(No Model.)

J. C. LOVE.

TROLLEY.

No. 490,028. Patented Jan. 17, 1893.

Fig. 1.

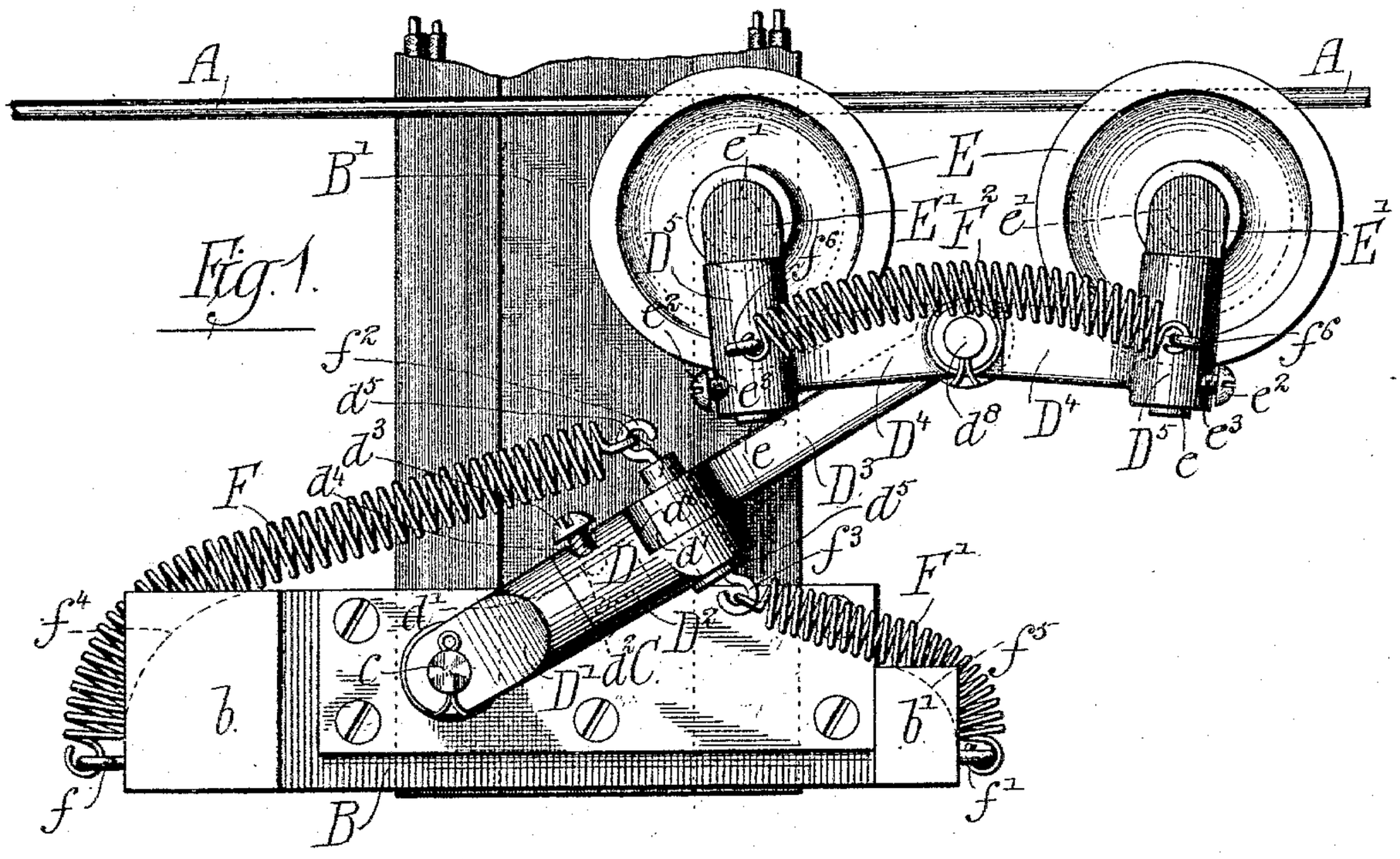


Fig. 2.

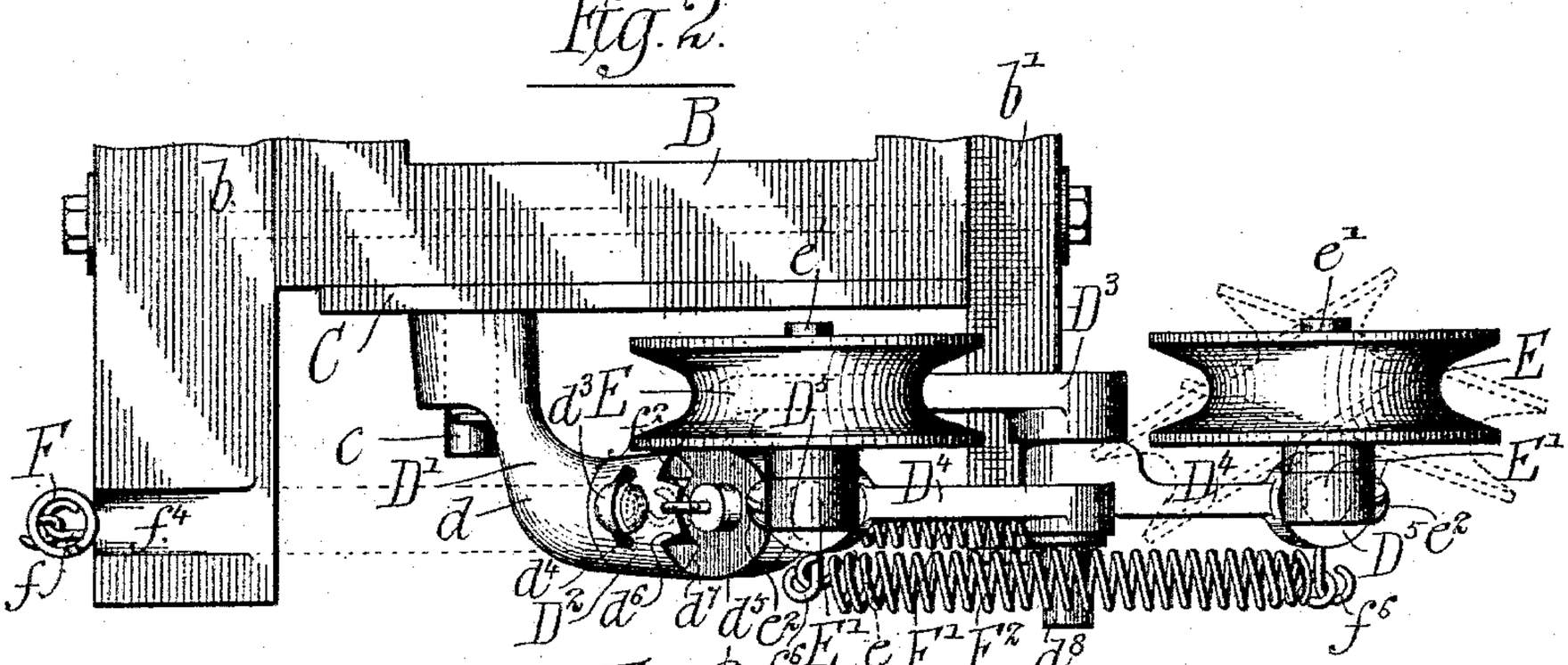
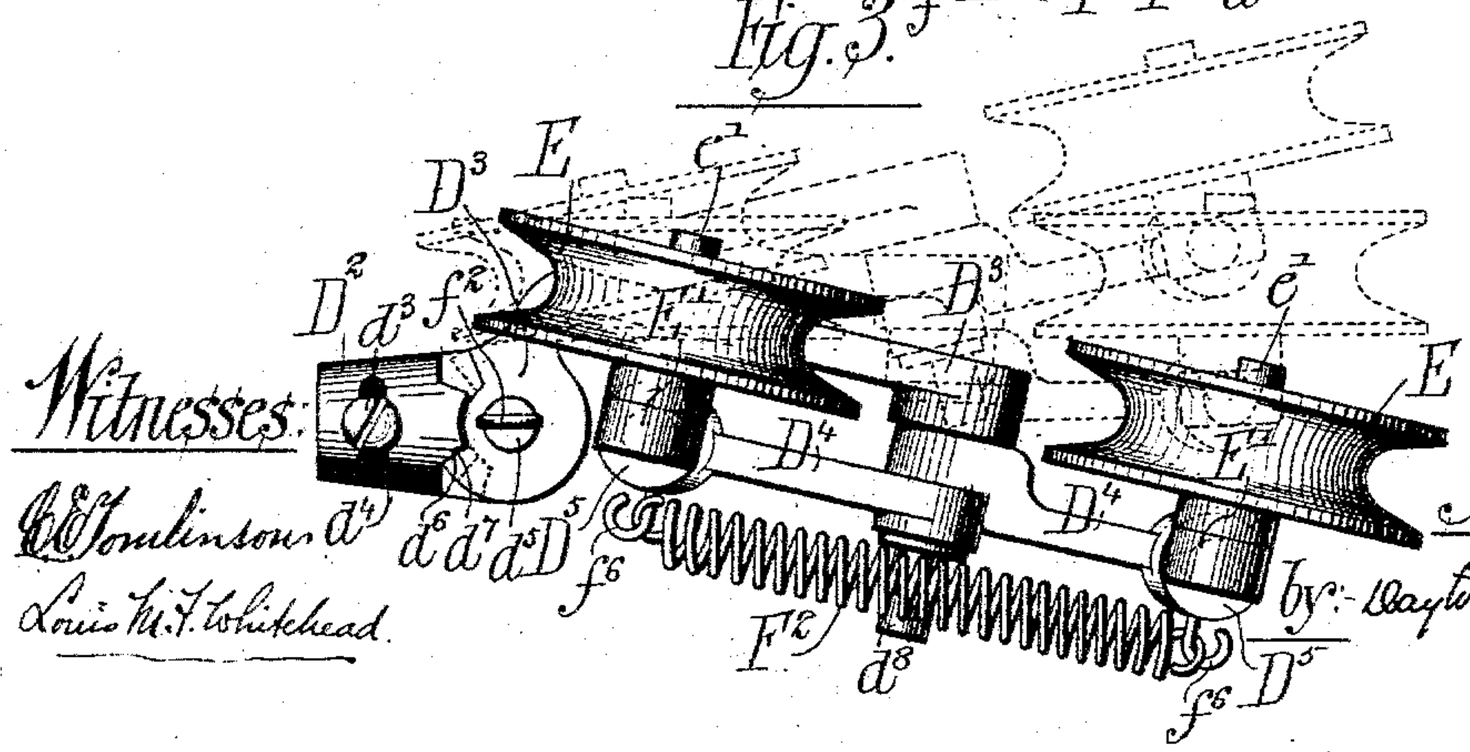


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN C. LOVE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE LOVE ELECTRIC TRACTION COMPANY, OF SAME PLACE.

TROLLEY.

SPECIFICATION forming part of Letters Patent No. 490,028, dated January 17, 1893.

Application filed May 17, 1892. Serial No. 433,367. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. LOVE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Traveling Contact Devices; 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 traveling contact devices by which a connection is formed between the main circuit wires or line conductors of an electric railway and the motor on the car.

The invention is herein shown in connection with conductors located in a slotted conduit beneath the surface of the ground, the contact device being supported from the body of the car by means of a standard secured to said car and extending downwardly into said conduit through the continuous longitudinal slot thereof.

The invention is a further development of the device set forth in my application Serial No. 433,369 and involves the same general principles of construction as my application Serial No. 433,366, both filed simultaneously herewith and consists in the features of construction hereinafter described and set forth in the appended claims.

In the accompanying drawings my improvements are shown in connection with a two-wire circuit and embrace right and left hand symmetrical parts. As will be apparent, however, said improvements admit of embodiment in a contact device adapted for use with a single line conductor.

Figure 1 is a side view of a contact device embodying my invention. Figs. 2 and 3 are partial top plan views thereof, also showing the capacity of said trolley for adjustment.

In the drawings, A represents the line conductors for contact with which the trolley is designed. As heretofore stated, said line conductors are located in a conduit under-ground, which is not indicated but may be of any approved construction.

As shown the trolley consists of a supporting block, B, of non-conducting or insulating material, having lateral projections, b and b', at each end thereof, said block being secured to the lower end of the standard, B′, extending downwardly from the car and into the conduit through a continuous longitudinal slot formed therein. These parts form no part of the present invention and may be of any approved or preferred construction.

Secured to the sides of the block B, between the projections b and b', are metallic plates or pieces, C, made of brass, copper or other good conductor of electricity. Projecting laterally from near the front ends of these plates and in their preferable form made integral therewith, are studs, c, to which are pivoted at one end contact arms, designated as a whole by D. Each of these arms consists of three sections; inner sections, D′, which are pivoted to the plates C; middle sections, D^2, having swiveled connection with the inner sections D′; and outer sections, D^3, pivotally connected with the middle sections D^2.

In order to bring the free end of the arm D in proper position relatively to the line conductors, A, the section D′ is offset adjacent to its pivotal point, as clearly shown at d (Fig. 2). The middle section D^2 is in alignment with the outer ends of the section D′ and said sections D′ and D^2 are respectively provided on their adjacent ends with a cylindric stud, d', and with an axial socket or aperture, d^2, adapted to receive said stud. A pin or screw, d^3, is inserted through a slot d^4 in the section D^2 and is secured in the stud d'. Said pin or stud serves to hold said sections securely together and allow a partial rotary motion of the section D^2 about the stud d' within limits defined by the length of the slot d^4. The section D^3 which, as shown, is bent or curved to accommodate the parts carried thereby, is pivoted at its inner end to a stud, d^5, projecting from the lateral face of a longitudinal projection or lug of the section D^2, the direction of pivotal motion being at right angles to that of the section D′ when the parts are in their normal position. Surfaces, d^6 and d^7, formed respectively upon the sections D^2 and D^3, and adapted to come into contact with each other, serve to limit the extent of pivotal movement of the section D^3. At the

outer or free end of the section D^3 is a laterally projecting stud, d^8, which in the normal position of the arm D will be parallel with the stud d'. Pivoted to this stud are two arms, D^4, at the outer ends of which are hubs, D^5, provided with cylindrical sockets, the axes of which will be vertical when said arms are horizontal and in which the contact devices directly in contact with the line conductors, are supported. These contact devices may be of any desired or approved construction, the particular form of contact piece herein shown being trolley wheels, E, such as are commonly used for the purpose, having peripheral grooves for engagement with the line conductors.

In the construction shown, the trolley wheels are pivoted to studs, *e*, projecting laterally from, and peripherally made integral with, supporting blocks or pieces, E', which have other studs, *e'*, projecting therefrom at right angles to the studs *e*, which are adapted to swivel in the sockets formed in the hubs D^5. The studs *e'* are held in engagement with the socket in which they are supported and their swiveling motion is limited in the same manner as in the case of the connection between the sections D' and D^2 of the arm D; that is to say, by pins or screws, e^2, inserted through slots, e^3, formed in the hubs D^5 and secured in the studs *e'*.

The sections D' and D^3, the arms D^4 and the trolley wheels E may be secured in position in any familiar manner, pins or cotters being employed in the construction shown in the drawings. Each of the arms D is yieldingly held in an upwardly inclined position by coiled springs, F, F', which are respectively secured at one end to the hooks, *f*, *f'*, secured near the lower edges of the front and rear surfaces, respectively, of the lateral projections, *b*, *b'*, of the insulating block B, and at the other end to hooks, f^2, f^3, secured one at each end of the stud d^5. Said springs pass over the upper edges of the pieces *b b'*, which are slotted or grooved, as seen at f^4 and f^5, to receive said springs and retain them in position. Other coiled springs, F^2, are attached at their opposite ends to hooks, f^6, which are secured to the hubs D^5 on the arms D^4 and pass over extensions of the studs, d^8, and serve also to hold the arms D^4 yieldingly extended, while allowing each to act upon the wire and to yield or oscillate by reason of irregularities in the wire independently of the other.

All parts of the plates C and of the arms D are made of brass or other good conductor of electricity and the electrical circuit from the line conductors to the motor is completed by conductors F connected to the plates C at their lower ends and leading upwardly through or along the standard A and thence to the motor on the vehicle; the connections being such as to allow a current in the proper direction.

In the drawings I have shown two sets of conductors connecting the plates C with the motor. This duplicate construction is to insure against disabling the motor from the severing of the connection, as it is improbable that both sets of conductors will be broken or get out of repair at the same time. In the construction shown one set of conductors is secured to each edge of the standard B' by U-shaped pieces of metal or other suitable material adapted to embrace said conductors and to be secured by their edges to the sides of the standard B. This construction avoids weakening the standard by making holes therethrough and also provides a construction such that the wires are easily accessible in case it is desired to either repair or replace them.

It is obvious that the construction described in devices for movably sustaining the two trolley wheels or contact pieces upon the block or supporting bar gives freedom of movement in all required directions of said wheels or contact pieces, so that the latter may easily and smoothly follow the line conductor or conductors notwithstanding lateral and vibratory movements of the car due to roughness and irregularities of the track rails and other causes. The pivotal connection of the arm D with the block B allows free vertical movement of the contact pieces as a whole. The swivel joint between the sections D' and D^2 of said arm allows said contact pieces to adjust themselves to lateral deviations of the car and supporting arms from the line conductors, and the pivotal connection of the sections D^2 D^3 allows said contact pieces to accommodate or adjust themselves to angular divergence of the line conductors, as when turning corners and the like. These movements of the arm are supplemented by the rotary or oscillatory movement of the contact pieces themselves in the ends of the arms D^4 and the said arms D^4 being pivotally connected with the end of the section D^3 and being supported by a spring, as described, are adapted to yield separately and independently of each other and to thereby adapt themselves to irregularities in the line conductors. The rising and falling of said arms D^4 D^4 also serves, in connection with the bodily movement of the arm D, to compensate for vertical movement or vibration of the car body and supporting arm due to irregularities of the track, jolting in passing over stones and other obstructions and similar irregularities in the movement of the car.

In contact devices having only one trolley wheel or contact piece, variation in the current is often produced by vibratory movement of the car by which pressure of the trolley against the wire is alternately increased and decreased and an important advantage is gained by having two trolleys or contact pieces, each of which is separately yielding and both of which are mounted on a spring supported and yielding arm, in that the current is affected to a much less extent when two separately yielding trol-

leys or contact pieces are acting upon the line conductor, than when a single one is employed; while at the same time vibratory motion is transmitted to a less degree from the car to the trolleys or contact pieces through the main supporting arm D and the auxiliary arms D^4 D^4 than when only one arm is employed. The employment of two contact pieces is also of advantage in order to prevent the breaking of the circuit in passing points where the continuity of the bearing surface of the line conductor is interrupted, either intentionally or by accident, as for instance, where the line conductor is bent out of its path at its intersection with another conductor or where some insulating substance has adhered to the conductor.

I claim as my invention:—

1. A traveling contact device for electric railways, comprising a supporting bar, a main arm pivoted thereto and adapted to swing in a vertical plane, a spring applied to throw said arm upward, two trolleys or contact pieces and two independently yielding spring-supported arms on which said contact pieces are mounted, said arms being pivoted to the free end of the said main arm, substantially as described.

2. A traveling contact device for electric railways, comprising a supporting bar, a main arm pivoted thereto and adapted to swing in a vertical plane, a spring applied to throw said arm upward, two trolleys or contact pieces, two arms supporting said contact pieces, said arms being pivoted to the main arm and being adapted to yield downwardly independently of each other, said main arm being provided between its ends with two pivotal or swivel joints, one affording rotary motion of the outer end of the arm on a longitudinal axis, and the other a lateral oscillatory movement of the outer end of the arm about a transverse axis, substantially as described.

3. A traveling contact device for electric railways, comprising a supporting bar, a main arm pivoted thereto and adapted to swing in a vertical plane, a spring applied to throw said arm upward, two trolleys or contact pieces and two independently yielding spring-supported arms on which said contact pieces are mounted, said arms being pivoted to the free end of the said main arm, and the contact pieces being pivotally mounted on said arms, 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:
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