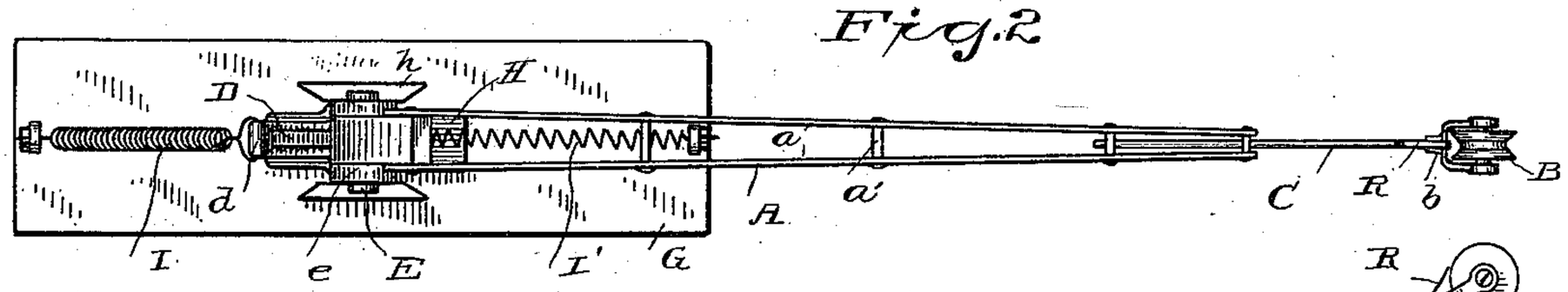
(No Model.) 2 Sheets—Sheet 1.

C. J. VAN DEPOELE.

CONTACT ARM FOR ELECTRIC RAILWAY MOTOR CARS.

No. 408,638. Patented Aug. 6, 1889.

Fig. 2



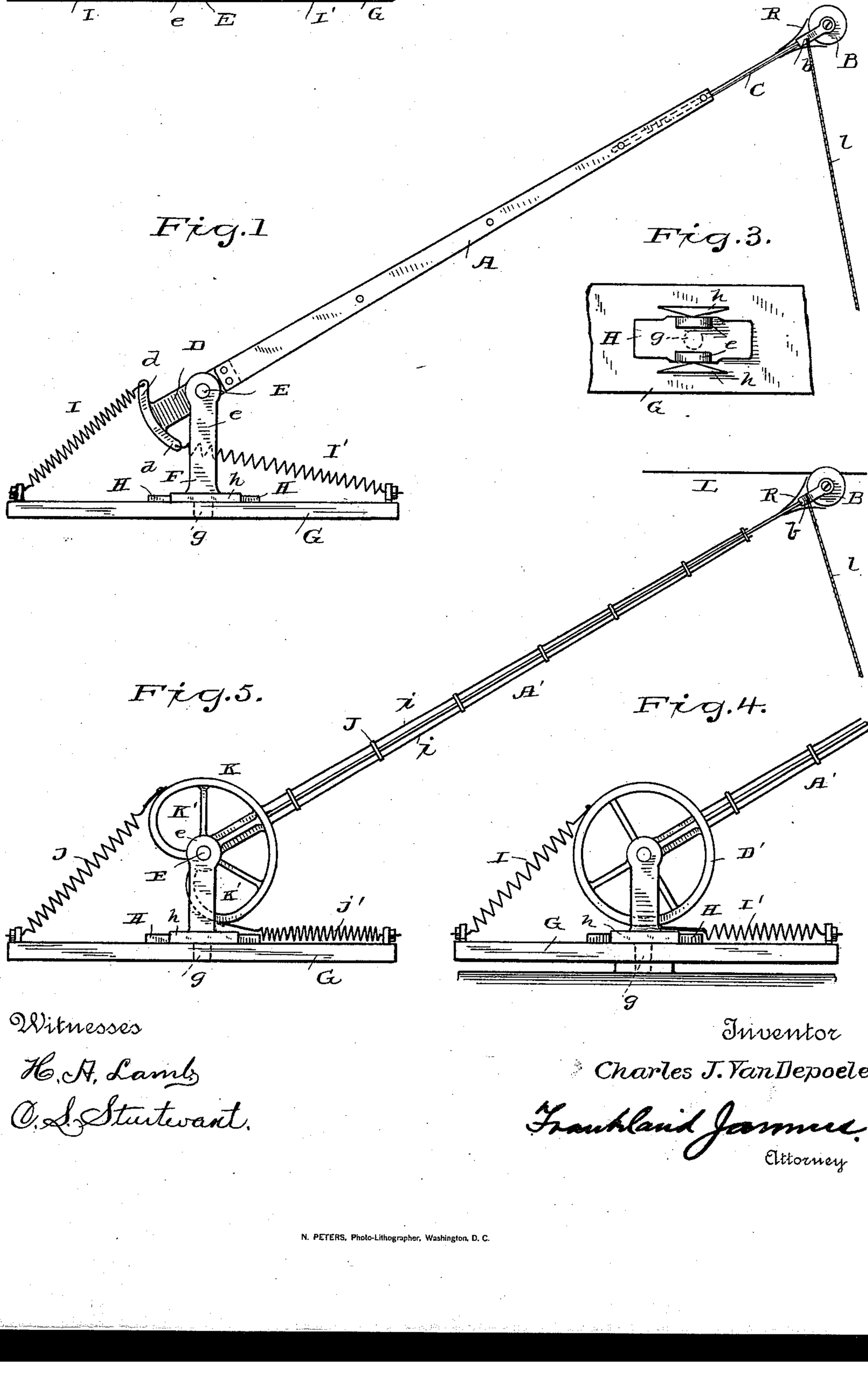


Fig. 1

Fig. 3.

Fig. 5.

Fig. 4.

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Fig. 7.

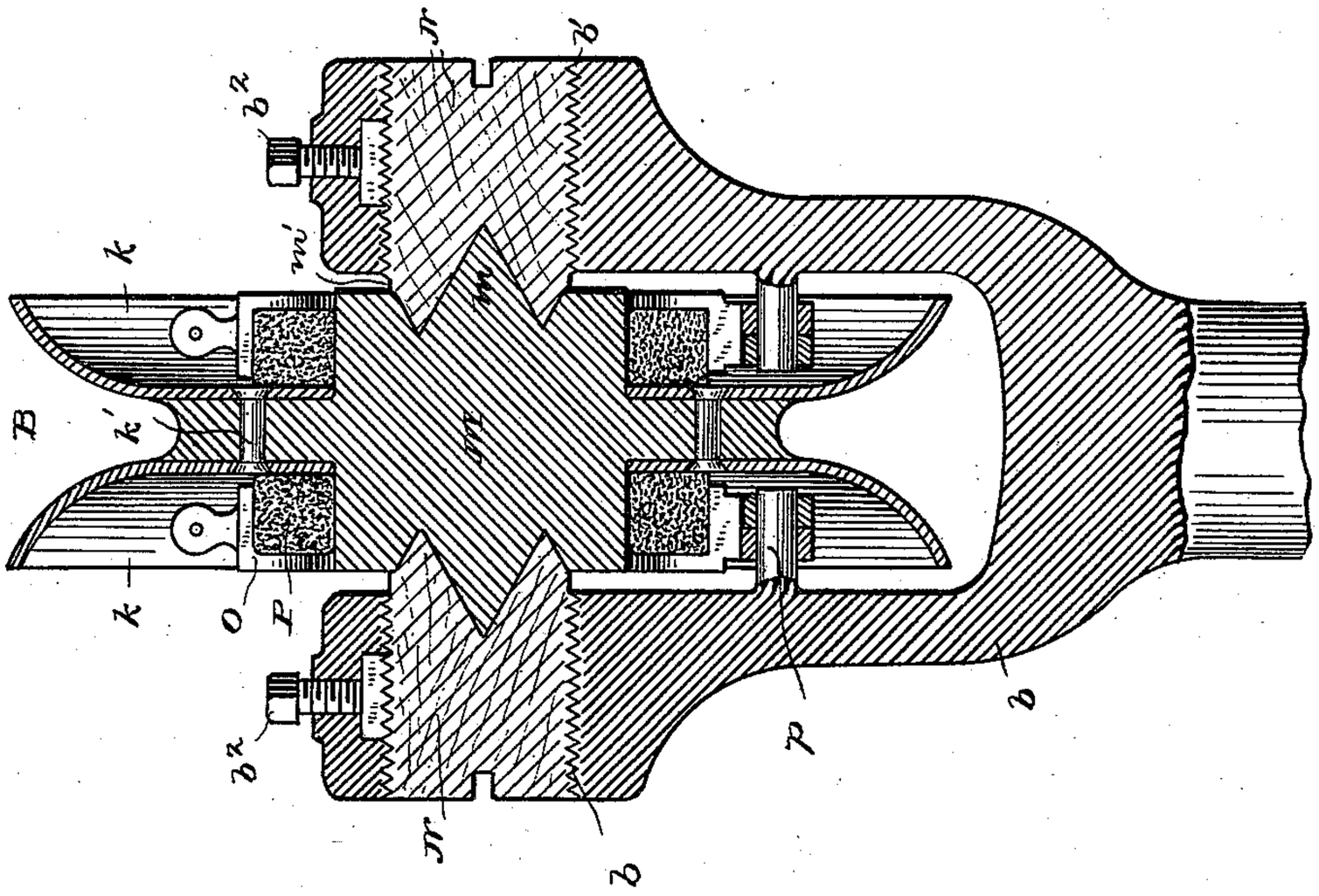
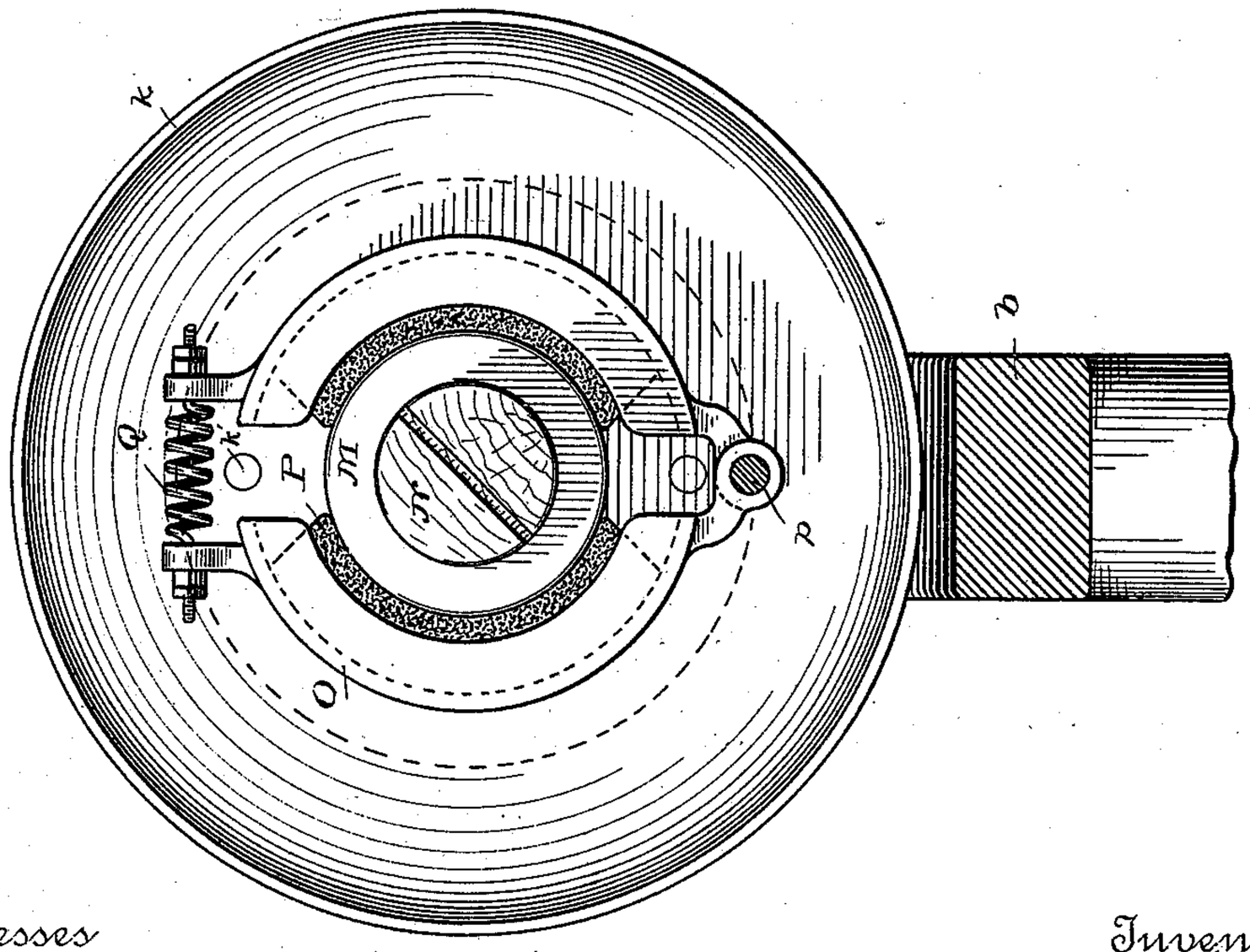


Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

CONTACT-ARM FOR ELECTRIC-RAILWAY MOTOR-CARS.

SPECIFICATION forming part of Letters Patent No. 408,638, dated August 6, 1889.

Application filed April 2, 1889. Serial No. 305,728. (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 Contact-Arms for Electric-Railway Motor-Cars, of which the following is a description, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon.

My invention relates to improvements in contact devices for electric railways of the class in which the current is supplied to the motor upon the traveling vehicle from a conductor suspended above the line of travel through a contact device engaging the under side of said conductor and held up into operative position by means of a spring-actuated arm mounted upon the upper portion of the car.

The details of the invention will be hereinafter described, and referred to in the appended claims.

In the drawings, Figure 1 is a view in elevation, showing a contact-arm and supports embodying the invention. Fig. 2 is a plan view thereof. Fig. 3 is a detail plan view of the arm-supporting devices. Fig. 4 is also a view in elevation, showing a slightly-different construction of the lower part of the arm and a different arrangement of the supporting-base. Fig. 5 is a view, also in elevation, showing a contact-arm differing from those seen in other figures, mainly in the arrangement of the tension-springs. Fig. 6 shows in elevation and on an enlarged scale an improved form of contact-wheel or trolley. Fig. 7 is a transverse vertical section of the trolley seen in Fig. 5.

As indicated in the drawings, A is a contact-carrying arm, which, as shown, is composed of two thin tapering metallic bars *a a*, united at intervals by braces *a'*, forming a strong, rigid, yet comparatively light structure. The arm A is provided at its outer extremity with a contact-wheel or trolley B, which, as shown, is mounted within a fork *b*, formed upon or attached to the extremity of a light steel rod C, which is secured in the extremity of the arm A. The rod C may possess considerable flexibility, which will aid the trolley in varying the sinuosities of the conductor, and will, furthermore, tend to lighten the outer extremity of the arm A, thereby relieving the-tension-springs.

The side bars *a a* are united at their outer extremities to a stout metallic shank D, provided at its lower portion with extensions *d d* and hinged a short distance above its lower extremity upon a bearing or pin E. The pin E, constituting the hinged bearing of the arm A, passes through and is secured in the upper extremities of arms *e e* of a forked or bifurcated post F, which is pivotally supported upon a suitable base or foundation G by a stout pin *g*, extending through or secured to said base. The pin *g* may be prolonged and form the support of both the base and the arm, as indicated in Fig. 4, or the base G may be rigidly secured to the top of the car, as in Figs. 1 and 5, in which event the pivot-pin *g* does not extend beyond said base. When constructed as shown, the pivoted post F is provided with extensions H H at its lower portion, and side checks *h h* are secured upon the base G in proximity to said extensions for the purpose of limiting the lateral swing of the arm A and its pivotal support F.

The arm A is normally held in vertical position by tension-springs I I', connected to the extensions *d d* upon the block D at the lower end of the arm A, and also secured at their opposite extremities to the ends of the base G. The springs I I' therefore would normally act equally upon the lower portion of the arm A, and if of equal strength would hold it in a vertical position. When, however, the said arm is pulled down in either direction—that is, toward either end of the car—one of the springs will be extended between the arms *e e* of the post F, and both of said springs will tend to return the arm to its vertical position. This action will take place from either direction, the springs being simply reversed in position and both acting to hold the outer end of the arm A upward, and when in operative position to press the trolley B against the under side of a suspended conductor. The shank D may be replaced by a cam, semi-circle, or, if more convenient, by a complete wheel D', Fig. 4, the rest of the supporting-structure remaining the same. With this arrangement the ten-

sion-springs I I′ will be connected by short bands and attached upon the periphery of the wheel D′ in position to secure results similar to those shown and described with reference to Fig. 1.

The arm A′, a portion of which is seen in Fig. 4, and which is shown complete in Fig. 5, is of a form described in Patent No. 394,037, granted to me December 4, 1888, being composed of a number of light steel rods *i i*, united by plates or cross-pieces J at suitable intervals, the arm, when so constructed, forming a light strong truss-frame.

As seen in Fig. 5, a duplex form of constant-pressure cam K, described and claimed in my said patent, is shown, the supports and remainder of the structure remaining the same. With this arrangement the tension-springs *j j′* are secured at opposite ends of the base G and connected from opposite directions to opposite points upon the periphery of a heart-shaped cam K′, to which the lower extremity of the arm A′ is attached, the said cam being centrally hinged upon the pin E. With this arrangement the arm is normally held in vertical position by combined tension of the springs *j j′*, and is equally operative from either direction.

With the form of support described it will be understood that the arm can be operated from either end of the car, and in its simplest form is reversed by detaching the trolley B from the conductor L by any suitable means—as, for example, a rope *l*—then permitting it to rise to a vertical position, and then pulling it downward from the opposite direction and permitting it to rise into engagement with the said conductor. If desired, however, as indicated in Fig. 4, the arm, with its supports, may be rotated upon the central pivot when being reversed. This would be convenient in positions where the conductor occupied the highest point and could neither be elevated nor permit of the contact-carrying arm being allowed to rise into a vertical position to be reversed. Furthermore, it will be obvious that it is not even necessary to detach the trolley from the conductor when reversing—that is, where it is possible to raise the conductor—for under these conditions the arm and contact may be reversed in position by simply pulling the same rearward, raising the conductor as the arm reaches a vertical position. With the arrangement shown in Figs. 1 and 4 a still further advantage is gained in that all the springs used coact to impart upward pressure to the outer extremity of the arm, and therefore the greatest upward pressure can be attained with the fewest number or minimum strength of springs.

The trolley B is a grooved metallic wheel constructed, desirably, of light exterior metallic shells *k k*, secured by rivets or bolts *k′* to a central steel hub M. As seen, the hub M is provided with conical central projections *m*, which may also be formed with annular grooves *m′* at their bases, and as bearings or supports for the wheel B, I provide adjustable anti-friction blocks N, formed at their extremities to engage and receive the cones upon the hub M. Blocks N are adjustably secured in the extremities of the arms of the fork *b*, and, as shown, they are exteriorly screw-threaded and pass through screw-threaded apertures *b′ b′* in said fork, being retained in the desired positions by set-screws b^2, extending through the metal of the fork and bearing upon the blocks N. The blocks N are desirably of wood, and, after having been formed of desired shape, are boiled or treated with a fatty or waxy substance for the purpose of filling the pores to protect them from the effects of moisture. The filling in the blocks N will furthermore act as a lubricant to the cones of the hub M; but the wearing-surfaces should be supplied with a lubricant—such, for example, as plumbago or any good lubricating material—with which they may be periodically supplied, if needed.

The cones *m* on the hub M should be well polished in the first instance, when their action upon the blocks N will be to produce a perfectly smooth anti-friction surface, and even should some heat be developed at first the effect thereof will be to produce a carbonized wearing-surface, which is found in practice to be extremely durable and satisfactory. A bearing constructed in this manner will wear very slowly, will not readily heat, and may run without lubrication after the wearing-surfaces have become perfectly smooth.

Adjustment is provided and an additional advantage accompanies the use of non-metallic bearings in that the current collected by the contact-wheel will not pass therethrough. This or any equivalent arrangement avoids the cutting and abrasion of the bearings otherwise caused by the current passing through a metal bearing from the contact-wheel, then through the shaft and bearing through the lubricant, since the lubricant is destroyed or burned up very rapidly where the current is forced to flow through it. I find, however, that where the current is conveyed away from the body of the contact-wheel without passing through the bearings its life is very greatly prolonged. The bearings N, while desirably of wood, may be of a great variety of materials, as vulcanized fiber, compressed leather, or, in fact, any porous fibrous substance or material. The hub M is desirably of steel, although it may be made of other metal; and while I have described the outer portion of the trolley B as being composed of shells *k k* it will be understood that the wheel may be made solid where preferred, the present construction embodying the advantage that the most readily-wearing portions—viz., the flanges or shells *k*—may be removed and replaced when worn out without the necessity of providing and adjusting a new set of bearings.

It will be entirely obvious that the arrangement here shown may be reversed and that

the axis of the contact-wheel may be non-metallic and the bearings of metal without in any way departing from the invention.

The hub M of the wheel B being practically insulated from the forks *b*, the current is collected from the exterior of the wheel—as, for example, by spring-contacts O, which are provided with contact-surfaces P, desirably of carbon, which bear upon the exterior of the hub M. The contacts P are desirably segmental pieces of carbon secured to semicircular metallic holders O.

The contact-holders O are semicircular metallic strips, which, as indicated, are pivotally supported upon pins or bolts *p*, formed upon or attached to the arms *b' b'* of the fork *b*, and they hold the contacts P with a suitable pressure upon the hub M, being spring-held toward each other by an adjustable tension spring or springs O, adjustably secured to and connecting their upper extremities.

The precise form of the contact devices O P may be varied considerably without departing from the invention, and although I prefer carbon for the contact-surfaces P it will be obvious that the same might be omitted and metallic brushes bearing directly upon the hub M be substituted as an equivalent therefor.

Guard fingers or springs R are provided at the base of the fork *b* for the purpose of preventing injury to the edges of the trolley B in case the arm A should be carried under a transverse wire or obstruction. The said guards R are secured near the extremity of the rod C and are curved upwardly, but without coming into contact with the trolley B. In passing under a transverse obstruction the said guards would act to depress the arm and permit the wheel B to pass safely thereunder without injury.

Various minor changes and modifications may be made in the hereinbefore-described devices without departing from the invention, and it will be apparent that the tension devices by which upward pressure is imparted to the free extremity of the contact-arm may be applied or employed in connection with an arm of any desired construction. Likewise my improved contact-wheel and bearings may be employed in connection with any species of support.

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

1. In electric railways, a contact-arm carrying a contact device at its free extremity and hinged at or near its lower end in a support adapted to be mounted upon the roof of a car or vehicle, and a plurality of tension-springs connected to the lower part of the arm and to its support and coacting under tension to impart upward pressure to the free end thereof, substantially as described.

2. In electric railways, a contact-arm carrying a contact device at its free extremity and hinged at or near its lower end in a support adapted to be mounted upon the roof of a car or vehicle, and two sets of tension-springs connected to the arm and to its support and coacting under tension to press the outer end of the arm upward from either direction, substantially as described.

3. In electric railways, a car provided with a contact-carrying arm having a contact device at its free extremity and mounted at or near its lower end upon a support located upon the top of the car, and tension-springs connected to the lower part of the said arm and to its support from opposing directions and coacting under tension to impart upward pressure thereto, substantially as described.

4. The combination, with an electric-railway car, of a contact-carrying arm extending upwardly therefrom and pivotally supported near its lower end, and oppositely-acting tension-springs connected to the lower part of the arm and to its support and arranged to coact under tension to impart upward movement to the free end thereof, substantially as described.

5. In electric railways, a contact-arm carrying a contact device at its free extremity and hinged at or near its lower end in supports adapted to be mounted upon the roof of the car, pressure-equalizing devices at the lower end of said arm below its support, and tension-springs connected to said lower extremity and to the support from opposite directions and coacting under tension to impart upward movement to the free end thereof, substantially as described.

6. In electric railways, an upward-pressure contact device comprising a suitable base, a bifurcated support pivoted upon said base, an arm having a contact device at its free extremity and pivoted near its lower end in the bifurcated support, and tension-springs connected to the lower portion of the arm below its pivot and from opposing directions, said springs coacting to impart upward movement to the free extremity of the arm, substantially as described.

7. A contact-wheel or trolley having metal contact-surfaces and non-metallic anti-friction bearings supporting each end of the axis thereof.

8. A contact-wheel having a grooved metallic periphery, a metallic hub, and non-metallic bearings supporting each end of the axis thereof, and contact-making devices electrically connecting the contact-wheel and its supports, substantially as described.

9. A contact-wheel having a grooved metallic outer portion to receive the conductor, non-metallic anti-friction bearings rotatively sustaining said metallic portion, and electrical connections between the metallic portions of the wheels and suitable connections for carrying the current collected thereby, substantially as described.

10. The combination, with a bifurcated support, of non-metallic anti-friction bearings therein, a metallic grooved contact-wheel

mounted between said bearings, and contact devices carried by the support and engaging the exterior of the contact-wheel, substantially as described.

11. The combination, with a metallic support, non-metallic bearings therein, and a grooved metallic contact-wheel mounted in the non-metallic bearings and insulated thereby from its support, of contact devices connected to the support and in electrical connection with the metallic contact-wheel, substantially as described.

12. A contact-wheel having a solid metallic hub and removable flanges adapted to be secured to said hub and having a groove between their upper edges, substantially as described.

13. The combination of a metallic contact-wheel, anti-friction supports or bearings therefor, and carbon-contacts spring-pressed upon the exterior of the hub of the wheel, substantially as described.

14. The combination of a bifurcated support, a contact-wheel mounted therein, and guides R, for deflecting the wheel and protecting it from injury, substantially as and for the purpose set forth.

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

CHARLES J. VAN DEPOELE.

Witnesses:
FRANKLAND JANNUS,
CHAS. L. STURTEVANT.