(No Model.)

C. J. VAN DEPOELE.

TROLLEY ARM FOR ELECTRIC RAILWAY CARS.

No. 424,381. Patented Mar. 25, 1890.

Fig. 1.

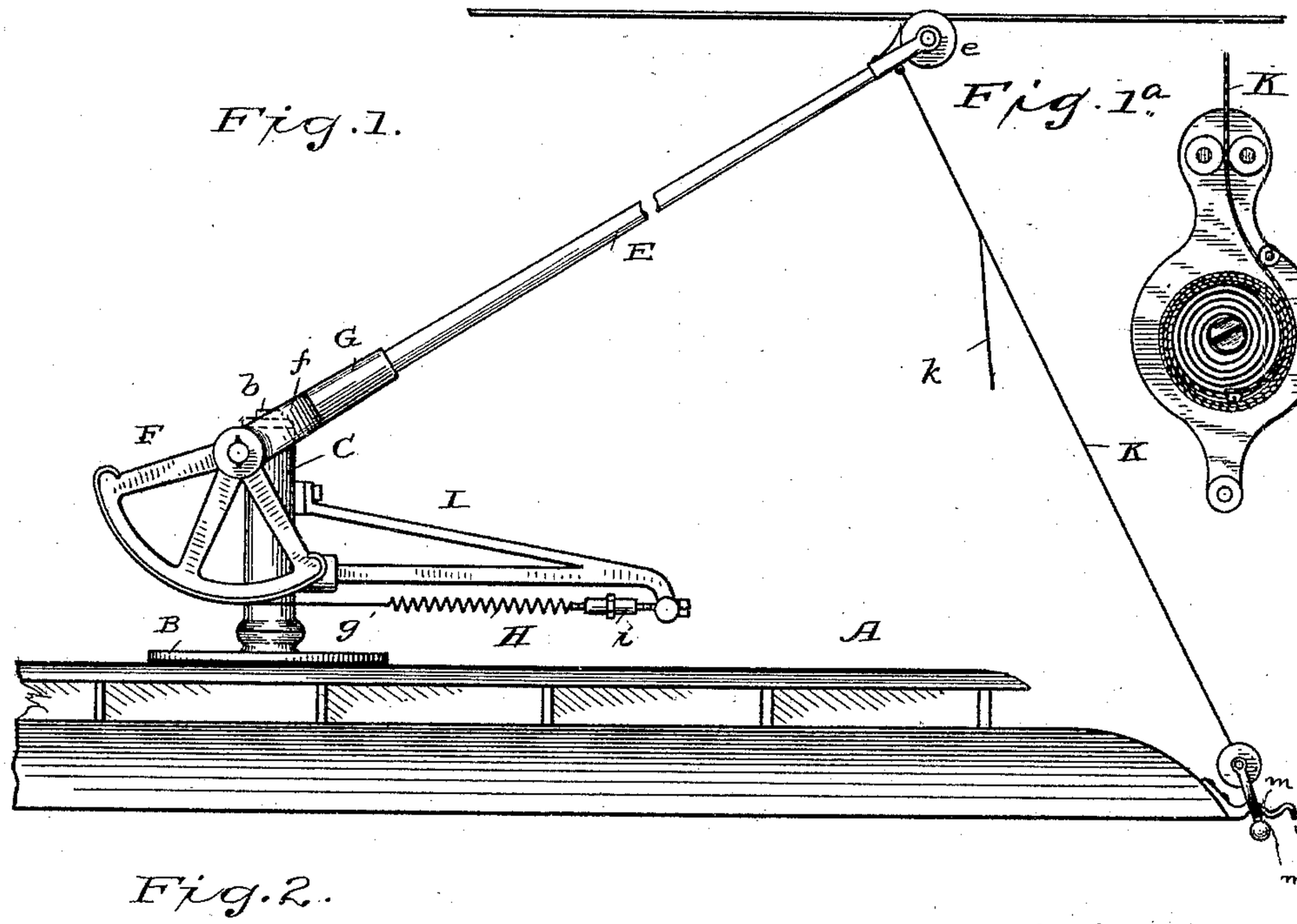


Fig. 1a.

Fig. 2.

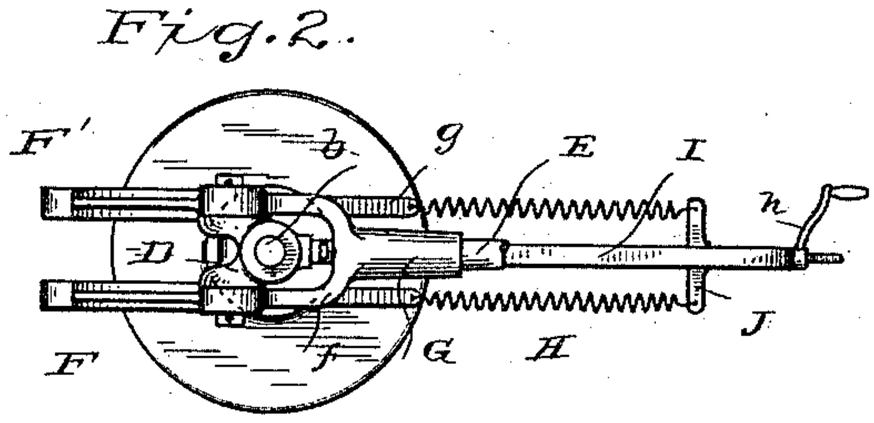


Fig. 4.

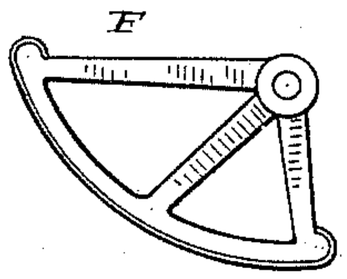
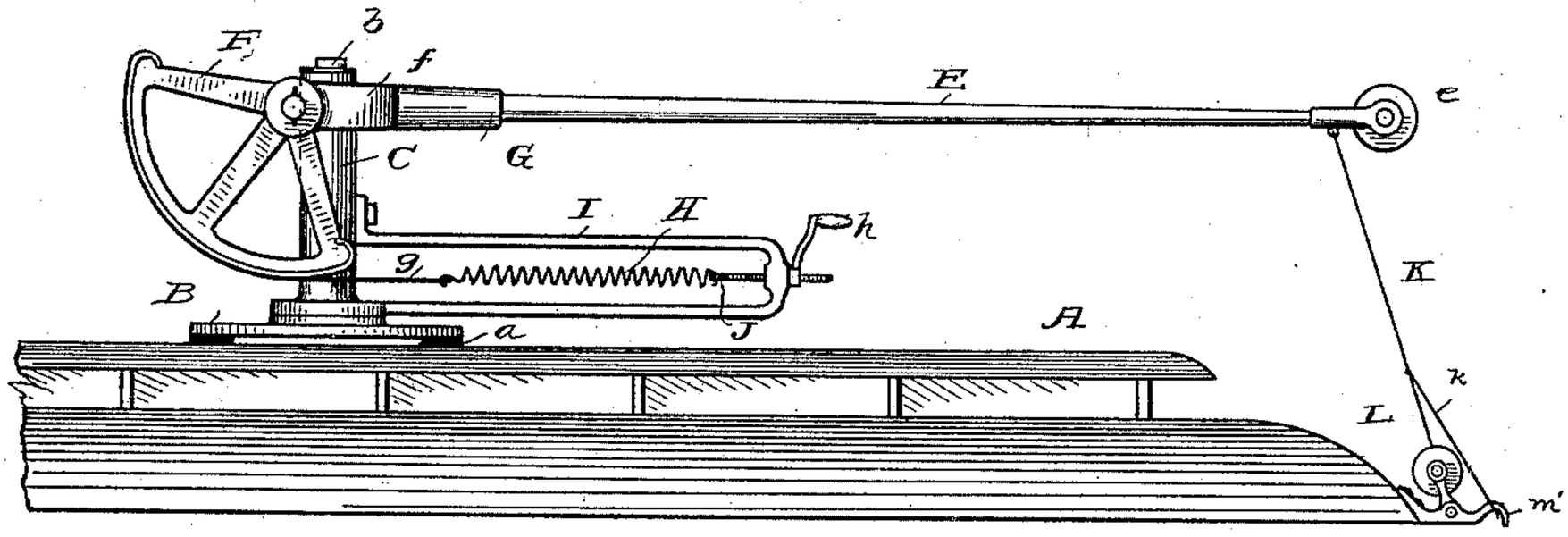


Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

TROLLEY-ARM FOR ELECTRIC-RAILWAY CARS.

SPECIFICATION forming part of Letters Patent No. 424,381, dated March 25, 1890.

Application filed October 17, 1889. Serial No. 327,284. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. VAN DEPOELE, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Trolley-Arms for Electric-Railway Cars, of which the following is a description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to improvements in upward pressure-contact devices for electric railways of the type in which the supply-current is carried by a bare conductor suspended above and along the line of travel.

The invention relates to means for collecting the current from such suspended conductor and transmitting the same to suitable circuits upon the car or vehicle to be propelled.

The invention resembles to some extent that disclosed in my prior patents, No. 394,037, December 4, 1888, and No. 408,638, August 6, 1889. It also includes certain features of improvement not specified in my said patents, and which will be hereinafter described, and referred to in the appended claims.

In the drawings, Figure 1 is a view in elevation showing my improved trolley-arm, together with a portion of the top of an electric-railway car upon which the same is carried. Fig. 1ª is a detail view of the take-up device. Fig. 2 is a plan view of the tension mechanism of the trolley-arm seen in Fig. 1. Fig. 3 is also a side elevation differing slightly in construction from Fig. 1 and seen in a different position. Fig. 4 shows an alternative form of tension-cam.

In said drawings, A represents the top portion of a car-roof.

B is a stand or base, desirably of metal, and provided with a vertical spindle or shaft *b*. The base B is securely attached to the top of the car, and should be insulated therefrom—as, for example, by means of rubber blocks or feet *a*, or by a thick layer of insulating material.

In my said prior Letters Patent No. 394,037 the base B and a vertical spindle are shown; but the entire apparatus being carried upon the upper portion thereof, said vertical part is of considerable height—say, two feet, more or less—to afford space for the tension-springs vertically, and, while the device operates perfectly and satisfactorily accomplishes the results for which it was designed, such an arrangement necessarily adds to the height of the car as a whole, which, where, as sometimes happens, the cars are required to pass under very low structures, renders the same more liable to injury or destruction, and even in some instances renders the use of such an apparatus impracticable.

One of the objects attained by the present invention is the lowering of the trolley support or stand so that it may possess all the strength and spring-power necessary for any purpose, and yet be capable of folding down very near to the car-top.

As indicated in the drawings, the vertical spindle *b* is not more than a few inches in height, six or eight inches being sufficient for the purpose, although the arrangement is not limited to any particular dimensions. The spindle *b* carries a sleeve C, upon which is formed or secured a transverse hinge-joint D. The sleeve C is free to move around its supporting-spindle *b*, and therefore anything sustained by the horizontal transverse hinge D would be movable upon both a vertical and a transverse axis.

E indicates the trolley-supporting arm, which is desirably of wood, although other material may be used, and said arm is provided at its outer extremity with a grooved metallic contact device, which may be a rotating or non-rotating wheel *e* or a sliding shoe, as preferred. The lower end of the arm E is hinged at the point D, and, suitable tension-springs being provided, is held upwardly against the conductor thereby.

As indicated, the tension device comprises a curved extension or a sector F, constituting the lower portion of the trolley-arm when considered as a whole. As illustrated, the lower part of the trolley-arm consists of two sectors F F′, which are formed integral with or attached to a fork *f*, the arms of said fork springing from a socket G. The lower end of the upwardly-extending portion of the arm E may be removably secured in the socket G, and be readily removed for replacement in case of damage, or to substitute a longer or shorter pole according to circum-

stances. The sectors F F′ are so placed with reference to the fork *f* and the socket G that when the trolley-arm is brought down to a horizontal position no portion thereof will project above the horizontal line of the contact device, and therefore the apparatus, as a whole, will be adapted to pass safely under obstructions having a height greater than the vertical spindle *b*. By the particular construction here shown I am enabled to employ a single vertical support, since the fork *f* and sectors F F′ will straddle the same, and this I find to possess some mechanical advantages over an arrangement comprising two vertical supports, between which the movable parts are sustained upon a transverse axis uniting them, as seen in my said Patent No. 408,638. The peripheries of the sectors F F′ are flat and form cam-surfaces upon which the flexible metallic or other bands *g* can move freely, and said bands *g* are connected thereto at the upper or outer extremities of the said surfaces. The lower ends of the bands *g* are connected to tension-springs H, and although but one spring H is shown for each band *g*, it will be understood that any desired number may be used. The outer extremities of the tension-springs H are connected to the outer portion of a frame I, which frame is secured to and carried by the sleeve C. The said frame I or any equivalent arrangement may be disposed as here shown, or in any equivalent manner, so that it partakes of the movement of the device upon its vertical axis, swinging freely thereupon.

In Fig. 3 a simple and convenient means for adjusting the tension of the springs H is afforded by the hand-lever *h*. A turn-buckle *i* might be substituted therefor, as indicated in Fig. 1.

The invention is not limited to the precise details of the construction of the frame I, since the same may be single, as in Fig. 1, which may be more convenient where a turn-buckle is used, or double, as seen in Fig. 3, as preferred. The tension-springs H should all be connected to a transverse part J at their outer ends, to which part the tension-adjusting devices are connected.

The operation of the device is obvious and does not differ from that described in my said prior patent, the special feature of improvement consisting in an organization permitting the horizontal arrangement of tension-spring, whereby a great saving of height is effected without in any way diminishing the operativeness, durability, or range of movement of the parts, and by the use of the term "horizontal" I mean to distinguish the arrangement of the tension-spring from any other heretofore used so far as I am aware. Obviously, however, it is not necessary that the springs should be in a strictly horizontal plane, since any convenient disposition of them below the transverse axis of the arm will be within the scope of my invention. The curved portions of the lower end of the trolley-arm are not restricted to any particular form, since they may be segments of a circle, as indicated, or eccentric, as seen in Fig. 4. The contact device *e* will sometimes leave the conductor, and when so freed therefrom the same will of course be thrown forcibly upward by the tension-spring. Whenever this happens in the immediate vicinity of the supports by which the supply-conductor is carried, the said trolley-arm will come into violent contact therewith, frequently causing sufficient damage to render the parts inoperative, either by tearing down the line-supports or being itself destroyed. This can be obviated by providing an automatic take-up or check, as indicated. The automatic take-up or check may be applied in various different ways, the essential features of which comprise a cord, tape, or line K, which is secured at one end to the trolley-pole near its outer extremity and is connected at its other end to a spring take-up L, by which it is always held, and by which the slack in the line K is absorbed as the trolley-arm is moved downward. The spring in the take-up L may be of any self-coiling type or construction, and should be of a strength only sufficient to wind up the cord K as the arm is depressed, thereby allowing the said arm to rise and fall without absorbing any considerable amount of power in winding up or overcoming the said take-up spring.

Various kinds of automatic stop-springs being well known, I have not considered it necessary to illustrate the same in detail, merely showing a casing L, within which is arranged a self-coiling spring which may be similar to the spring part of an automatic tape-line. Almost any form of spring that can be wound up by pulling out the cord K with slight pressure and is capable of winding itself up to absorb the slack as the arm E is depressed would answer the purpose. The length of the line K should be such as will permit the trolley-arm E to rise to a position as near the vertical as may be necessary to reach the highest parts of the conductor. While the free movement of the trolley-arm will not be interfered with by the line K and take-up spring in the ordinary operation of the device, should the contact-arm leave the conductor its sudden upward movement will be checked by the take-up and damage prevented. Were the take-up not provided the arm would be thrown violently forward with the probability of coming over the roof of the car and causing serious damage even if no cross-wires were in the vicinity.

The take-up device L is preferably located at the edge of the car-roof to the rear of the direction of movement and is preferably sustained upon a hook M, one of which is provided at each end of the car for that purpose. The hooks M are desirably provided with two notches *m m′*, and the take-up L is readily attached thereto, being desirably placed in

engagement with the notch *m*. It may in many cases be convenient to secure the trolley-arm E in its lowest or horizontal position, as in passing under bridges or obstructions, although in practice it would be extremely inconvenient to hold the trolley-arm in that position for any length of time. There I provide the cord K with a loop or extension *k*, which is located at such a point upon the cord K that when said loop *k* is placed upon the outer hook *m'*, the trolley-arm will be in its lowest possible position. Upon releasing the loop *k* the arm will of course rise to its normal position, where it can be pulled down or positioned by the use of the cord K, it requiring no great effort for the conductor to reach up over the lower edge of the car-roof when manipulating the same. The take-up L being detachable, the trolley-arm can readily be reversed by detaching the said take-up from the hook at one end of the car and transferring the same to the similar hook at the opposite end, the trolley-arm and its tension devices turning upon the axis *b* to permit such movement.

The take-up device, as shown in Fig. 1, is provided with a downwardly-extending hook or link m^2, adapted to pass easily over the hooks *m m'*, and which is desirably provided with a short handle to bring it within more convenient proximity when being changed. The take-up may, however, be a fixture, if preferred, as indicated in Fig. 3.

Various minor modifications and changes may be made in the above-described apparatus without in any way departing from the spirit, nature, or scope of the invention.

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

1. A contact-carrying arm hinged upon a transverse axis carried by a vertical support, a tension-spring arranged and sustained in a substantially horizontal position with respect to the vertical support and below the axis of the arm, and connections between said tension-spring and the lower part of the contact-carrying arm, whereby the outer extremity thereof is spring-pressed upward.

2. The combination of a vertical support having a lateral extension and adapted to be mounted upon an electric-railway car, a contact-arm mounted near its lower extremity on a transverse axis carried by said support, and tension-springs connected to the said extension arranged entirely below the support of the arm and engaging its lower extremity for imparting a normally-vertical tendency to its free end.

3. A trolley-arm for electric-railway cars, comprising a vertical support provided with a lateral extension, a contact-carrying arm transversely mounted near its lower extremity upon said support, a curved or extended part forming a portion of said arm and extending below its support, and a tension-spring carried by the support and connected to the lateral extension thereof and arranged wholly below the transverse axis of the arm and connected to the extended lower portion thereof for imparting a normally-vertical tendency to the free end of the arm.

4. In a trolley-arm for electric-railway cars, the combination of a vertical support, a transverse axis upon said vertical support, a contact-carrying arm carried thereon and having a downwardly-extending part below its transverse support, an arm or frame extending horizontally from the vertical support, and a spring connected to the arm or frame and to the lower extremity of the trolley-arm below its support for imparting upward movement thereto.

5. A trolley-arm for electric-railway cars, comprising a short vertical support, a sleeve rotatable thereon, a hinge upon said sleeve, a contact-carrying arm sustained upon the hinge, an extended part below said hinge, a bracket or frame sustained by and extending at right angles from the sleeve, tension-springs connected to the bracket or arm so as to move therewith, and connections between the free ends of the springs and the lower part of the contact-carrying arm, whereby the said springs constantly exert a tension thereon for forcing the outer extremity of the arm in an upward direction from any position.

6. A trolley-arm for electric-railway cars, comprising an arm carrying a contact device at its outer extremity and hinged near its lower extremity upon a transverse axis sustained by a vertical standard, an extended portion or cam-surface secured at the lower extremity of said arm, a frame or bracket carried by the vertical standard and extending rearward thereof, an underacting tension-spring secured to the bracket, and connections between the free end thereof and the extended portion of the lower part of the contact-arm, said spring being arranged substantially at right angles to the vertical support, whereby, when the contact-carrying arm is depressed to a horizontal position, the tension-spring will be in position parallel therewith.

7. A trolley-arm for electric-railway cars, comprising a short vertical standard, a tubular bearing upon said standard, a transverse axis carried by said bearing and having a trolley-arm mounted therein near the lower extremity of said arm and provided with a contact device at its outer free end, a frame or bracket extending laterally from the tubular support, and a tension-spring secured at one end to the extremity of the lateral extension and connected at its other end with the lower end of the trolley-arm, said spring being arranged in a substantially horizontal position and entirely below the transverse axis of the trolley-arm.

8. A trolley-arm for electric-railway cars, comprising a short vertical standard, a tubular bearing upon said standard, a transverse axis carried by said bearing and having a

trolley-arm mounted therein near the lower extremity of said arm and provided with a contact device at its outer free end, a frame or bracket extending laterally from the tubular support, and a tension-spring secured at one end to the extremity of the lateral extension and connected at its other end with the lower end of the trolley-arm, and tension-adjusting devices connected to the outer extremity of the lateral extension and to the tension-spring for varying the tension thereof.

9. The combination, with a trolley-arm and means for imparting an upward pressure thereto, of a check-line connected to its outer or free end, and means for limiting the length thereof, substantially as described.

10. The combination, with a trolley-arm and means for imparting upward movement thereto, of a check-line secured to the outer end of said arm and means for adjusting the greatest length thereof and for taking up the slack of the line when in intermediate position.

11. The combination, with a trolley-arm and means for imparting an upward movement thereto, of a check-line connected to the free end of the arm, a take-up spring acting upon the other end of the check-line, and detachable connections between the take-up device and its support.

12. The combination, with a trolley-arm and means for imparting an upward pressure thereto, of a check-line connected to its outer or free end and acting to limit the upward movement thereof, and a supplemental cord or loop on said check-line, and a hook for engaging the loop when the trolley-arm is in horizontal position.

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

CHARLES J. VAN DEPOELE.

Witnesses:
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