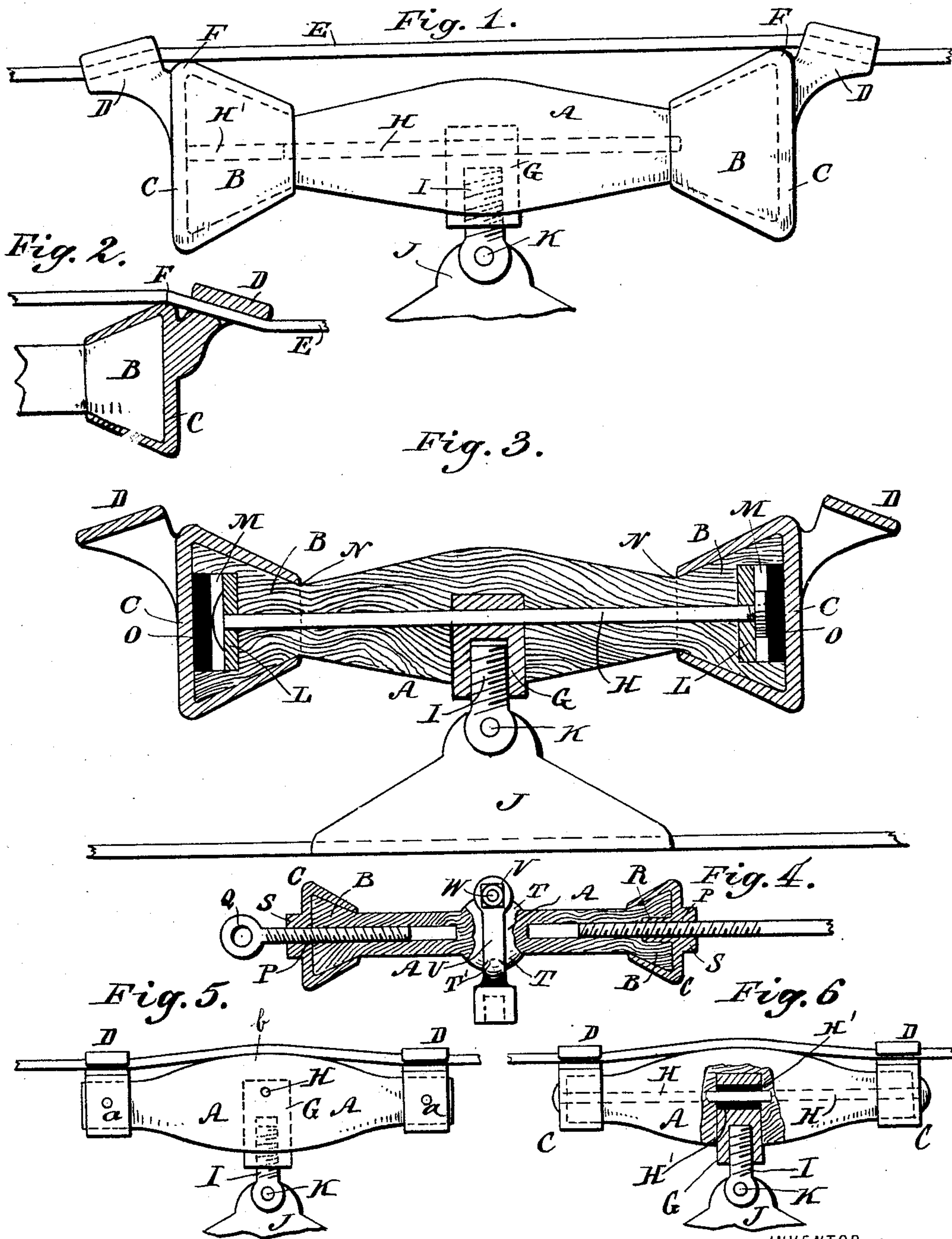


(No Model.)

C. A. LIEB.  
ELECTRIC WIRE SUSPENDER.

No. 452,017.

Patented May 12, 1891.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

CHARLES A. LIEB, OF NEW YORK, N. Y.

## ELECTRIC-WIRE SUSPENDER.

SPECIFICATION forming part of Letters Patent No. 452,017, dated May 12, 1891.

Application filed November 8, 1890. Serial No. 370,832. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES A. LIEB, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Electric-Wire Suspenders, of which the following is a specification.

My invention relates to improved means whereby trolley-wires in overhead systems for electric railways may be attached to the span-wires; and it consists in a body-piece of insulating material provided with means whereby it may be suspended from the span-wires attached to it in such manner as to secure insulation of the trolley-wire.

My invention also comprises a construction of the device in such manner that it will serve not only as a suspender for the trolley-wire, but also as a turn-buckle for tightening or slackening the span-wire.

Figure 1 illustrates a plan of one form of the invention. Fig. 2 illustrates a sectional view longitudinally of one end of the device, as shown in Fig. 1. Fig. 3 illustrates a plan of another form of suspender, showing means whereby fracture of the suspender will not result in dropping the trolley-wire in the street. Fig. 4 illustrates a combined suspender and turn-buckle. Fig. 5 illustrates a modified construction of the suspender shown in Fig. 1. Fig. 6 illustrates an alternative construction of the form of hanger shown in Fig. 5.

In the drawings I show the span-wire as running parallel with the trolley-wire. I do this in order that a more clear idea of the invention may be had. They do not often run parallel with each other, although sometimes they do and also at an angle thereto.

Referring to Figs. 1 and 2, A is the body part of the suspender. It is made of any insulating or non-conducting material or of material duly insulated. B B are enlarged ends, which are inclosed in metallic caps C C, which are compressed upon the enlarged ends, substantially as set forth in my United States Letters Patent No. 435,505, dated September 2, 1890, for a somewhat similar device. In fact, the caps C C may be compressed at their forward ends so hard upon the non-conducting body part as to indent it, and I sometimes make the enlarged ends in this way to prevent slipping or displacement of the caps

from a body-piece which did not originally have enlarged ends, or the ends of the cap may be bent inwardly into grooves made in the insulating body part or piece. D D are hooks which are attached to or form part of the caps C C. They are so formed that the span-wire E may be caught under them, as shown in Fig. 2, and preferably the adjustment of the hook is such that the span-wire will be deflected somewhat from a right line when it crosses over the edge of the caps, as at F F, to pass below the hooks. G is a block of metal set in a hole made in the body-piece A and held therein by a longitudinally-extending pin or bolt H. I is the spindle of the trolley-wire support to which the connection-piece J is pivoted at K, as usual. The spindle I is threaded into the block G, as shown. H' is a plug of wood driven into the hole through which the pin H is passed and in rear thereof, which prevents the pin from working backwardly and coming in contact with the cap C, which might carry current to the cap and thence to the span-wire. I sometimes, however, make this pin H of non-conducting material. If so, the plug H' will not be required. It will be seen that when the trolley-wire is suspended to the span-wire by this device it is completely insulated from the span-wire, and that no current can pass from one to the other, and also that if the hooks D are constructed as shown the bends in the span-wire will prevent longitudinal sliding of the support A along it. And in addition to these features I secure the following advantages, which I believe are not attainable by any prior form of trolley-wire suspenders. The old porcelain or bell-shaped wooden suspenders, whether of porcelain or wood, do not, owing to their material and shape, withstand the blows from trolley-poles which have escaped from the wires, nor do they withstand the action of the elements, but crack, split, burst, or get out of order in various ways, sometimes occasioning the trolley-wheel to leave the wire, and sometimes dropping the line into the street.

In Fig. 3 I show a construction substantially the same as that shown in Figs. 1 and 2, excepting that the pin or rod H has two metallic washers L L firmly riveted on either end thereof, these washers being contained in re-



cesses M, made in both ends of the body part A. The diameter of these washers is greater than that of the opening across the contracted neck of the insulating-body A at N, so that  
 5 if it should break there or at any other place, or be destroyed by fire from any cause the trolley-wire would not drop, because the washer could not escape from the caps. O is a piece of insulating material, which I prefer to in-  
 10 terpose between the washers L L and the caps at each end, so that by no possibility can current pass to the caps through the pin or rod H.

In Fig. 4 I show a combined suspender and  
 15 turn-buckle. The body part A and caps C are the same as explained before, but there are no hooks, because the span-wire in this case engages with the ends of the turn-buckle, and for this reason the caps are centrally  
 20 threaded, as at P, so that the span-wire shown at the right at E, or an eyebolt or its equivalent Q shown at the left, to which the other end of the span-wire will be attached, may be threaded right and left into the caps, and  
 25 they may have an inwardly-extending bushing R shown at the right, which may or may not be threaded, and which will prevent the strain from crushing the end B of the insulator inwardly. The bushing may be inte-  
 30 gral with the cap or in a separate piece, like a section of tubing, and if it be threaded, then the bosses S, which I use to thicken the metal for better hold by the threads, need not be employed. The body part A is preferably en-  
 35 larged a little at its central part, as at T, and a groove T' is made therein, which receives a clamp U, the upper ends V whereof are separable and are united by a screw or bolt W. It preferably does not clamp the body A  
 40 so tightly but that it may be turned to act as a turn-buckle; but if it does, slight loosening of the bolt or screw W will allow it to be turned when necessary.

In Fig. 5 I show a form in which the insu-  
 45 lated body part has not the enlarged ends and caps, but on the contrary simple bands *a a*, on the upper part whereof the hooks D D are placed in the body. It is preferably enlarged centrally, as at *b*, so that it will be addition-  
 50 ally strengthened, and also so that the span-wire E will be deflected from its right line in passing over this enlarged part, thus securing the fixed relation of the suspender relative to the span-wire when in place thereon.  
 55 In this case, also, I show the block G as held in place by a pin H, running crosswise instead of lengthwise of the suspender-body.

In Fig. 6 I show a form similar to that shown in Fig. 6, excepting that the end pieces or  
 60 rings are cup-shaped, and the block G is held in place by a longitudinal instead of a crosswise bolt or pin H, which passes through the ends of the caps C C and is riveted thereon. Of course the block has to be insulated from  
 65 the pin H. This I do by inclosing the pin in a bushing H' of insulating material. This is another form in which the wire will not drop

irrespective of injury to the suspender by burning, &c., as before stated.

I desire to call special attention to one fea- 70  
 ture of my invention, which, although not perhaps the most essential, is apt to be over-  
 looked unless attention be called to it. It is as follows: Short-circuiting from the flanges  
 75 of the trolley-wheel is very apt to occur by reason of the current leaving the flanges as it passes under the supports, especially be-  
 cause, owing to the contraction and expansion of the trolley-wire, the supporters are frequently canted or tilted from their verti- 80  
 cal position, thus bringing the trolley-wire closer to the metal part of the supports. Thus the short-circuiting above alluded to is  
 rendered more liable to occur, especially if ice or snow be deposited upon the parts; also, 85  
 if the trolley-wheel should leave the wire adjacent to a supporter short-circuiting is liable to occur through the wheel itself or some  
 part of its frame coming in contact with the trolley-wire, some other part of it, probably 90  
 the flanges of the wheel, coming in contact with the metal parts of the supporter. By my construction all of these defects are com-  
 pletely obviated, because the insulated body part may be as long as desired—a foot if nec- 95  
 essary—and it will be still very light and the metal caps or rings at the two ends of the insulating body part will be so far removed  
 from the flanges of the trolley-wheel and from the trolley-wire that the short-circuit- 100  
 ing above alluded to cannot in any instance occur.

I do not limit myself to the details of construction of the devices, as described and  
 shown, because alteration may be made 105  
 therein and still the essentials of my invention be employed.

I claim—

1. A suspender for electric wires, comprising, essentially, an insulating body part hav- 110  
 ing at each end a hook-like device, which are insulated from each other, and whereby it may be hung to another wire or support, and insulated means for attaching the trolley or  
 other wire to it, substantially as set forth. 115

2. A suspender for electric wires, comprising, essentially, a horizontally-disposed insulating body part having means at each end, insulated from each other, whereby it may be  
 attached to another wire by bending the same, 120  
 and insulated means for attaching a trolley or other wire to it, substantially as set forth.

3. A suspender for electric wires, comprising, essentially, an insulating body part, insulated means whereby a trolley or other wire 125  
 may be attached thereto, chambered caps which inclose the ends of the body part, and a rod extending through the body part and provided with washers or heads within the caps, and which are larger than the opening into 130  
 them, substantially as set forth.

4. A suspender for electric wires, comprising, essentially, an insulating body part, insulated means whereby a trolley or other wire



may be attached thereto, chambered caps which inclose the ends of the body part, a rod extending through the body part and provided with washers or heads within the caps, 5 which are larger than the opening into them, and which are insulated from the caps, substantially as set forth.

10 5. A suspender for trolley-wires, comprising, essentially, a horizontally-disposed insulating body part provided with means at each end whereby it may be attached to a span-wire, means, substantially as described, whereby the

trolley-wire will be held from falling should the insulated body part be destroyed, and means for attaching the trolley-wire to the 15 suspender, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 7th day of November, A. D. 1890.

CHARLES A. LIEB.

Witnesses:

PHILLIPS ABBOTT,  
FREDERICK SMITH.