(No Model.)

C. J. VAN DEPOELE.

CONSTANT UPWARD PRESSURE CONTACT FOR OVERHEAD CONDUCTORS.

No. 394,037. Patented Dec. 4, 1888.

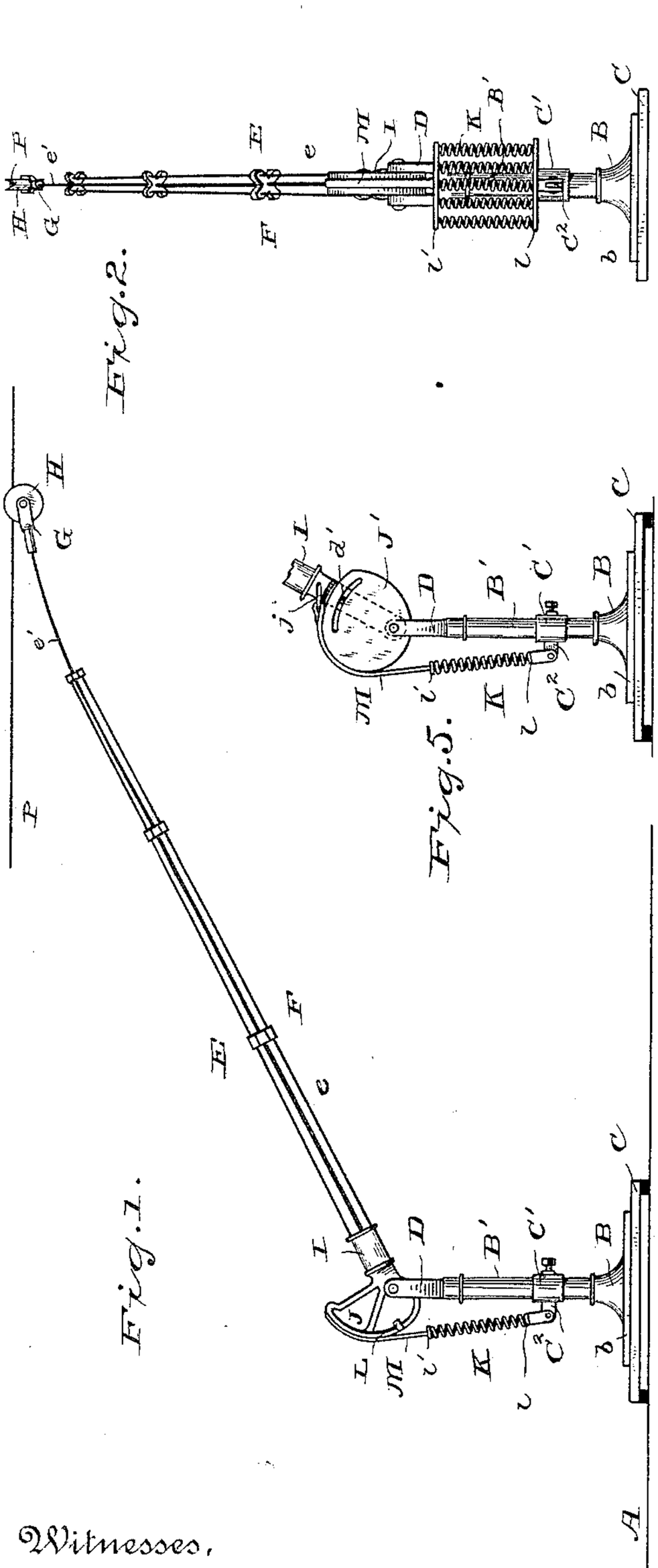

Fig. 1.

Fig. 5.

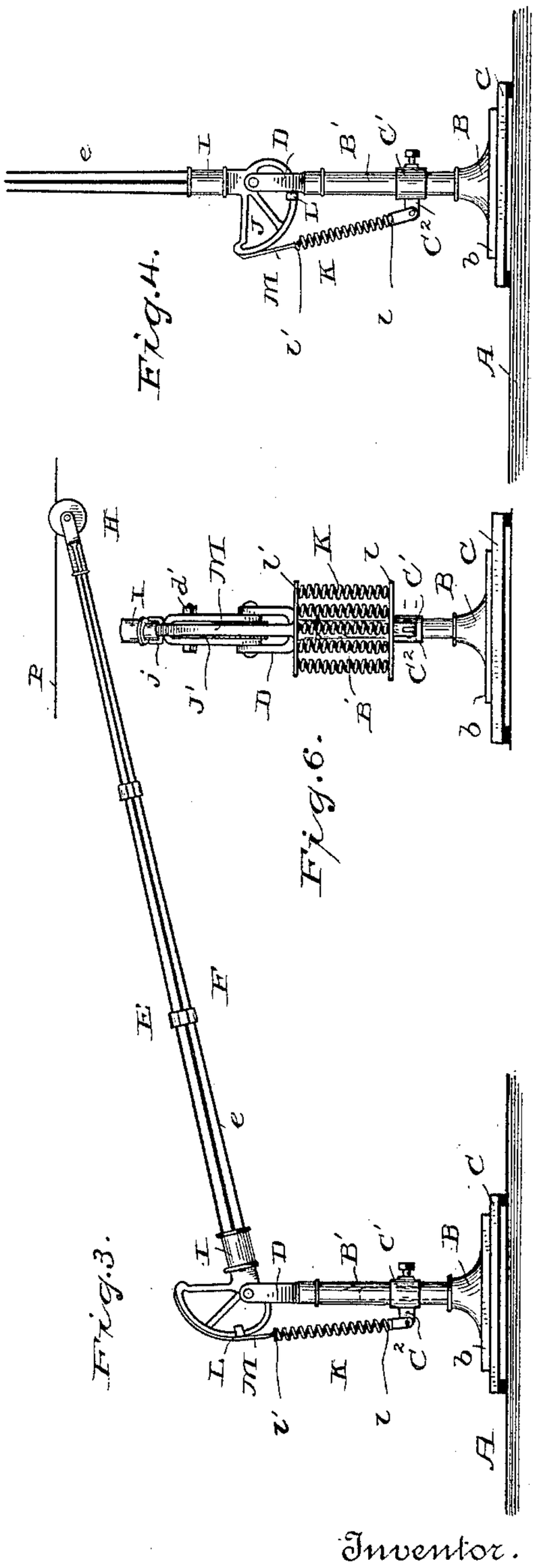

Fig. 4.

Fig. 6.

Fig. 3.

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CONSTANT UPWARD-PRESSURE CONTACT FOR OVERHEAD CONDUCTORS.

SPECIFICATION forming part of Letters Patent No. 394,037, dated December 4, 1888.

Application filed August 9, 1888. Serial No. 282,332. (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, State of Massachusetts, have invented certain new and useful Improvements in Constant Upward-Pressure Contacts for Overhead Conductors, of which the following is a description.

My invention relates to improvements in electric railways, more particularly to that feature thereof which comprises the traveling connection between the moving car and a suspended supply-conductor.

The main feature of the invention comprises a contact-carrying arm of novel design and means for maintaining an upward contact of constant pressure between the contact device at the extremity thereof and the undulating under side of the suspended conductor.

The details of my improvement will be hereinafter fully set forth, in connection with the accompanying drawings, in which—

Figure 1 is an elevation showing a portion of the top of an electric-railway car and my improved contact-arm in operative position thereon. Fig. 2 is an end view of the contact-arm and tension-springs. Fig. 3 is a view in elevation with the contact-arm in different positions, the contact-arm itself being shown as without the flexible portion. Fig. 4 is an elevation showing the relationship of the tension devices in another different position. Figs. 5 and 6 are respectively an elevation and an end view of a different form of compensating device.

As seen in the drawings, upon the top of the car A, centrally, or in any other desired position, is mounted upon a suitable thickness of insulation a metallic post, B, which is provided with an extended base, *b*, between which and the metallic roof of the car is interposed a suitable thickness of insulation, C. Upon the post B is placed a rotatable and removable sleeve, B′, to the upper end of which is secured a fork, D, which latter is thus pivotally supported upon the post B and capable of rotary movement thereon to any desired extent. A vertically-adjustable collar, C′, is also secured upon the exterior of the sleeve B and provided with a projection, C^2, as will appear.

E is the contact-carrying arm, which is constructed of a number of light metallic rods or wires, *e*, united at suitable distances by stay-plates F. The outer extremities of the rods *e* are permanently secured to a collar, or to the shank of a fork, G, between the prongs of which is journaled or otherwise mounted the contact-wheel or device H. The lower extremities of the rods *e* are likewise similarly attached to a block, I, which may be formed integral with or be subsequently attached to an elliptical or sloping cam, J, or to an eccentric which is pivotally mounted between the extremities of the fork D, with the extended portion of the cam projecting rearward and upward, the arm being thus universally movable upon its support. To the projection C^2 of the vertically-adjustable collar C′ are attached the lower extremities of tension-springs K, the upper extremities of said springs being connected to a band, M, engaging the face of the cam J and firmly secured at its highest point.

The tension of the springs K, acting through the band M, tends to elevate the extremity of the contact-carrying arm E, and thereby to hold the contact H against the under side of the supply-conductor P. Great difficulty has heretofore been experienced in maintaining said contact with good operative effect, for the reason that as it is impracticable to suspend the conductor P in a perfectly horizontal line at the same distance above the track in all places, the tension-spring heretofore used by me was either required to be unnecessarily strong, in order to elevate the contact-wheel as much as might in some cases be desired, or else its range of effective movement was too limited. By my present invention, however, all these objections are overcome.

The radius of the cam J, as seen in Figs. 1 to 4, is that of the involute of a semicircle, otherwise known as an "Archimedean spiral," and it increases in diameter toward its upper part in proportion to the loss of power by the tension-springs in contracting—that is to say, as the springs K elevate the outer end of the contact-arm and become weaker their operative leverage upon said arm is increased by the increased radius of the cam J, so that the effect of said springs upon the con-

tact-arm and the pressure with which said contact is held up against the conductor is practically uniform throughout its entire range of movement.

The radius of the cam J will not be the same under all circumstances, and where the contact-arm is made heavier, or the contact-wheel varied in size, or the contact-arm made longer or shorter, cams of suitably-different radii are provided, or the cam is made adjustable or in the form of an eccentric and provided with means for adjustment to the service required.

As shown in Fig. 5, an eccentric, J′, may be substituted for the cam J. The eccentric is mounted in the fork D, and the shank *d* of the contact-arm is also supported upon the same pivot. The shank or lower end of the contact-arm is secured to the eccentric by an adjustable connection—as, for example, by the curved brace arm or arms, or by the bolt *d′* moving in a curved slot in the eccentric and by which the arm is bolted or clamped in desired relation to the eccentric J′. The band M may be attached at different points upon the face of the eccentric by a movable screw-bolt, or directly to the shank of the arm, as by link *j*.

As other means of adjustment will be obvious in view of the foregoing, the form illustrated will suffice.

Theoretically, a single tension-spring attached at one end to the extension C^2 of the adjustable sleeve C′ and at its other to the band M would suffice; but in practice it is found that a bunch of springs—containing, for example, five—all of much lighter wire, will produce the desired effect in a more satisfactory manner than the single heavy spring referred to, and, furthermore, be much more easily handled both for adjustment and in construction. I have therefore shown a bunch of springs, as indicated by the letter K, the lower extremities of which are hooked into a cross-plate *l*, said cross-plate being bolted to the projection C^2. The upper ends of the springs K are similarly secured to a cross-plate, *l′*, connected to the band M.

In Figs. 1, 2, and 3 the arm is seen at different elevations, from which the difference in leverage in the different positions will be apparent. A stop, L, is formed or attached to the cam J, and constructed to engage the fork D, to limit the movement of the arm and prevent the tension-springs from throwing it over backward, in case the contact device should become accidently detached from the conductor.

The contact-arm, as just described, is a perfectly rigid structure, and as such embodies one form of my invention. For many purposes, however, it is advantageous to construct the arm so that a part at least thereof, desirably the outer end portion, shall be flexible. Each component member of the arm consists, as stated, of a thin metallic rod possessing considerable elasticity, but rigidly secured in the cross-plates F. When all the rods are rigidly secured in the cross-plates, as seen in Fig. 3, the structure as a whole is practically rigid; but in the form shown in Fig. 1 a central rod, *e′*, carrying the contact H at its outer extremity, is added. The rod *e′* passes loosely through the outer plate, and may also project beyond said plate for a length of one or two feet. It is rigidly secured in the next cross-plate, and may terminate there or extend the entire length of the arm and be secured in block I. This arrangement, while allowing the end portion to bend freely, will impart a very useful degree of flexibitity to the contact-supporting device, which will materially lessen its tendency, if any there be, to jump or spring downward from the wire when making switches or in passing any obstruction or obstacle that may be encountered.

It will be understood that the cam J, or its equivalent, constitutes a distinct feature of invention, irrespective of the construction of the arm used in connection therewith, and that the arrangement of the tension springs or devices might be materially modified without departing from the invention.

It will be understood, moreover, that various minor modifications and changes may be made in the structure herein shown and particularly described by way of illustration, and I therefore do not limit myself to the precise details set forth.

In the foregoing I have described a sloping cam or an adjustable eccentric as a means of imparting constant upward pressure to the contact-carrying arm. In using the term "cam" I intend to include both these features or anything equivalent thereto.

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

1. An upward-pressure contact for electric railways, comprising the combination, with a universally-movable arm, of a sloping cam attached thereto, and a tension-spring connected with said cam and acting to exert a practically constant force upon said arm throughout its operative range of movement, substantially as described.

2. An upward-pressure contact for electric railways, comprising the combination, with a movable arm carrying a contact device at its outer extremity, of a cam at its lower extremity, and a tension-spring connected with said cam and acting to exert a practically constant upward pressure upon the outer extremity of said arm throughout its operative range of movement, substantially as described.

3. An upward-pressure contact for electric railways, comprising the combination, with a movable arm, of a cam adjustably connected thereto, and a tension-spring connected with the cam and acting to exert a constant force upon said arm throughout its operative range of movement, substantially as described.

4. An upward-pressure contact for electric

railways, comprising the combination, with a hinged arm carrying a contact at its outer extremity, of an adjustable cam connected to its lower extremity, a spring connected to said cam for imparting upward movement to the contact-carrying arm, and movable clamping devices for connecting the arm and cam or eccentric in any desired relation, substantially as described.

5. An upward-pressure contact for electric railways, comprising the combination, with a hinged arm carrying a contact at its outer end, of a cam at its lower extremity, and a tension-spring connected to said cam and acting to press the outer end of the contact-arm upward with a constant pressure throughout its operative range of movement, substantially as described.

6. An upward-pressure contact for electric railways, comprising the combination, with a hinged arm carrying a contact at its outer end and a sloping cam at its lower extremity, of a tension-spring connected to said cam, whereby as the tension of the spring decreases with the elevation of the arm its leverage thereon will be increased, substantially as described.

7. An upward-pressure contact for electric railways, comprising the combination, with hinged arm, of a hinge-support for the lower end thereof, an eccentric also mounted upon said support and adjustably connected to the arm, and a tension-spring connected to the face of the eccentric for imparting upward movement to the outer portion of the arm, substantially as described.

8. An upward-pressure contact for electric railways, comprising the combination of a hinged arm carrying a contact at its outer extremity, the cam J at its lower extremity, the tension-spring K, and a flexible connection extending from the spring and engaging the face of the cam, substantially as described.

9. An upward-pressure contact for electric railways, comprising the combination of a contact-carrying arm, a sloping cam at its lower extremity, a tension-spring connected to the face of the cam for imparting upward motion to the outer extremity of the arm, and a fixed support and a movable support sustained thereon, and carrying the arm, cam, and tension-spring, substantially as described.

10. A contact-carrying arm mounted upon a hinged support and having a flexible end portion, to which the contact device is secured, substantially as described.

11. A contact-arm composed of side rods secured in cross-plates and forming a rigid structure, and a flexible end rod centrally disposed and secured in one of the plates and passing loosely through the end plate and carrying the contact device, as described.

12. The combination of an arm carrying a contact at its outer extremity and a cam at its inner end, a fixed support, B, a tubular support rotatably mounted thereon and hinged at its upper extremity to the lower part of the contact-arm, a tension-spring connected to and acting upon the face of the cam, and a support for the tension-spring adjustably mounted upon the rotatable support.

13. An upward-pressure contact for electric railways, comprising the combination of the hinged arm, the cam, the tension-spring connected to the cam for imparting upward movement to the outer portion of the arm, and a stop for limiting said upward movement, substantially as described.

14. A contact-arm composed of a truss having a flexible rod secured in its end portion and carrying a contact device at its outer extremity, substantially as described.

15. A contact-arm mounted upon a hinged support and having a portion of its length rigid or semi-rigid, and a flexible whip-like end, to which the contact-trolley is secured, substantially as described.

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

CHARLES J. VAN DEPOELE.

Witnesses:
FRANKLAND JANNUS,
MARTIN R. KAYS.