(No Model.) 2 Sheets—Sheet 1.

J. C. LOVE.

TRAVELING CONTACT DEVICE FOR ELECTRIC RAILWAYS.

No. 544,313. Patented Aug. 13, 1895.

Fig. 1.

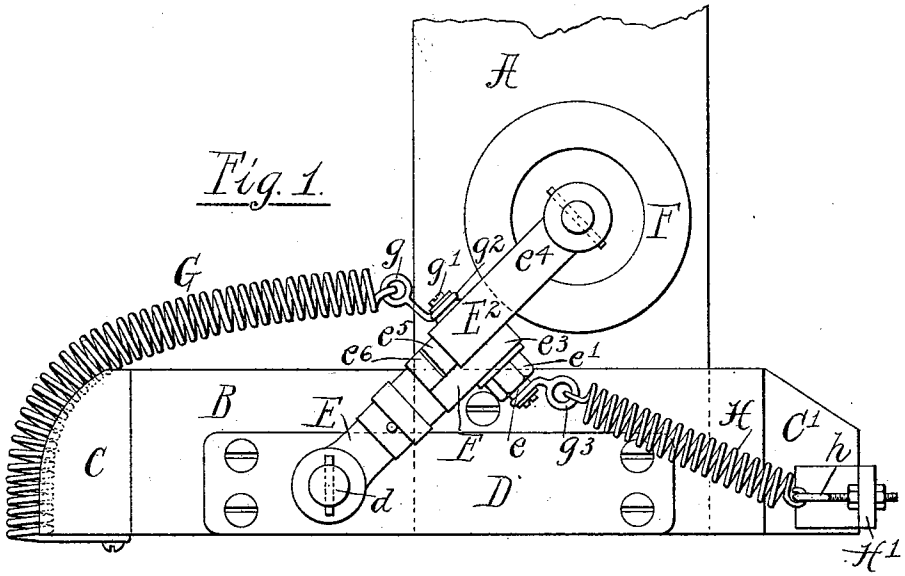

Fig. 2.

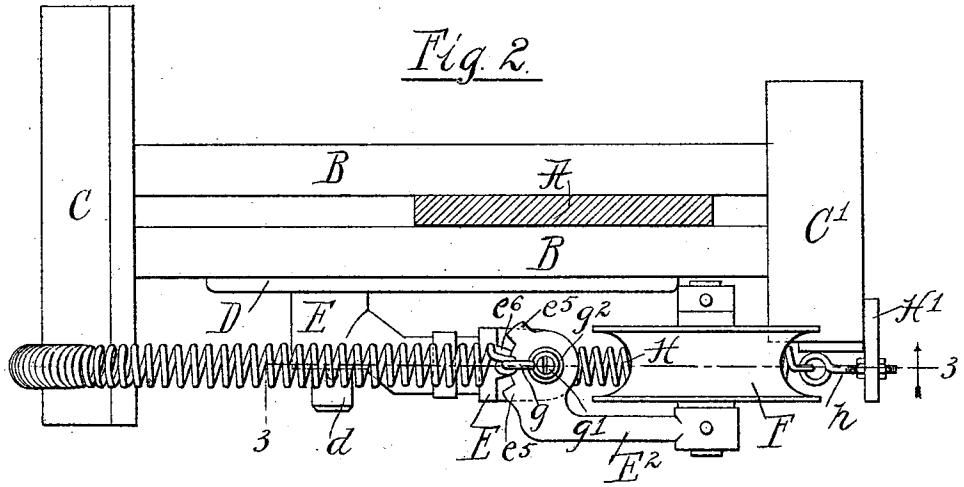

Fig. 3

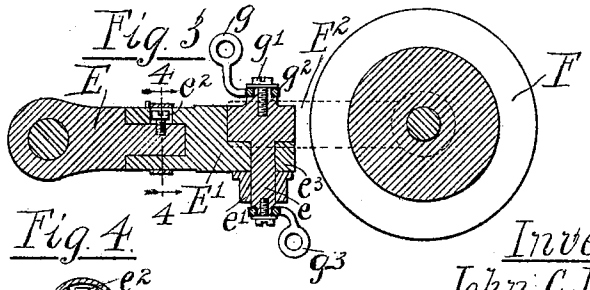

Fig. 4.

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(No Model.) 2 Sheets—Sheet 2.

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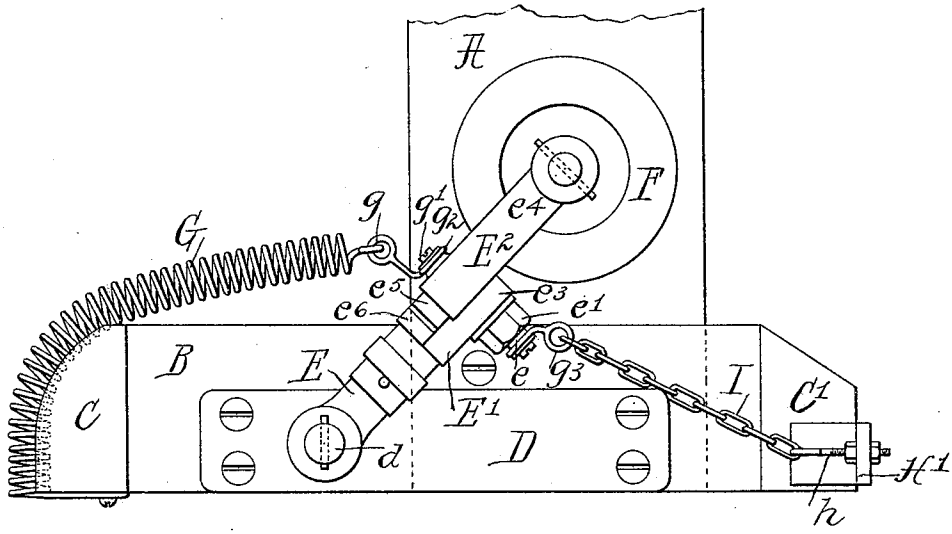
Fig. 5.



Witnesses.
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Louis M. F. Whitehead.

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John C. Love.
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his Attorneys

UNITED STATES PATENT OFFICE.

JOHN C. LOVE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE LOVE ELECTRIC TRACTION COMPANY, OF CHICAGO, ILLINOIS.

TRAVELING CONTACT DEVICE FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 544,313, dated August 13, 1895.

Application filed September 5, 1893. Serial No. 484,828. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. LOVE, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Traveling Contact Devices for Electric Railways; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in trolleys or contact devices for use in electric railways of that class wherein the electric conductor or conductors conveying the current along the line are located within a slotted conduit beneath the surface of the roadway, said trolley or contact devices being carried by a bar attached to the car and extending downward through the slot of the conduit.

The present invention embraces improvements in trolleys of the same general class as that shown and described in my prior patent, No. 511,343, of December 26, 1893; and it consists in the matters hereinafter described, and particularly pointed out in the appended claims.

The invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a contact device embodying the invention. Fig. 2 is a plan view of a trolley-arm and connected parts, a second arm being commonly present, which is an exact counterpart of the one shown. Fig. 3 is a vertical section taken on line 3 3 of Fig. 2, showing parts in central longitudinal section. Fig. 4 is a vertical section taken on line 4 4 of Fig. 3. Fig. 5 is a side elevation of a modified form of the device.

Referring to said drawings, A designates the lower end of the trolley-bar, to which are attached the contact devices. Secured on either side of the lower end of this bar are horizontally-arranged bars B B of insulating material, these bars being made of equal length and provided at their ends with cross-pieces C C′ firmly secured thereto.

Secured to the outer side of each bar B is a metal plate D, provided with an outwardly-extending horizontal bearing-pin d. Mounted upon said bearing-pin d is a vertically-oscillating trolley-arm, said arm being composed of three main parts E, E′, and E^2, connected by pivotal joints and carrying at its free or upper end a trolley-wheel F. The pivotal connection between the parts E and E′ is such that the part E′ may turn about an axis extending longitudinally of the trolley-arm, while the connection between the parts E′ and E^2 is such that the part E^2 may swing about an axis transverse to the trolley-arm and normally in a vertical plane.

The form of connection between the parts E, E′, and E^2 is as follows: The part or section E is provided at its upper end with a cylindrical pin which enters a socket in the section E′, said section E′ being held in engagement with the bearing-pin by means of a stud e^2, which passes through the part E′ and through a transverse slot in the section E, and is secured therein, so as to permit a limited oscillatory movement of the section E′ on the bearing-pin while holding the said parts from shifting endwise or becoming detached. Said section E′ is provided at its outer end with a lug e^3, through which is inserted a transverse bearing-pin e, formed integral with or rigidly secured in the part E^2 and adjustably held in said lug e^3 by means of a nut e', as shown in Fig. 1. Said section E^2 is provided at its outer end with a hub e^4, which is offset from the main part of the arm, so that the trolley-wheel F comes opposite or in the same vertical plane with the pivot e. The pivot pin or stud e being arranged in the vertical plane in which the trolley-arm oscillates as a whole, the outer section E^2 is adapted to oscillate laterally, or, in other words, to allow the trolley-wheel to swing toward or from the center of the conduit. This oscillatory movement of the outer section E^2 is limited by opposing shoulders or surfaces e^5 e^5 formed on the section E^2 and adapted to come in contact at either limit of its movement with a corresponding shoulder or lug e^6 formed on the section E′.

G is a coiled spring attached at one end to the trolley-arm at the pivotal point e and at its opposite end to the block C in such man-

ner that the tension of the spring will tend to hold the free end of the arm elevated and the trolley-wheel thereon in contact with the conductor. The spring is shown as secured at one end to an arm g, secured to the bearing-pin e in such manner as to prevent turning of the arm on said pin, and at its opposite end is carried over the rounded outer face of the cross-piece C and secured to the under side thereof, as clearly shown in Fig. 1. The arm g is shown as being of considerable length and bent into L shape, so as to stand out at right angles to the trolley-arm in the plane of vertical oscillation of the trolley-arm and at one side of the said transverse pivot-axis, in which position it is rigidly held by means of a socketed end g^2, which fits over a square projection on the pivot-pin e, and is held thereon by a set-screw g'.

Secured to the pivot-pin e, at the opposite side of the trolley-arm, is a similar arm g^3, also extending at right angles to the trolley-arm and in the plane of vertical oscillation of the trolley-arm, but in the opposite direction and at the opposite side of said transverse pivot from the arm g, and connected with this arm g^3 is a spring H, attached at its opposite end to an adjustable screw-eye h, secured in a bracket H′ mounted on the cross-piece C′, said spring being adapted to yieldingly restrict the upward movement of the trolley-arm under the influence of the spring G.

As thus constructed and arranged it is obvious that the trolley-wheel is movable in three different and distinct ways, while at the same time the arrangement is such that the springs G and H will tend to promptly return the trolley-wheel to its normal central position. The tension of the spring G acting over the rounded block C will tend to hold the arm at its uppermost limit; but by oscillation of the arm on the pin d the wheel may follow the conductor through vertical variations of considerable extent without breaking contact therewith. By the swinging of the section E^2 on the pivot e the trolley may follow the conductor notwithstanding lateral variations of the conductor from strict parallelism with the slot; but by so oscillating on the pivot e the arms g and g^3 which, as before stated, are rigidly secured to the part E^2, will be carried out of the vertical plane in which they normally stand, thus bringing an increased strain on the springs G and H, which will, by their contractile action, promptly restore the trolley-wheel to its central position.

In order that the trolley may run smoothly in passing around curves, it is necessary that it should be free to assume a position approximately parallel with the conductor, and this movement is provided for by the swiveled connection between the parts E and E′. Such a movement of the trolley in either direction will, however, twist the pivot e out of the vertical plane, which plane is the shortest line between the points of attachment of the springs G and H, and will therefore cause an increased tension on said springs, which will tend to prevent such movement and to return the trolley when the strain is removed.

The conducting-wires for conveying the current to and from the contact device will lead along the trolley-bar and will be connected with the plates D, as heretofore common in such devices.

In Fig. 5 I have shown a modification of the construction hereinbefore described, in which a chain I is substituted for the spring H as a restraining member to limit the upward movement of the trolley-arm under the action of the spring G. The result produced by the use of a chain is generally the same as that secured by the employment of the spring H, the restraining member in either case acting to prevent the trolley being thrown upwardly when released from the conductor in such manner as to strike the parts of the conduit above the conductor and at the same time insuring proper action of the trolley in case the car is run backward by avoiding possibility of the arm being swung past its vertical position, as might be possible in some cases where the conductor is located at a greater distance than usual above the pivot of the trolley-arm. The chain I shown in said Fig. 5 has the advantage over the spring H of being free to drop out of the way of the trolley-arm when the latter is lowered, it being obvious that when the arm is thrown below the point at which the said spring is under tension endwise compressive strain will be exerted on the spring. The chain, on the contrary, will drop freely out of the way of the trolley, which is a feature of considerable importance where considerable amplitude of vertical movement in the trolley-wheel is required.

It is to be noted that the lifting-spring G, in connection with the restraining-spring H or chain I, when connected with the outer part or section E^2 of the trolley-arm in the manner shown tend to turn or move the trolley-wheel in two directions—that is to say, they tend to rotate the outer part of the trolley-arm about the longitudinal pivot connecting the parts E and E′—so as to throw the wheel into a vertical position, and also tend to swing the part E^2 about its transverse axis, and to thereby bring the trolley-wheel to its central position relatively to the main part of the arm. The first of these movements, or the turning of the outer part of the arm about the longitudinal axis so as to bring the trolley-wheel into a vertical plane, will be accomplished by a simple connection of the spring G and the restraining member H or I with the upper and lower surfaces of the part E^2 of the arm—as, for instance, by the simple loop or eye connection shown in said prior application. The additional movement of the outer end of the arm tending to hold the trolley-wheel at the central point of its lateral throw is, however, secured by the use of the arms g g^3, which extend laterally from the central axis of the

pivot e in such manner that the strain on said arms tends to turn said pivot and thereby swing the part E^2 about its transverse axis to a central position.

It is obvious that the trolley-wheel will be in the position most favorable for running smoothly on the wire when it stands parallel with the same or in the same plane with the wire. The attachment of the lifting-spring and restraining member to the outer member or section of the trolley-arm in the manner described tends to hold the pulley in the position mentioned and therefore in the position most favorable for running smoothly under natural or normal conditions, while at the same time permitting such freedom of lateral movement in the trolley as will insure the smooth traveling of the trolley on the wire, whatever may be the angular position of the trolley-arm or the lateral deflection of the wire from its central position. The connection of the lifting-spring and restraining member to the outer part of the trolley-arm in such manner as to hold the wheel in a vertical plane without provision for the swinging laterally of the outer section of the arm, as illustrated, for instance, in said prior application, is in itself a valuable improvement. For best results, however, I employ the construction herein shown, wherein the said lifting-spring and restraining member tend to hold the pulley both in a vertical plane and at the center of its lateral throw.

It will, of course, be understood that while the employment of the arms g g^3, as herein shown, as a mode of attaching the lifting-spring and restraining member to the trolley-arm is a desirable one, yet other means may be provided for affording such attachment with practically the same result. The specific construction illustrated has, however, advantages in point of simplicity and effectiveness, and is herein claimed as a part of my invention.

It is to be noted that the construction shown in Figs. 1 to 3 is somewhat similar to that shown in my said prior patent, No. 511,343 and in another prior patent, No. 490,028, the important difference being that in said prior patents the pivot-stud connecting the outer section of the arm with the intermediate section is rigidly attached to the intermediate section, so that strain of the spring on the eyes or loops attached to said stud has no effect to turn the said outer section, while in the present construction said pivot-stud is rigidly attached to the outer section, with the result that the spring is connected with and acts on said outer section and thereby operates to turn or rotate the same about the pivotal axis between it and the intermediate section in such manner as to hold the trolley-wheel normally in its central position, as hereinbefore set forth.

I claim as my invention—

1. A traveling contact device for electric railways, comprising a supporting bar, a trolley wheel or contact piece, a trolley arm mounted to oscillate in a plane parallel with the line of travel of the contact device and provided between its ends with pivoted or swiveled joints, one permitting movement of the trolley wheel about an axis longitudinal of the arm and the other a lateral movement thereof about an axis transverse to the arm, a lifting spring, and a restraining member, both of which are connected with the outer section of said arm, and one or both of which are applied to act on the said outer section of the arm at a point or points in the plane of oscillation of the arm and laterally distant from the said longitudinal axis and also from said transverse pivotal axis, whereby the trolley tends to remain in its central position and plane of oscillation, substantially as described.

2. A traveling contact device for electric railways, comprising a supporting bar, a trolley wheel or contact piece, a trolley arm mounted to oscillate in a plane parallel with the line of travel of the contact device and consisting of three parts connected by pivotal or swiveled joints, one connecting the inner and intermediate parts so as to permit movement of the trolley about an axis longitudinal of the arm, and the other connecting the intermediate and outer parts so as to permit a lateral movement of the trolley about an axis transverse to the trolley arm, a lifting spring, a restraining member, and an arm or arms for connecting said lifting spring or restraining member or both with the outer part of the trolley arm, said connecting arm or arms being rigidly attached to the said outer part of the trolley arm at its inner or pivoted end, and extending to a point or points laterally distant from both the longitudinal and transverse pivotal axes of the trolley arm, substantially as described.

3. A traveling contact device for electric railways, comprising a supporting bar, a trolley wheel or contact piece, a trolley arm mounted to oscillate in a plane parallel with the line of travel of the contact device, and consisting of three parts, of which the inner one is connected with the intermediate one by a pivotal joint the axis of which is longitudinal of the arm, and the intermediate one is connected with the outer one by a transverse, pivot pin rigidly attached to the outer arm and extending through and adapted to turn in the end of the intermediate one, a lifting spring, a restraining member, and a connecting arm attached to the said pivot pin and reaching to a point laterally distant from both the longitudinal and transverse axes of said pivotal joints, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

JOHN C. LOVE.

Witnesses:
C. CLARENCE POOLE,
ALBERT H. GRAVES.