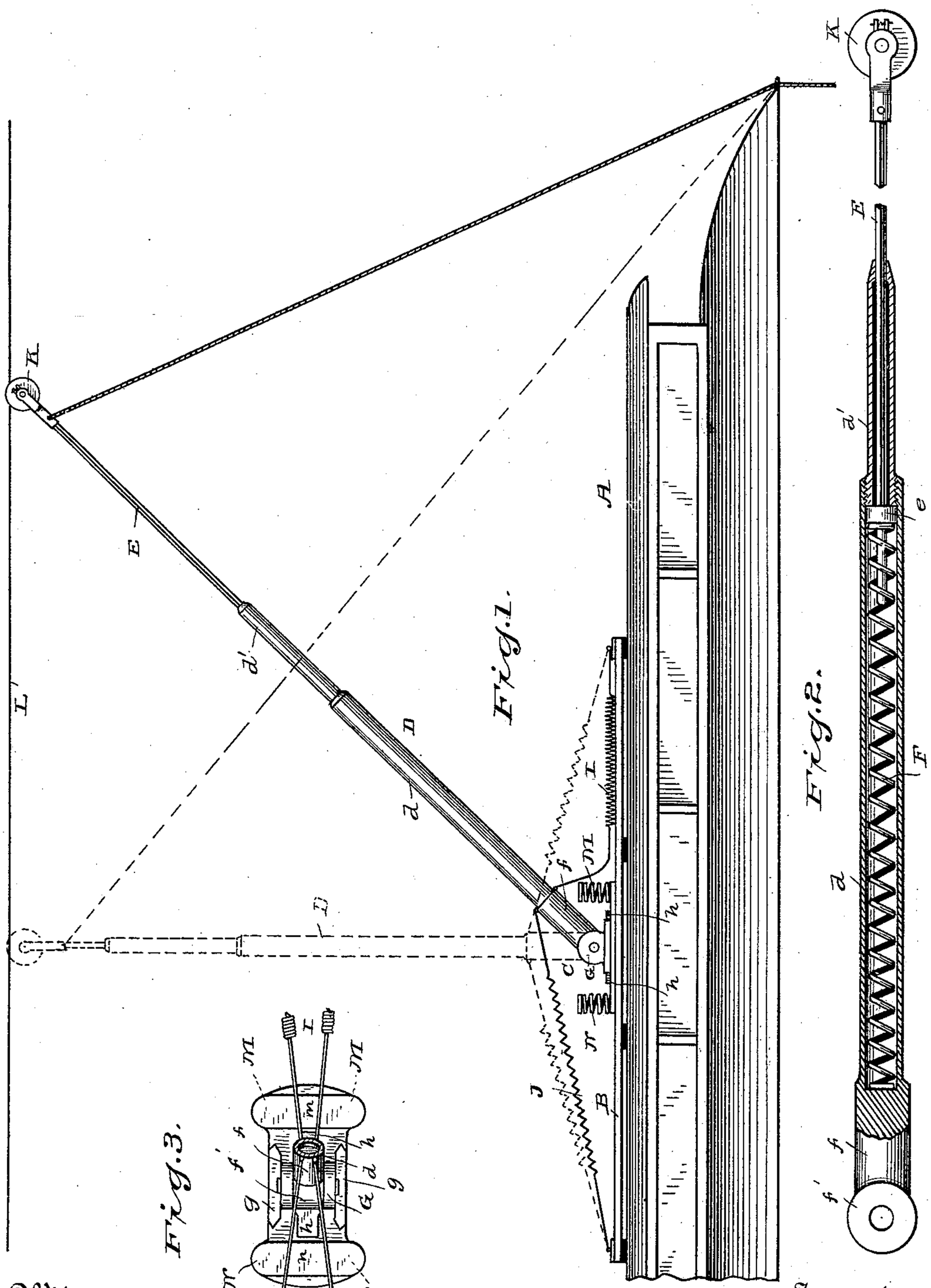
(No Model.) 2 Sheets—Sheet 1.

C. J. VAN DEPOELE.

EXTENSIBLE UPWARD PRESSURE CONTACT ARM.

No. 407,749. Patented July 23, 1889.



Witnesses

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(No Model.) 2 Sheets—Sheet 2.

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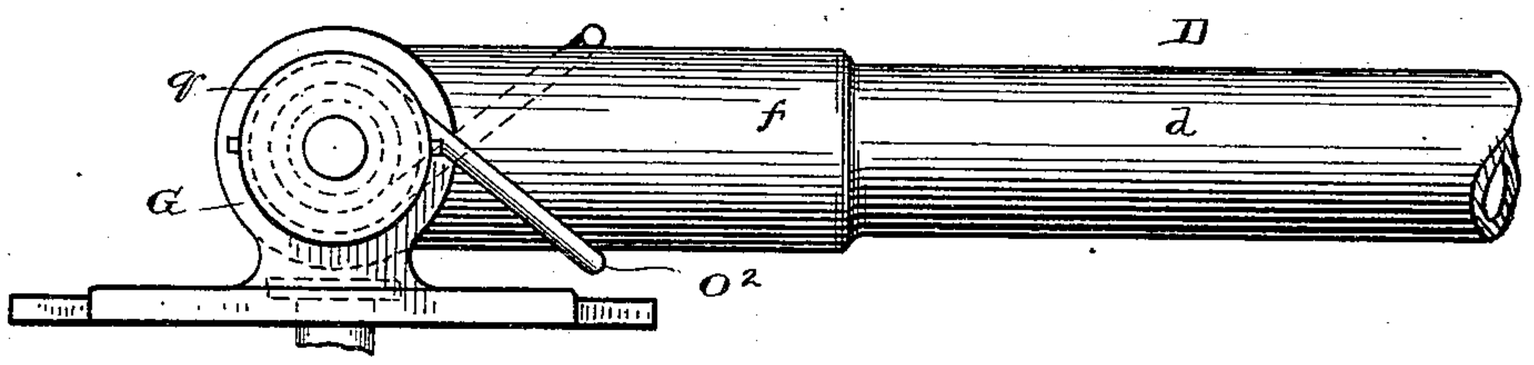
Fig. 4.



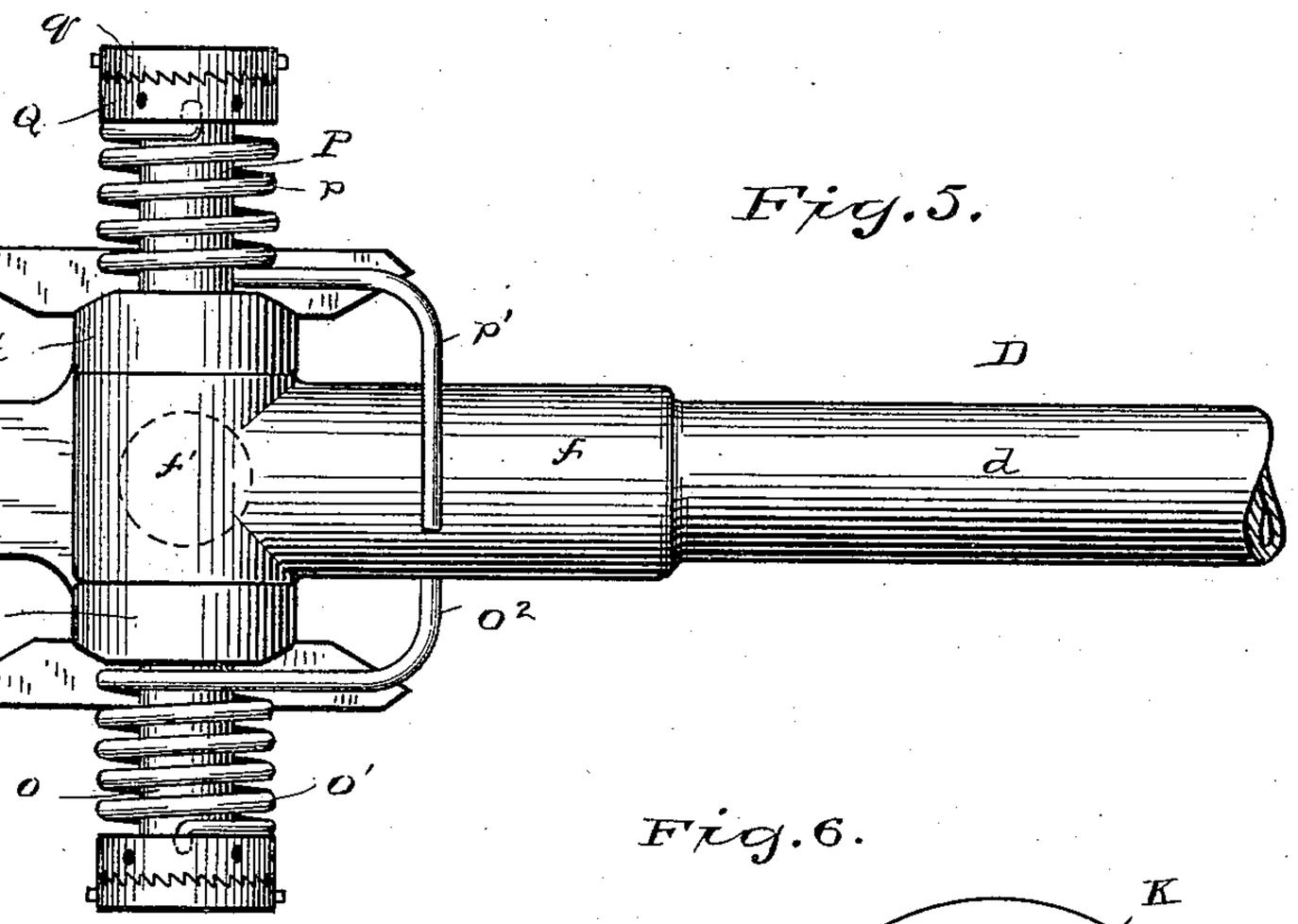


Fig. 5.

Fig. 6.

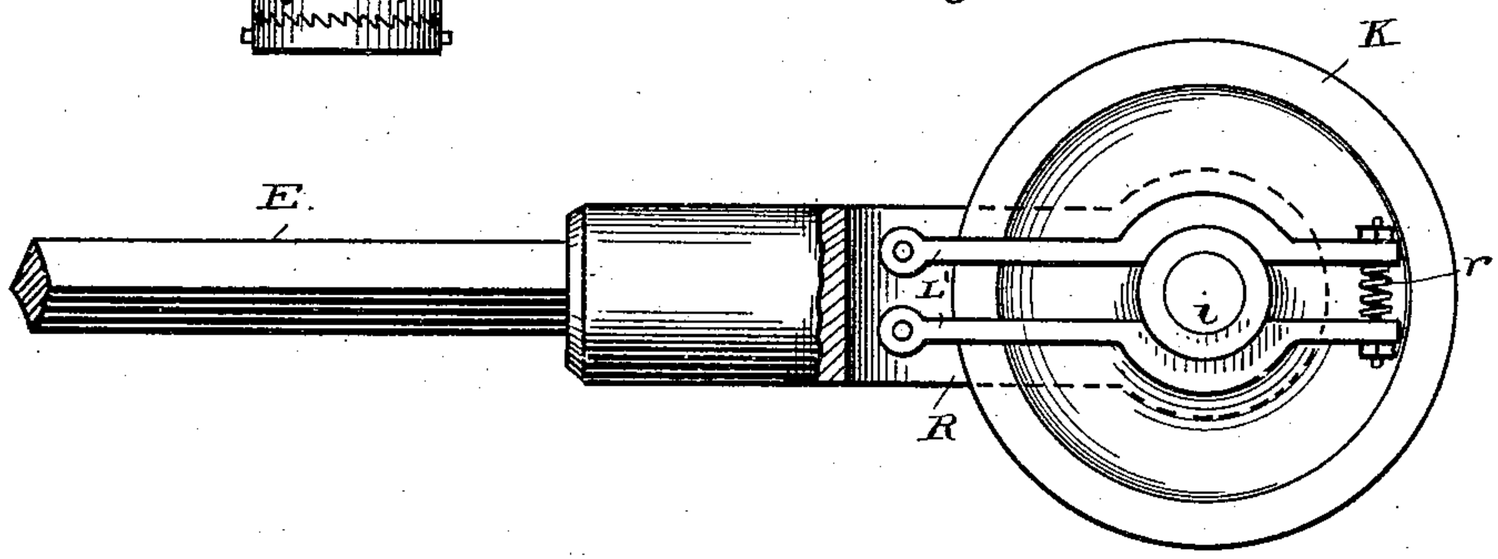
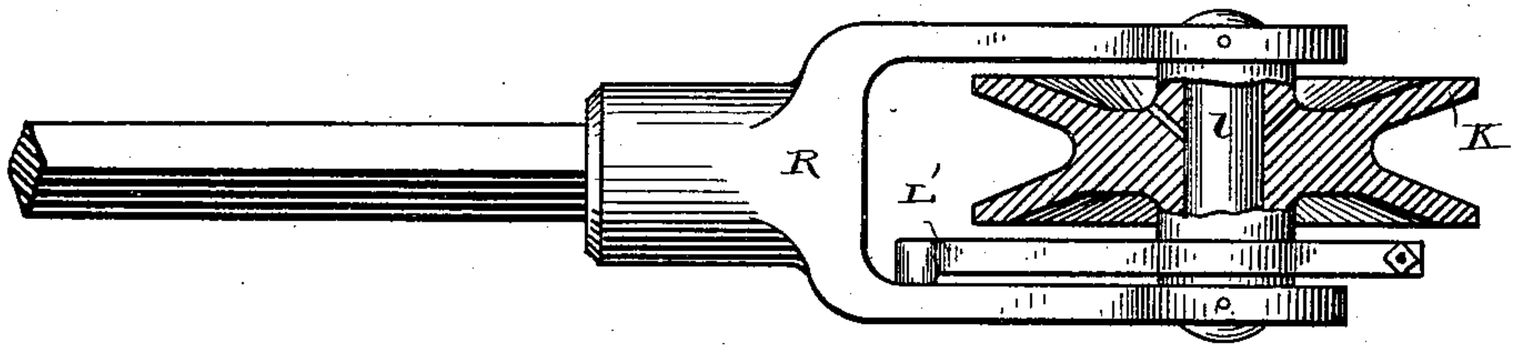


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

EXTENSIBLE UPWARD-PRESSURE CONTACT-ARM.

SPECIFICATION forming part of Letters Patent No. 407,749, dated July 23, 1889.

Original application filed November 23, 1888, Serial No. 291,652. Divided and this application filed June 7, 1889. Serial No. 313,478. (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 Extensible Upward-Pressure Contact-Arms, of which the following is a description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This application is a division of an application filed November 23, 1888, Serial No. 291,652.

The invention relates to an improvement in traveling contact devices in electric railways of the type in which the current is supplied to the motor on the traveling vehicle by means of a traveling contact extending upward into engagement with the under side of the suspended conductor. The contact device is, according to my present invention, carried at the extremity of an arm movably supported upon the top of the vehicle being propelled and by its support held upward against the under side of an overhead suspended conductor. For my purposes a flexible longitudinally-yielding arm possesses practical merits, and is particularly adapted to the difficulties and conditions to be met in some positions. For example, the supply-conductor may be suspended quite low at nearly all points and yet be necessarily considerably elevated at some one point — as where crossing a railway-track. With an extensible arm no other special provision for overcoming this difficulty would be necessary, since the telescopic section can be made long enough to reach up to the extra high portion of the conductor. My improved contact-arm possesses other practical advantages—as, for example, where centrally supported upon the roof of a car it can be reversed in position from front to rear when it is desired to run the motor-car in the other direction, and without being detached from the supply-conductor when making such change. An advantage resulting from this is found in the fact that where the car is lighted by incandescent lamps receiving current through the traveling contact the said lamps will not be extinguished when the trolley-arm is reversed at the end of the line.

My present invention is in part an improvement upon the devices shown in Figs. 1, 2, and 7 of Letters Patent No. 347,901, granted to me August 24, 1886. The details of construction, arrangement, and operation of my said invention will be hereinafter pointed out, and referred to in the appended claims.

In the accompanying drawings, Figure 1 is a view in elevation showing part of the roof of a car having a telescopic contact-arm embodying my invention mounted thereon, and seen in two positions in engagement with its supply-conductor. Fig. 2 is a detail view of the contact-arm partly in section to show the arrangement of the telescopic portions. Fig. 3 is a top plan view of the base of the contact-arm and its support and tension-springs. Fig. 4 is a fragmentary detail showing the lower end portion of the contact and support, together with a different form of tension-spring. Fig. 5 is a top plan view of Fig. 4. Fig. 6 is an enlarged detail showing in elevation the outer extremity of the contact-arm, the trolley wheel and arm. Fig. 7 is a top plan view of the devices seen in Fig. 6.

Similar letters denote like parts throughout.

In the drawings, A represents the roof or top of a vehicle to be propelled, and upon this is mounted a board B or other suitable piece of insulating material, to which is attached at about its central portion a hinged or pivoted or universal joint C.

The board B should be mounted centrally with respect to the top of the car in order to facilitate the operation of the contact-arm from either end of the car, according to the direction in which the car is running. This, however, is not essential, as the contact can be operated from any point that will afford a sufficient support for the arm and tension-springs.

D is the contact-carrying arm referred to as the "contact-arm," and, as here stated, said arm comprises a tubular section *d* and an intermediate tubular section *d'*, desirably of less diameter than the tube *d*, and serving as a guide for a telescopic end section E, composed desirably of a flexible steel rod, which should

be square or should have some angular form in cross-section in order to prevent it from turning. A spiral spring F is placed within the tube *d*, and the lower portion of the telescopic section E is provided with a collar or extension, against the under side of which the spring acts to project the section E outwardly as far as circumstances will permit. The end section E need not necessarily be flexible, and may, in fact, be made of light tubing provided with a feather or spline on one side to prevent it from rotating, with which construction the part E will of course be much lighter, permitting the use of a light spring within the tube *d*. The tube *d* should comprise a considerable portion of the contact-arm, so that the end section may be capable of moving a considerable distance therein, so as to possess a wide range of extensibility. The lower end of the tube *d* is formed with or attached to a solid shank *f*, the lower end *f'* of which is pivotally mounted in the hinge-block G, which in turn is pivoted upon a supporting-plate H, so that, the arm D being pivotally secured within the hinge-block G and the said hinge-block pivoted upon its supporting-plate H, the said arm is free to move in any direction upon its support.

Obviously a ball-and-socket joint or a spiral spring (both of which are shown in my above-mentioned patent, although in connection with a somewhat different contact-arm) might be substituted for the devices shown in the drawings. I find it desirable, however, to limit the lateral movement of the arm D, and so at points beyond which it cannot move in actual use projections *h h* upon the hinge-block G will encounter rigid side checks *g g*, and will thereby prevent it from further lateral movement.

A double set of tension-springs I J are provided on and secured to opposite sides of the lower part of the contact-arm and to opposite ends of the board B and operate either conjointly to hold the contact-arm in a central perpendicular position when freed from the conductor or independently to sustain the contact-arm in an inclined position when the contact-wheel K at the extremity of the said arm is in engagement with the under side of a suspended supply-conductor L. As seen in the drawings, the springs J are in operative position, the springs I being necessarily inactive. Upon reversing the position of the contact-arm with respect to the car the springs I would become operative and the springs J inactive.

Ordinarily, and with other forms of contact-carrying arms, when it is desired to reverse them to change the direction of the car without turning it around, it is usual to detach the contact-wheel from the conductor and then make such change in the position of the arm as permitted by the construction. This, however, has the disadvantage of breaking the car-circuit and extinguishing any lamps that may be included therein. With the present invention this difficulty is entirely overcome, and the arm can be reversed without detaching the contact-wheel. When reversed, the telescopic portion E will compress sustaining-spring F to such an extent as to shorten the said arm and allow it to pass under the conductor without forcing the latter out of its position or disturbing or injuring the devices by which it is suspended. The contact-arm is seen in its vertical central position in dotted lines, Fig. 1, from which, of course, it can be moved forward or backward, as desired.

With tension-spring construction and arrangement, as are the springs I J, it will be apparent that when the arm D assumes a horizontal position with respect to the top of the car both of said springs would be rendered inoperative and the arm would remain in that position until raised somewhat, when the spring J in Fig. 1 would be enabled to pull it upward into operative position.

As it might be inconvenient to provide the tension necessary to accomplish this, and as it might also be that the said arm was not self-raising from a horizontal position with the form shown in Fig. 1, I also use buffer-springs M N, which are shown in Fig. 1 and indicated in Fig. 3, and are arranged in pairs in front and rear of the hinge-block G. The springs M M N N are placed as far apart as the base of the contact-arm D is required to swing in the ordinary operation of an electric-railway car.

The springs M M N N are united across their upper ends by plates *m m n n*. From whichever end of the car, therefore, the arm D is depressed, if it should become necessary to lower it into a horizontal or substantially horizontal position at about the point where the tension-springs I J become inoperative, the base of the said arm will rest upon the plate *m* or *n* and act to compress the springs M M N N, according to which end of the car the arm D is directed.

Should the arm D have been lowered into a horizontal position, when released it will at once be thrown upward by the springs M M N N far enough for the springs I or J to come into action to raise said arm to a vertical or any intermediate position.

In Figs. 4 and 5 is shown another form of tension-springs. With the construction here shown the axis of the hinge upon which the arm D is supported is extended both ways to form trunnions O P. Upon each of the trunnions O P are wound strong coiled springs O' *p*, the outer extremities of which O^2 and *p'* engage the shank *f*. The springs O' *p* are wound upon the respective trunnions in opposite directions, so that they both tend to move the arm D into vertical position, and neither interferes with the other until a vertical position is reached, when the action of each is opposed by the other. With this arrangement a single set of springs is required, and as the said spring devices are entirely

self-contained—that is, are attached to a moving part—namely, the pivoted hinge—they do not in any way interfere with the practically universal motion of which the said arm D is capable. With this construction the lugs *h* are shown for engagement with the side checks *g* to limit the lateral swing of the arm D upon its pivoted hinge. It will, however, be understood that the lugs *h* might be reduced inside or dispensed with altogether whenever wide range of movement is desired.

The springs O′ *p* should be adjustable, for which many devices might be used. I have, however, shown a very simple arrangement comprising a face-ratchet Q, to which the inner extremity of the spring *p* is secured. A second face-ratchet *q*, the teeth of which mesh with those of the ratchet Q, is rigidly attached to the extremity of the trunnion P, upon which the ratchet Q, secured to the end of the spring *p*, is loosely mounted.

It will be obvious that by rotating the ratchet Q the tension of the spring *p* can be increased as desired. The expansion of the spring *p* will hold the face-ratchets Q *q* in engagement and prevent their disarrangement. The periphery of the ratchet can be provided with holes for a spanner, or might be formed with angular projections to receive an ordinary wrench for the purpose of adjusting the tension of the springs. With this form of spring, or anything equivalent thereto, which may of course be used as a substitute, one of the springs will raise the arm into any position from which it may be depressed, and this form of spring or its equivalent is of course preferable on account of its greater simplicity. The springs O′ *p* are similar, and can readily be moved and replaced if broken.

The contact-wheel K is mounted on any suitable axis *l*, whether provided with antifriction devices or otherwise, and said axis is mounted in a fork R, secured at the outer extremity of the rod E. In order to provide an exterior metallic connection between the contact-wheel and its support or electrical connections, I provide a pair of movable arms L, which are desirably pivoted at their lower ends to one of the prongs of the fork R, the outer portion of the said arms resting upon or embracing the exterior of the hub of the contact-wheel. The outer extremity of the contact-arms L′ are held toward each other and against opposite sides of the hub of the contact-wheel by a light adjustable spring *r*. As pointed out in my said other application, No. 276,257, filed June 6, 1888, it is very desirable to have an exterior metallic contact-making device in order to prevent the main current passing through the lubricated parts of the rapidly-rotating wheel. The pivoted spring-held arms L′ constitute a convenient means of accomplishing this desired result, and as such are specifically claimed here.

Having described my invention, what I claim is—

1. In an electric railway, the combination, with an overhead conductor and a moving vehicle, of a rigid arm hinged to the top of said vehicle, said arm being composed of a tubular section and a telescopic end section carrying a contact-wheel at its free end and fitting into said tubular arm, and a spring within said arm acting against said end section and keeping the contact-wheel normally against the conductor when the arm is moved upon its support.

2. In an electric railway, the combination, with an overhead conductor and a moving vehicle, of a rigid arm hinged to the top of said vehicle, said arm having a telescopic end section carrying a contact-wheel, a spring for projecting said end section and keeping the contact-wheel normally against the under side of the conductor when the arm is moved upon its support, and springs in engagement with the lower part of said arm for raising the same from a horizontal toward a vertical position, according to the height of the conductor.

3. In an electric railway, the combination, with an overhead conductor and a moving vehicle, of a rigid arm hinged to the top of said vehicle, springs connected to the lower portion of said arm for raising the same toward a vertical position, and a telescopic end section carrying a contact-wheel at its free end and fitting into said tubular arm, and a spring within said arm acting against the end section for projecting the same, whereby the arm may be moved into operative position toward either end of the car without detaching the contact device from the conductor.

4. In an electric railway, the combination, with an overhead conductor and a moving vehicle, of a rigid arm hinged to the top of said vehicle, springs connected to the lower portion of said arm for raising the same toward a vertical position from either direction, and a telescopic end section carrying a contact-wheel at its free end and fitting into said tubular arm, and a spring within said arm acting against the end section for projecting the same, whereby the arm may be moved into operative position toward either end of the car without detaching the contact device from the conductor.

5. In an electric railway, the combination, with an overhead conductor and a moving vehicle, of a rigid arm hinged to the top of said vehicle upon a transverse axis, said rigid arm having a telescopic end section fitting within the arm and carrying a contact device at its free extremity, a spring within the arm for projecting the end section, and a spring or springs in engagement with the lower portion of said arm and acting to raise the same toward a vertical position.

6. In an electric railway, the combination, with an overhead conductor and a moving vehicle, of a rigid arm mounted at its lower end upon both a vertical and transverse axis upon the top of said vehicle, springs connected

to the lower portion of said arm for raising the same toward a vertical position, and a telescopic end section carrying a contact-wheel at its free end and fitting into said tubular arm, and a spring within said arm acting against said end section for projecting the same, whereby said arm may be moved into operative position toward either end of the car without detaching the contact device from the conductor.

7. In an electric railway, the combination, with an overhead conductor and a moving vehicle, of a contact-carrying arm hinged to the top of the car, springs coiled about the axis thereof, their free ends engaging the said arm, detent devices connected to the other ends of said springs, and devices adjustably engaging the detents, whereby the tension of the springs may be adjusted.

8. In an electric railway, the combination, with an overhead conductor and a moving vehicle, of a contact-carrying arm hinged to the top of the car, springs coiled on the axis thereof, their free ends engaging the shank of the arm, ratchets, as Q, mounted on said axis, the inner end of said springs being secured to the interior of the ratchets, and ratchets, as *q*, rigidly secured on said axis and having teeth engaging the teeth on the ratchets Q, whereby the tension of the springs may be adjusted.

9. In an electric railway, the combination, with an overhead conductor and a moving vehicle, of an arm hinged to the top of the car, a contact-wheel engaging the under side of said conductor, the axis thereof being pivoted in a fork on the end of the arm, and an arm or arms, as L, pivoted at one end to the prongs of the fork and at their outer ends engaging the hub of the contact-wheel, whereby external contact is made between the conductor and the arm.

10. In an electric railway, the combination, with an overhead conductor and a moving vehicle, of an arm hinged to the top of the car, a contact-wheel engaging the under side of said conductor, the axis thereof being pivoted in a fork on the end of the arm, and arms, as L L, pivoted at one end to the prongs of the fork and embracing the hub of the contact-wheel, and an adjustable spring connecting the outer ends of said arms.

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

CHARLES J. VAN DEPOELE.

Witnesses:

J. W. GIBBONEY,

CHAS. L. STURTEVANT.