(No Model.) 3 Sheets—Sheet 1.

L. O. DION.

ELECTRIC RAILWAY.

No. 458,844. Patented Sept. 1, 1891.

Fig. 1.

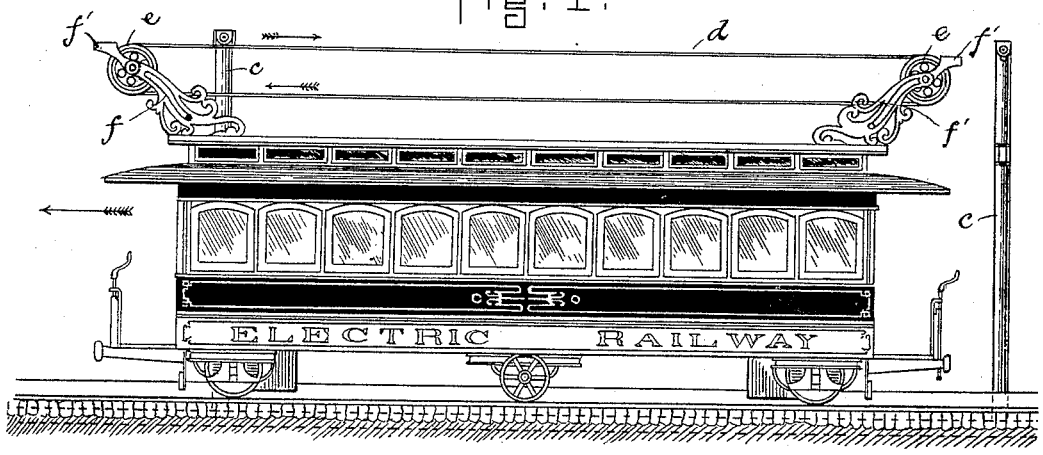
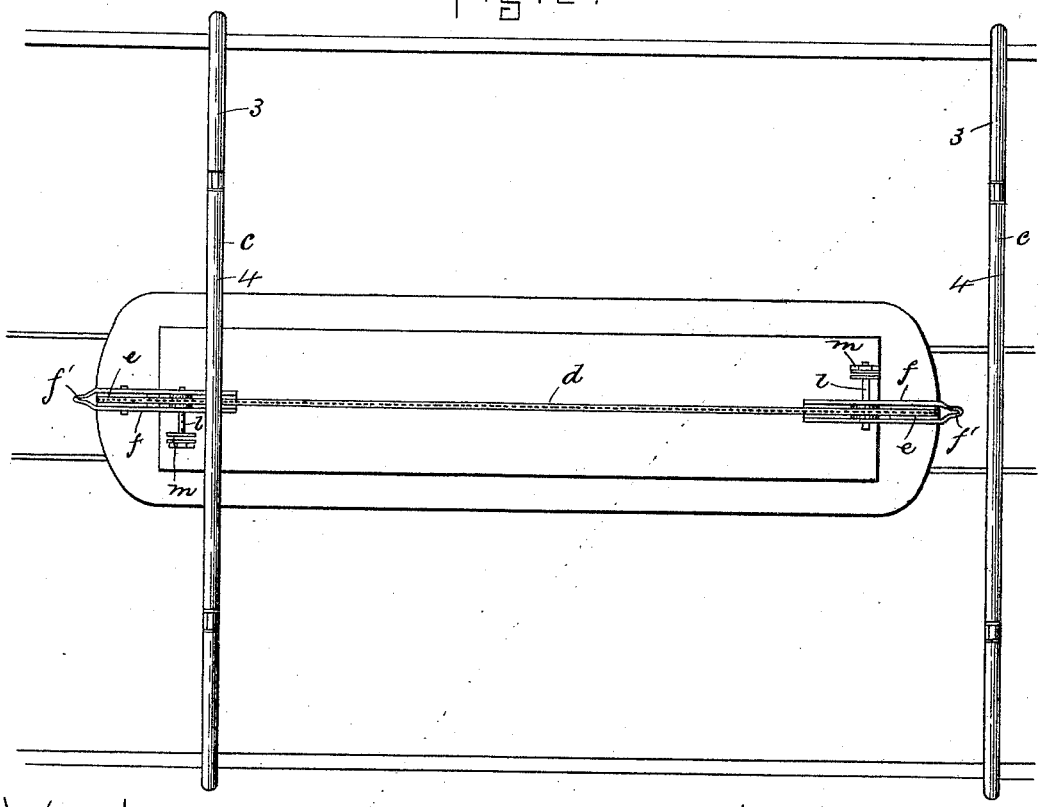


Fig. 2.



WITNESSES.

C. Kemp Marsh.

C. G. Bartlett

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(No Model.) 3 Sheets—Sheet 2.

L. O. DION.

ELECTRIC RAILWAY.

No. 458,844. Patented Sept. 1, 1891.

Fig. 3.

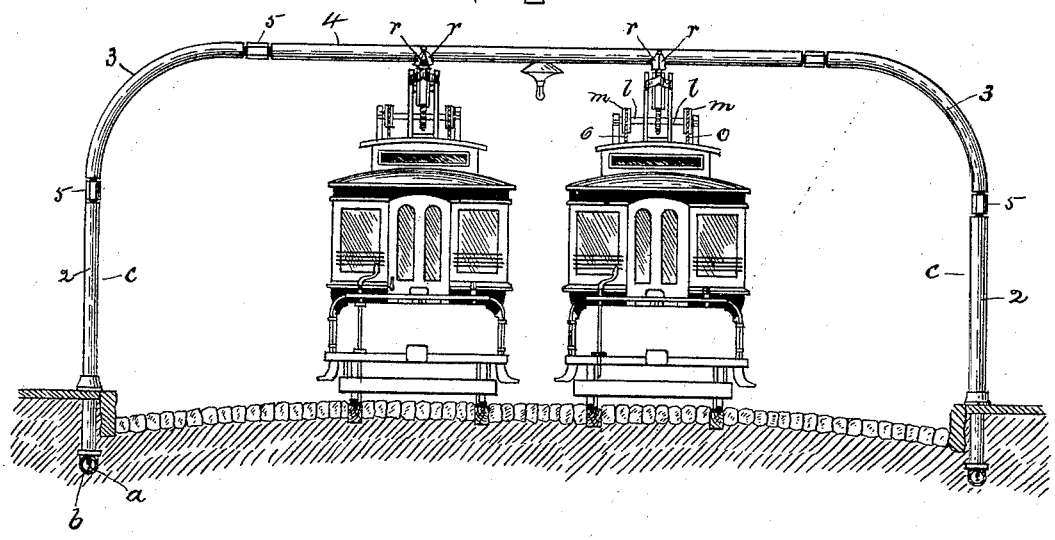


Fig. 5.

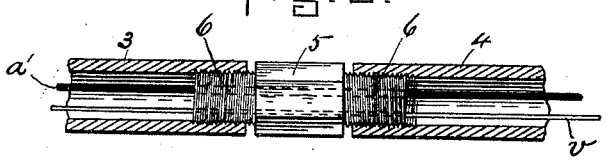


Fig. 4.

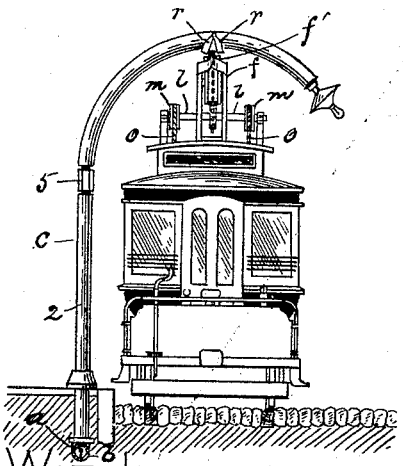


Fig. 6.

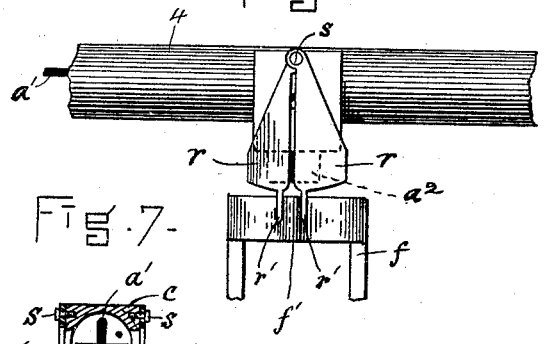
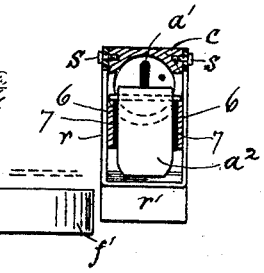


Fig. 7.



WITNESSES.

R. Henry Marsh

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3 Sheets—Sheet 3.

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ELECTRIC RAILWAY.

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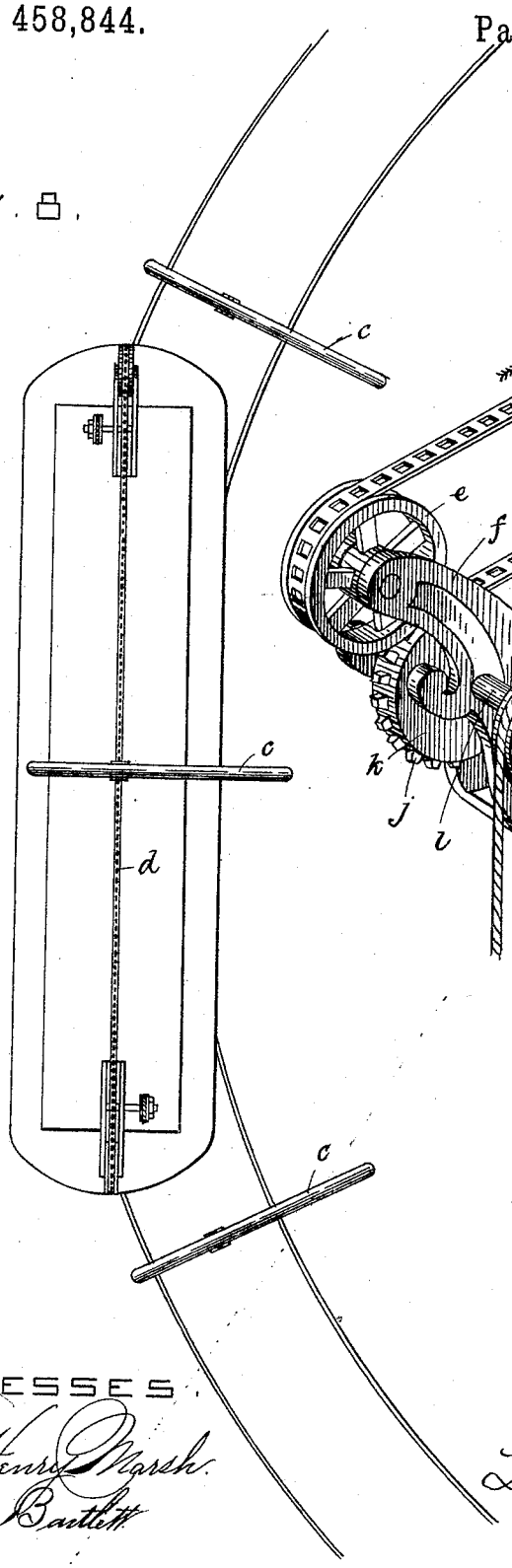
Fig. 8.



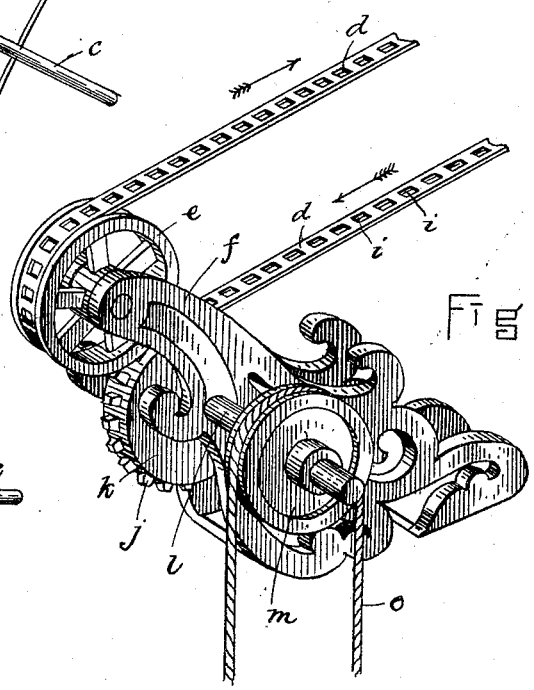


Fig. 9.

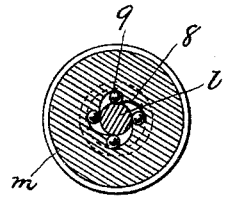


Fig. 10.

WITNESSES.

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UNITED STATES PATENT OFFICE.

LÉON O. DION, OF NATICK, MASSACHUSETTS.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 458,844, dated September 1, 1891.

Application filed November 24, 1890. Serial No. 372,426. (No model.)

To all whom it may concern:

Be it known that I, LÉON O. DION, of Natick, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Electric Railways and Cars Therefor, of which the following is a specification.

This invention has for its object to dispense with overhead conducting-wires in electric-railway systems and to substitute therefor a series of transverse conductors or branches from the main electrical conductor, the latter being placed underground or otherwise arranged, so that it will be out of the way, said branches being in the form of rigid arms or structures which extend upwardly from the conducting-wire at points outside of the track and are curved to project over the track and present points of contact to a conducting attachment on a car, said conducting attachment being connected with the motor on the car and made of such length that whenever it is separated from one of the fixed branches of the conducting-wire by the progressive movement of the car its forward end will come in contact with the next fixed branch, so that the motor will continuously remain in circuit so long as the car is in motion.

The invention consists in the improved system and devices incidental thereto, which I will now proceed to describe and claim.

In the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of an electric car having a conducting attachment embodying my invention and two of the fixed branches of the main conductor. Fig. 2 represents a top view of the same. Fig. 3 represents a transverse section of a street, showing the adaptation of my invention for a double-track road. Fig. 4 represents a similar section, showing a single track. Figs. 5, 6, and 7 represent detail views. Fig. 8 represents a plan view of a curved track, a car thereon, and a series of fixed branches from the main conductor. Fig. 9 represents a perspective view of a portion of the conducting attachment on the car, and Fig. 10 represents a sectional view of the pulley shown in Fig. 9.

The same letters and numerals of reference indicate the same parts in all the figures.

In carrying out my invention I arrange the main conducting-wire *a* of an electric-railway system at any suitable point below the road-bed, preferably in a tube or conduit *b* below the surface, as shown in Figs. 3 and 4. Said conductor corresponds to the usual trolley-wire of an electric-railway system, and may be connected to the source of electrical supply in any suitable way. From said conductor *a* extends a series of branches *a'* to points sufficiently elevated above the railway-track to permit the passage of a car under them. Said branches are rigidly supported by means of fixed tubular structures *c*, which are preferably sections of metal tubing suitably affixed to the road-bed or supported in any suitable way and extending vertically upward outside of the track, and then bent to extend over the track above the roofs of cars passing along the track.

As here shown, each supporting structure *c* is composed of a vertical hollow post 2, rising from the road-bed, and a curved hollow section 3, attached to the upper end of the post 2, and in case the post 2 is located at the edge of the sidewalk, as shown in Fig. 3, the support *c* also comprises one or more horizontal sections 4, which, with the posts 2 and curved sections 3 at the opposite sides of the street, constitute a flattened arch, as shown in Fig. 3. In case the post 2 is located close to the track, as shown in Fig. 4, the structure will comprise only the post 2 and the curved section 3. The sections of which the supports *c* are made are preferably connected by means of tubular couplings 5, having screw-threaded ends 6 6, onto which the ends of the said sections are screwed. (See Fig. 5.)

Each branch *a'* terminates at a point above the track in a terminal or electrode a^2. Said electrode is preferably a block of any suitable metal adapted to slide vertically in a socket 6, formed on and projecting downwardly from the support *c*, said socket being open at its lower end to permit the electrode to project downwardly below it, as shown in Figs. 6 and 7. The electrode is attached to the branch wire *a'*, so as to conduct the electric current flowing therethrough. Said electrode should be suitably insulated from the socket 6 and other parts of the support *c*, and to this end said socket may have a lining 7 of insulating material. (See Fig. 7.)

On the top of each car is located an elon-

gated conductor or conducting attachment d, which is in electrical connection with the motor of the car. Said conducting attachment is here shown as an endless metallic belt mounted upon pulleys e e, which are journaled in brackets f f on the roof of the car. The electrical connection between the conducting attachment d and the motor may be through the pulleys e, brackets f, and suitable connections between said brackets and the motor, or said connection may be effected in any other suitable way. The upper portion of said belt extends horizontally lengthwise of the car and is preferably of a length slightly exceeding the distance between two adjacent branches a' of the main conductor and the supports c therefor. The belt or conductor d is arranged at such height that it will make contact with the electrode a^2 of each branch conductor a' as the car moves along the track, the forward portion of the belt coming in contact with the electrode on one branch a' just before the rear portion of the belt passes away from the electrode of the preceding branch a'. Hence there is always an electric connection between the main conductor a and the motor on the car, said connection being through one of the branches a', the belt d, and the connections between said belt and motor. The motor is therefore continuously operated, as it would be if the overhead conducting-wire were employed and the car were provided with a trolley-arm, as in the ordinary overhead system.

To prevent excessive wear of the conducting attachment d and electrodes a^2, I impart motion to the said conducting attachment d in a direction opposite to the movement of the car, this being the object of the belt form of the attachment d. To this end I provide the belt with a series of holes i, Fig. 9, formed and arranged to engage sprocket-teeth j on a wheel k, which is affixed to a shaft l, journaled in bearings in the bracket f, there being a shaft l and sprocket-wheel k on each of the brackets f. Each shaft l is provided with a pulley m, which is connected to the shaft by a clutch of such construction that when the pulley m is rotated in one direction it will rotate the shaft l and when rotated in the other direction it will turn loosely without rotating the shaft. A suitable form of clutch is shown in Fig. 10, the pulley being provided with a series of eccentric recesses 8, which form tapering spaces around the periphery of the shaft, in which spaces are inserted a series of balls or rollers 9, which when the pulley is turned in one direction are wedged between the pulley and the shaft, causing the rotation of the shaft, said balls being loose when the pulley is rotated in the opposite direction.

The pulleys m are connected by belts o or by any other suitable means with the motor on the car and are rotated by said motor. The pulley at one end of the car has its clutch so arranged that the shaft l will be rotated by a movement of the pulley in one direction, while the pulley at the opposite end of the car has its clutch arranged so that the shaft l will be rotated by a movement of its pulley in the opposite direction. Consequently the pulley at the rear end of the car will always rotate idly without imparting movement to the shaft on which it is located, the belt d being therefore moved only by the forward pulley, which rotates in such direction that the upper portion of the belt runs backwardly, or in a direction opposite to the movement of the car, as indicated by the arrows in Fig. 1. The described movement of the belt has the effect of neutralizing the motion of the car so far as friction of the conducting attachment d on the electrodes a^2 is concerned, the friction being entirely obviated, or reduced to such a degree that its consequences will not be injurious. I prefer to impart to the belt a backward movement of about the same rate as the forward motion of the car, so that the belt will have no slipping motion upon the electrodes. The motion of the belt is governed by the speed of the motor. Hence it will always sustain the same relation to the movement of the car.

To protect the electrodes against ice and snow and other foreign matter, I provide each electrode with two gravitating hinged covers r r, which are pivoted at s s and are arranged to close over the electrode by gravitation. Each cover has a downwardly-projecting lip r', and the brackets f are provided with forwardly-projecting wedge-shaped extensions f', formed to enter the space between the lips r' and swing the covers r r outwardly, thus permitting the belt d to pass between the covers and bear upon the electrode. When the belt has passed away from the electrode, the covers r r swing to their closed position.

In Fig. 8 the position of the support c over the curved track is represented, said supports being radially arranged.

I do not limit myself to the employment of the belt as the conducting attachment on the car, as a conductor extending lengthwise of the car and affixed rigidly thereto might be used without departing from the spirit of my invention. I prefer the belt, however, for the reasons above stated.

The conducting attachment or belt may be located at one side of the car in some cases.

Electric-light wires v may be extended through the supports c, as shown in Fig. 5.

It will be seen that the vertical movability of the terminals or contacts a^2 enables them to conform to variations in the height of the conductors d on the cars, and thus maintain contact with said conductors without regard to depressions in the latter.

I claim—

1. In an electric-railway system, an underground main conductor a, combined with a series of rigid supports extending upwardly from points outside of the track and laterally over the track and branch conductors extend-

ing from the main conductor along said supports and provided with vertically-movable electrodes or terminals projecting below said supports above the track, as set forth.

2. The combination, with the fixed supports, the branch conductors, and the downwardly-projecting electrodes or terminals held by said supports, of the swinging covers adapted to close over said electrodes and to be separated to expose the electrodes, as set forth.

3. The combination of an electric car, a conducting attachment composed of a belt mounted on suitable supports on the car, and means for moving said belt, substantially as and for the purpose specified.

4. The combination of an electric car, the conducting-belt mounted on supports on the car, sprocket-wheels engaged with said belt, pulleys connected by clutches with the shafts of said wheels, and connections between said pulleys and the motor of the car, the pulley at one end of the car being arranged to slip loosely when moved in the opposite direction, as set forth.

5. The combination, with the fixed supports, the branch conductors, and the downwardly-projecting electrodes or terminals held by said supports, of the swinging covers adapted to close over said electrodes and to be separated to expose the electrodes, and a car having a conducting attachment and a wedge or separating device adapted to displace the said covers, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 21st day of November, A. D. 1890.

LÉON O. DION.

Witnesses:
A. D. HARRISON,
ARTHUR W. CROSSLEY.