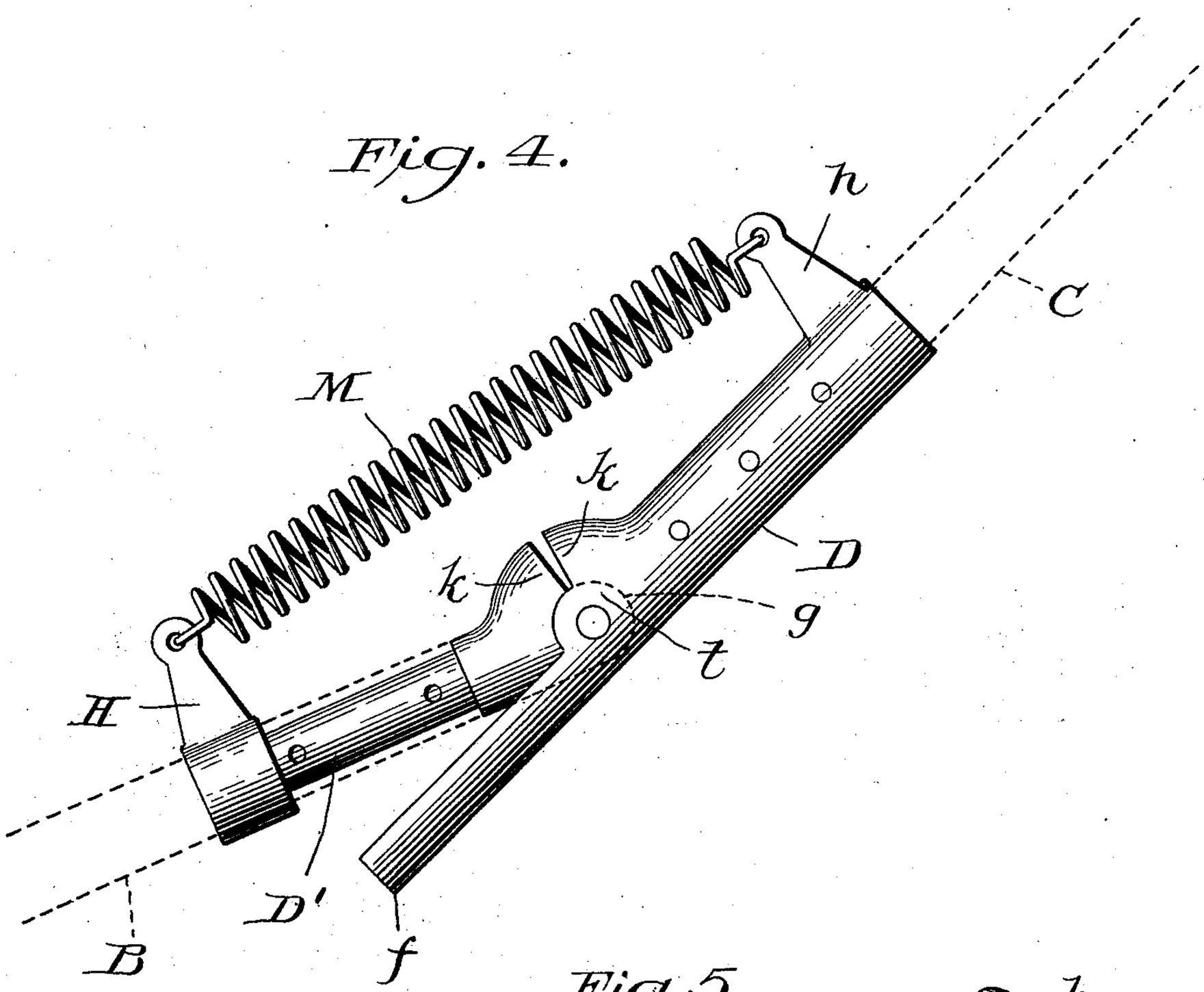
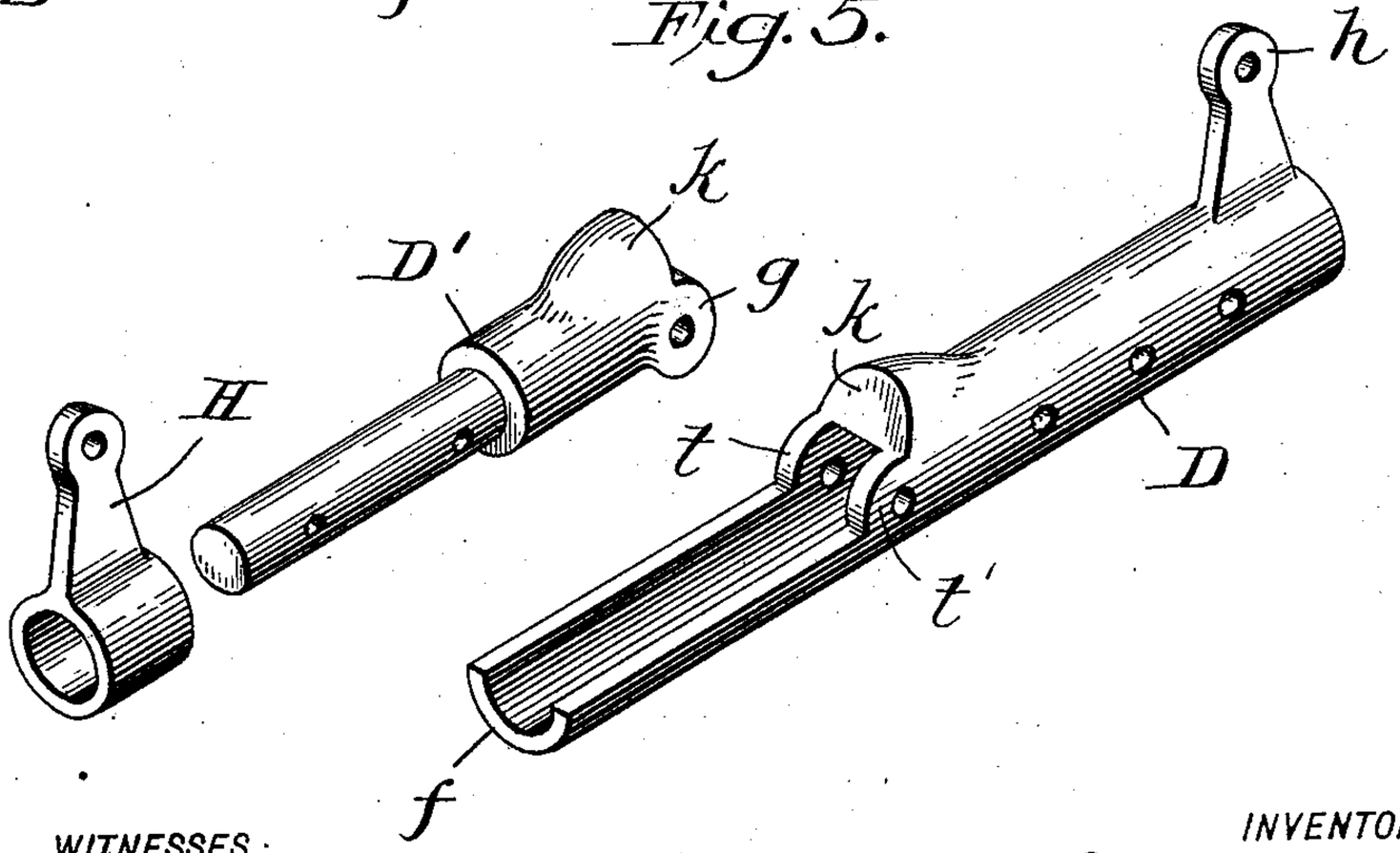


Fig. 5.



WITNESSES:

A. V. Groupe

C. C. Parker

INVENTORS:

Ernest B. Robertson
Samuel N. Dole
by W. V. Hauton
ATTORNEY

UNITED STATES PATENT OFFICE.

ERNEST B. ROBERTSON, OF PHILADELPHIA, PENNSYLVANIA, AND SAMUEL N. DOLE, OF CAMDEN, NEW JERSEY.

TROLLEY CONTACT-POLE.

SPECIFICATION forming part of Letters Patent No. 688,486, dated December 10, 1901.

Application filed July 12, 1901. Serial No. 67,943. (No model.)

To all whom it may concern:

Be it known that we, ERNEST B. ROBERTSON, residing at Philadelphia, in the State of Pennsylvania, and SAMUEL N. DOLE, residing at Camden, in the State of New Jersey, citizens of the United States, have jointly invented certain new and useful Improvements in Trolley Contact-Poles, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to trolley contact-poles employed in establishing and maintaining an electric circuit between the fixed overhead trolley-wire and the electric motors carried by a moving car. Devices for that purpose as now commonly employed consist of a hollow pole one end of which is pivotally mounted on the car-roof, springs being supplied at or near said end tending to normally keep the free end of the pole in a vertically-inclined position, the said free end of the pole carrying and supplying by suitable means a bearing for a small wheel or disk having a concave periphery, whereby contact is maintained with the overhead electric wire. In such devices the object sought in pivotally mounting the pole on the car-roof and controlling its movement by springs is to impart a resiliency to the pivotally-mounted pole and so maintain contact of its grooved disk with the wire that constantly-occurring changes in the angle of inclination of the pole tending to remove the wheel from the wire will be compensated for by the spring tension constantly exerted on the pole. The difficulty with such devices, however, is that such changes in the angle of inclination of the pole are frequently brought about suddenly, due to variation in the grade of the street-track, to varying heights of the trolley-wire from the track, and particularly is such breaking of contact occasioned by the swaying of the wire, the rocking of the car, imperfections in the roadbed or the rails, weakening of the springs at the base of the pole, and finally by curves in the track and in the line-wire. Under such conditions even the spring-controlled pivotally-mounted pole is too rigid to compensate for such tendency of the wheel end of the pole to leave the wire.

In the drawings illustrating our invention, Figure 1 is an elevation of our improved device, showing also the trolley-wire and indicating the car-roof on which the pole is mounted. Fig. 2 is a like elevation of our improved device, illustrating the position of certain of its parts when in operation. Fig. 3 is a vertical section. Fig. 4 is an enlarged elevation of our improvement detached with the divided pole ends in dotted lines; Fig. 5, a perspective of the two elements constituting the hinge connection with the brackets for the spring device, and Figs. 6 and 7 a section and a top view of a modification of a part of the hinge connection to admit of using double springs.

Our invention is designed to remedy the aforesaid defect by supplying resiliency at a point in the length of the pole itself, whereby the tendency of the pole-wheel to leave the trolley-wire under most if not all of the conditions stated will be fully compensated for.

To that end our invention consists, broadly, of a trolley contact-pole divided at a point forward of its longitudinal center with a spring-controlled hinge connection between said divided ends and with positive stop devices to limit the pivotal movement of said ends relatively to each other. Stated more specifically, it consists of a pole divided at a point forward of its longitudinal center with a hinge connection between said divided ends, spring mechanism at or near said hinge connection tending to pivotally throw said ends normally out of alinement with each other, stop devices operating to limit the extent of said non-alinement, and other stop devices coöperating with said spring device operating to limit the pivotal movement of said ends in the opposite direction to a degree which will effect a perfect alinement thereof.

Our invention also comprises the combination therewith of the usual spring-controlled pivotal mounting commonly employed for trolley-poles when applied to the lower extremity of the longer end of our improved divided pole, also in certain novel detail fea-

tures of the device and combinations thereof for operative purposes with the body of a car and an overhead trolley-wire, all as hereinafter set forth in the following description and pointed out in the claims.

Referring to said drawings, A indicates the roof of a moving car, and B the lower end of a trolley contact-pole which is pivotally mounted thereon, the means shown for so doing being a standard *b*, fastened to the car-roof, the extreme end of the pole being hinged in and to said standard. The object sought is to normally maintain the pole at an incline, usually about forty-five degrees, and to do so resiliently. For both of said purposes the pivotal connection is spring-controlled by double or counteracting springs, (indicated at *d d'*,) these springs being so adjusted that any tendency to shift the pole from a normal degree of inclination will simultaneously create a compression of one spring and a tension of the other. The extreme free end of the pole is provided with suitable bearings for a rotating disk or wheel *m*, which is circumferentially grooved to provide a concave periphery which partially embraces the trolley-wire, (indicated at *c*.) Under constantly-occurring conditions, some of which have been stated above, the rigidity of the pole is such, notwithstanding the yielding effected by its base-springs *d d'*, that the trolley-wheel will jump from the wire, a tendency which will be largely if not wholly overcome by dividing the pole forward of its longitudinal center, preferably about one-third of its whole length, and uniting said ends by a spring-controlled hinge connection governed by devices limiting the pivotal movements of the free or short end in both directions, the effect being that while the parts are as shown in Fig. 1 when operating under normal conditions the parts assume the position shown in Figs. 2 and 4 when resisting a tendency of the wheel to jump the wire. Referring now to Figs. 4 and 5, the dotted lines indicate the two ends of such a trolley-pole divided forward of its longitudinal center, the lower or car end being indicated by letter B and the upper or free end by letter C. Such poles are usually made hollow or tube-like and of iron, usually round externally and of greater diameter at the lower or car end than at the free end. So divided we provide a sleeve-like element D, fitting over and riveted to the end C of the pole, said sleeve having ears *t t* to form part of a hinge connection, and preferably, also, an extension end *f*, which is in the form of a hollow semicylinder and operates as a brake-shoe. A bracket *h* is provided to hold one end of a pull-spring. To the other or lower end B of the pole is fitted the other element D' of our device. If the pole is hollow, as usual, it is preferably driven into the pole and then riveted instead of encircling it sleeve-like, as in case of element D. It is provided with a tongue *g*, forming part of the hinge connection with the ears *t t* of the opposite element. It is obvious, however, that variations may be made in the form of the hinge elements *t t* and *g*. Encircling the pole end B is a bracket-ring H, provided to hold one end of a pull-spring. It is obvious, however, that if the element D' is made sleeve-like the bracket-ring H may be integral with it instead of being a separate element fitted on the pole, and the reverse is also true of the bracket *h* of element D, it being quite the same to make said bracket *h*, like bracket-ring H, a separate element and secured directly to the pole. Between said brackets is stretched a pull-spring M under such tension as to have a tendency to bring the parts into the relative positions shown in Figs. 2 and 4, and which tension will be entirely overcome by the pressure of the trolley-wheel against the overhead wire when the said parts are in the normal position. (Shown in Fig. 1.) As it is necessary to limit the pivotal movement of the hinge members D D' toward each other, they are each provided with flat and jaw-like faces *k k*, which are normally separated, but by their contacting, as seen in Fig. 4, limit the pivotal movement in an upward direction of the free end D' of the pole. Equally so the brake-shoe *f*, while primarily operating by reason of its semicylindrical form to partially encircle the end B of the pole, and hence strengthen and support the hinge connection between the elements D D' and prevent lateral relative displacement, also aids the spring in limiting the opposite pivotal (the downward) movement of said pole end D', it being an absolute stop device for that purpose.

For some purposes it might be deemed desirable to duplicate the pull-spring M, and to effect this the modification shown in Figs. 6 and 7 presents a convenient method of accomplishing that end.

We are aware that it has been heretofore proposed to obtain the results above described by dividing the trolley-pole in the direction of its length and uniting the divided ends by a hinge connection; but such devices, even when the hinge is spring-controlled, fail to effect the object intended in the absence of opposite stop devices operating to control and limit the two opposite pivotal movements of the divided pole ends and in the absence of means to prevent a lateral wabbling of said ends relatively to each other.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A trolley contact-pole divided at a point forward of its longitudinal center, a hinge connection between said divided ends, spring mechanism tending normally to throw said ends out of alinement, positive stop devices operating to limit the extent of such non-alinement, consisting of oppositely-disposed inclined jaw elements, mounted respectively on each member of the hinge element, and another positive stop device mounted on the

shorter pole end coacting with said spring device to limit the reverse pivotal movement of the shorter pole end to an extent which will bring said divided pole ends into perfect alinement.

2. In combination, a trolley contact-pole divided at a point forward of its longitudinal center, a car-body, a spring-controlled pivotal bearing for the lower extremity of the longer end of said pole tending to maintain the same yieldingly in a vertically-inclined position, an overhead trolley-wire, a rotating peripherally-grooved wheel on the shorter end of said divided pole, a hinge connection between the contiguous faces of the divided pole ends, consisting of a hinge proper with means to support the elements thereof on the opposite pole ends, spring mechanism tending normally to effect a non-alinement of the divided pole ends; a stop device operating to limit such non-alinement, consisting of oppositely-disposed inclined jaws *k*, *k*; and another stop device operating to limit the opposite pivotal movement of the parts to effect a perfect alinement thereof.

3. In a longitudinally-divided trolley-pole, the combination with the contiguous ends thereof, of a spring-controlled hinge connection, one element of which consists of a sleeve D provided with ears *t*, *t*, a hollow semicylindrical stop device *f*, an inclined projecting stop device *k* and a bracket *h*, and the other element D′ of which consists of a member provided with tongues *g*, *g*, like inclined stop device *k*, and a spring-holding bracket; means to operatively connect said hinge elements, and a pull-spring between the same tending normally to maintain them out of alinement.

In testimony whereof we have hereunto affixed our signatures this 10th day of July, A. D. 1901.

ERNEST B. ROBERTSON.
SAMUEL N. DOLE.

Witnesses:
ANDREW V. GROUPE,
H. T. FENTON.