(No Model.) 2 Sheets—Sheet 1.

W. F. SHERMAN.

MEANS FOR APPLYING ELECTRIC MOTORS TO CARS.

No. 302,596. Patented July 29, 1884.

Fig. 1.

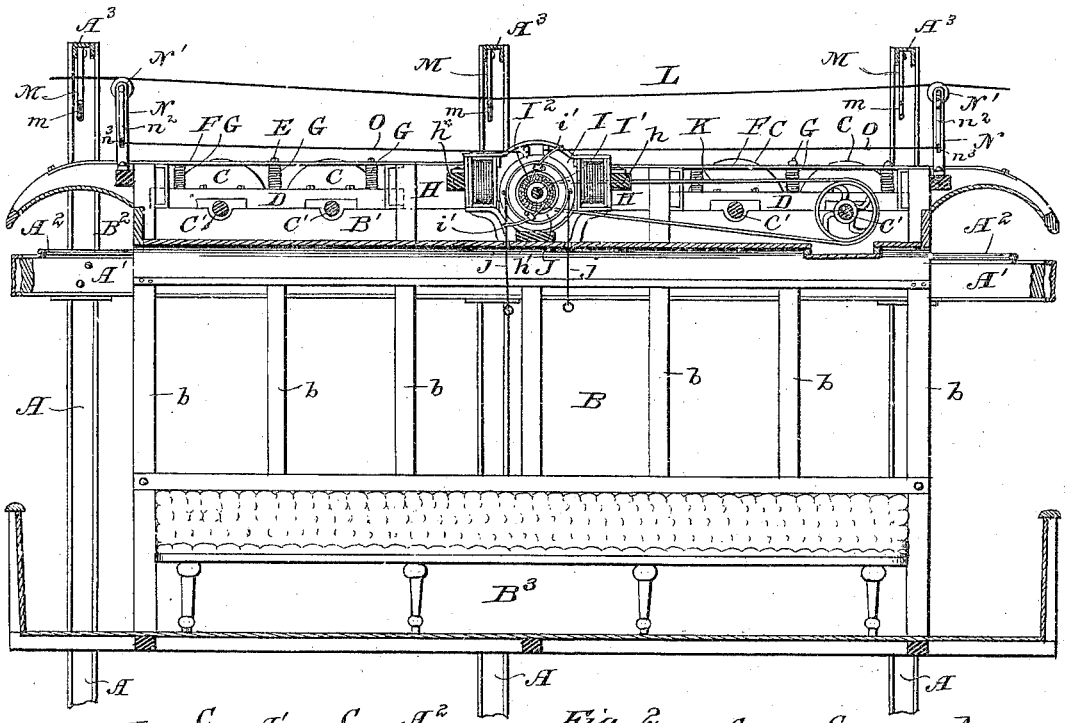
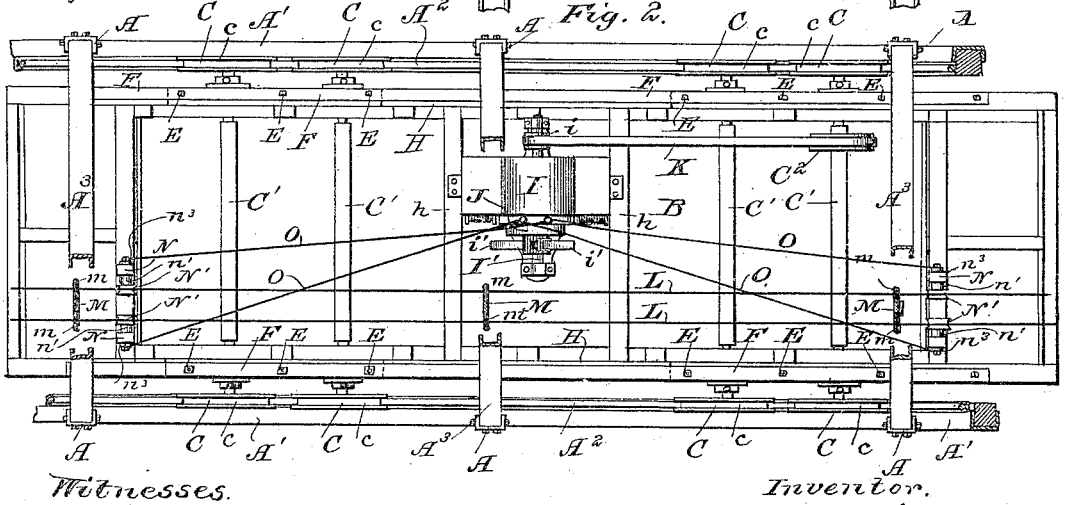


Fig. 2.



Witnesses.
Jno. W. Sockett
C. C. Poole

Inventor.
William F. Sherman
By W. E. Dayton
Attorney.

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

W. F. SHERMAN.

MEANS FOR APPLYING ELECTRIC MOTORS TO CARS.

No. 302,596. Patented July 29, 1884.

Fig. 3.

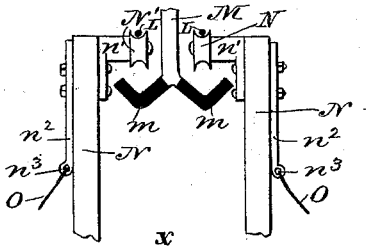


Fig. 4.

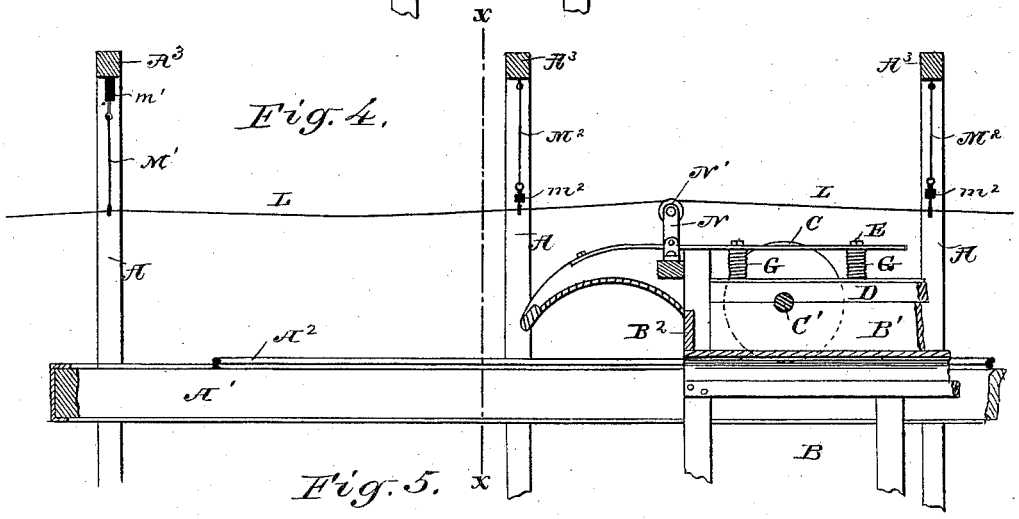


Fig. 5.

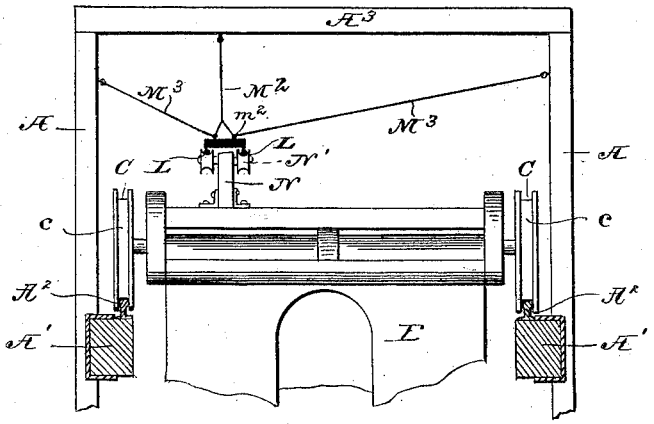


Fig. 6.

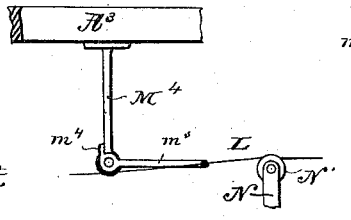
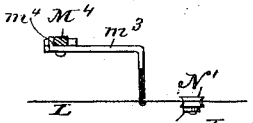


Fig. 7.



Witnesses:
Jno. H. Stockett.
C. C. Pool

Inventor.
William F. Sherman
Per W. E. Dayton
Attorney.

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM F. SHERMAN, OF CHICAGO, ILLINOIS.

MEANS FOR APPLYING ELECTRIC MOTORS TO CARS.

SPECIFICATION forming part of Letters Patent No. 302,596, dated July 29, 1884.

Application filed October 5, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. SHERMAN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Means for Applying Electric Motors to Cars; 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.

The object of this invention is to provide an improved means for applying electric motors to that class of elevated railways in which a suspended car is used, or a car in which the supporting-wheels are located at or near the top of the car, and the car-body, or portion for the accommodation of passengers, hangs below the level of the rails; and the invention consists in the matters hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a central longitudinal section of the track-supporting structure of an elevated railway and a car supported thereon, showing an electric motor upon the cars, an electric wire or conductor supported by the track-structure, and connections between such a structure and wire. Fig. 2 is a plan view of the matters shown in Fig. 1. Fig. 3 is a detail fragmentary view of the devices illustrated in Figs. 1 and 2, for transmitting the electric current from the conducting-wires to the motor upon the car, showing a hanger for supporting the said wires from the track-structure, and standards upon the car which support metal pulleys constructed to engage and lift the wires from the hanger. Fig. 4 is a detail longitudinal section of a modified form of the devices for supporting the electrical conducting-wire. Fig. 5 is a transverse detail section taken upon line *x x* of Fig. 4. Figs. 6 and 7 are detail views of a modified form of the devices shown in Figs. 4 and 5.

As illustrated in the accompanying drawings, A are the vertical supporting-posts of a track-supporting structure, and A′ are longitudinal beams or stringers which are attached to the inner faces of the supporting-posts A, and upon which the track-rails A^2 are secured.

B is a car, which preferably consists of an upper rigid frame placed at or near the level of the rails, said frame consisting, principally, of longitudinal beams B′ and cross-pieces B^2, and a lower depending portion, B^3, which hangs below the level of the rails, and which is formed with a relatively light frame-work, and is supported from the longitudinal timbers B′ by means of uprights *b*. The car is, as shown, supported upon wheels C, which are fixed rigidly upon the ends of the axles C′, two pairs of said wheels being placed near each end of the car. Each pair of axles C′ has bearings at its ends in longitudinal bars D, which are, as shown, located above the longitudinal frame-pieces B′, and secured to them by means of spring-connections, and the wheels C are secured upon the extreme end of the said axles, outside of said bars, and are provided with deep grooves *c*, constructed to fit upon the track-rails A^2.

In the construction shown the spring-connections between the bars D and the beams B′ are formed as follows: To the beam B′ are secured vertical rods or bolts E, which pass upwardly through vertical apertures in the bars D, and are secured at their upper ends in longitudinal bars F, between which bars F and the said bars D are located strong coiled springs G, preferably placed around said bolts. The strap or bar F is, as shown, secured to re-enforcing pieces H, which are located above the beam B′, and which are provided in their ends with vertical slots, which serve as guides for the ends of the bars D. The features of construction in the car above described are set forth in an application for Letters Patent filed by me September 10, 1883, and are not therefore included in this invention.

At the top of the car, and supported from the side frame-pieces, B′, is placed an electric motor, I, which is, as shown, constructed in a manner similar to an ordinary dynamo-electric machine or "dynamo," and which is operated by an electric current from a stationary generating-dynamo located at any convenient point. Said motor is, as shown, provided with a central shaft, I′, upon which the revolving armature I^2 thereof is supported, and upon said shaft is secured a pulley, *i*, which is arranged in line with a pulley, C^2, upon one of the axles C′ of the wheels C, a driving-belt,

K, being placed over the pulley *i* and C^2, as shown, by which motion is transmitted from said shaft to the driving-wheels.

L are the conducting-wires for the electric currents by which the motor I is operated, said wires being supported upon the track-structure, longitudinally thereof, and connected at one end of the line, or at other convenient point, with the generating-dynamo. The said wires are supported upon insulated holders from the track-supporting structure, and the electric current is transmitted from them to the electric motor I by means of connecting devices upon the car provided with contact-points constructed to slide upon the wires, so as to form a continuous circuit through said wires and the motor. As shown in the drawings, Figs. 1, 2, and 3, the wires L are supported at suitable intervals upon insulated hangers M, which are attached to cross pieces or braces A^3, secured at their ends to the tops of the posts A of the track-supporting structure, and upon the top of the car are secured standards N, which are provided upon their upper ends with metal pulleys N′, which travel beneath the wires L and over the lateral projections or arms *m* of the hangers M, upon which arms the said wires rest. The arms *m* are preferably made of insulating material, and are V-shaped, so as to hold the wires from lateral displacement. The said arms *m*, as shown in Fig. 3, extend in opposite directions from the hanger M, and the standards are so located that their upper ends pass at either side of the hangers, the pulleys N′ upon said standards being mounted upon arms *n*′, which project from said standards toward the hangers, and overhang the projections *m*. The pulleys N′, which are composed of metal, as before described, are connected to the ends of conducting-wires O, by which the electric currents are transmitted from the said pulleys to the said electric motor I, the opposite ends of the wires O being connected with the field-magnet coils of said motor. As shown in the drawings, Fig. 3, metal strips n^2 are secured to the standards N, said strips having metallic connections with the wheels N′, and being provided upon their lower ends with eyes N^3, in which the ends of the wires O are secured.

As shown in the drawings, two standards, N, and pulleys N′, for making contact with the wires L, are located at both ends of the car. It is obvious that only one set of these standards and pulleys is necessary; but two sets are preferably used in order to insure perfect contact at all times, and also to give a greater area of contact with the wires, and to afford ample means for conducting the current from said wires to the motor.

For the purpose of enabling the direction of motion of the driving-shaft J′ of the electric motor to be readily changed, means are provided for shifting the brushes *i*′ to opposite points upon the commutator, so as to reverse the poles of the field-magnets, and thereby reverse the direction of rotation of the revolving armature I^2. For this purpose the brushes are mounted upon the face of a pulley, J, which is rotatably supported upon the frame of the motor concentrically with the shaft I′, said pulley being rotated by means of straps or cords J, which are secured to the periphery thereof at opposite points, and extend downwardly through the roof of the car in position to be grasped by the operator. By means of the pulley described and the cords attached thereto the brushes may be readily turned to opposite sides of the commutator, or held over the neutral points thereof, so that the car may be moved in either direction, or stopped, as desired.

As a preferable means of supporting the motor upon the car-frame, cross-pieces *h* and *h*′ are secured in the longitudinal pieces H, the dynamo being secured to and between the pieces *h*, and the piece *h*′ being placed below it, so as to take all or a part of its weight.

In Figs. 4 and 5 another, and for some reasons a preferable, form of the device for supporting the conducting-wires L is shown. In this case contact is made with the wires by means of pulleys N′ upon the car, similar to those before described, and said wires are supported from the cross-pieces A^3 by means of flexible hangers constructed to yield upwardly as the said pulleys pass beneath them.

The flexible hangers, as shown at M′ at the left hand in Fig. 4, consist of flexible wires, which are connected with the line-wires at their lower ends, and with an insulator, *m*′, at their upper ends. A preferred form of hanger is shown at the two right-hand posts in Figs. 4 and 5. In these figures wires M^2 are shown as connected with a horizontal cross-bar, m^2, of insulating material, to the down-turned ends of which bar the two conducting-wires are secured, so that said conducting-wires are held at the proper distance apart and parallel to each other, and in order to retain the wires in line with the pulleys upon the car, and to prevent them from becoming displaced laterally, they may be held by transverse wires M^3, which are, as shown, connected with the insulated cross-pieces m^2 and the posts A of the track-supporting structure. The wires are supported by the several devices described in such manner that they will yield or be deflected by the pulleys upon the car as such pulleys traverse them, and perfect contact between said pulleys and wires is thereby constantly obtained. The same result may also be obtained by other forms of upwardly-yielding supports—as, for instance, that shown in Figs. 6 and 7, in which a rigid downwardly-projecting arm, M^4, is secured to the track-structure, to the lower end of which arm is pivoted a horizontal arm, m^3, the free end of which is constructed to yield upwardly, and said arm m^3 being bent at right angles, and provided upon its extremity with a suitable insulator, to which the conducting-wire is attached.

In the operation of this device the extremity

of the arm m^3 yields upwardly in the passage of the roller N′ beneath it, in an obvious manner, the downward motion of the arm being limited by means of a stop, m^4, at its pivotal point, as shown.

The wires L may obviously be yieldingly supported by springs, instead of the devices shown, and the rollers in such case may be constructed to bear upon and deflect the wires laterally, or in other directions, instead of upwardly, as before described.

Instead of the devices shown an electric motor may be used which is operated by means of a storage-battery carried upon the car. In such case the conducting-wires L and the several connecting devices between the motor and said wires are unnecessary, and would be dispensed with.

By locating the electric motor at the top of a suspended car in which the wheels are located at its top, as described, important advantages are gained, one of which is that such motor is out of the way of the passengers, and does not occupy space in the car-body, and another is that the said motor being located in position adjacent to the supporting-wheels of the car, the driving-connections between them may be of simple and inexpensive construction.

Important advantages are gained by the construction above stated, in connection with conducting-wires supported over the car, from the fact that the wires are beyond the reach of persons in the car, and the liability to injury by accidental contact with the said wires is thereby greatly lessened, and also for the reason that, the said conducting-wires being adjacent to the motor, the connecting devices between them may be of simple construction, and readily accessible for adjustment and repairs.

The construction in the car by which the rigid main frame thereof is located at its top, and both the motor and driving-wheels are located upon such frame, presents the advantage that the principal weight of the car is located at its top and in line with the rails, whereby the strain upon the running-gear which would be consequent upon the action of centrifugal force (or other laterally-acting forces) exerted upon the car at a point considerably above or below the rails is avoided. Another advantage of the construction last mentioned is that the motor and driving-wheels being supported upon the main frame of the car, the connections between them are not liable to be thrown out of line or adjustment by the yielding of parts of the car-frame, and a special construction in said frame is unnecessary in order to obtain sufficient rigidity in the parts thereof which support said wheels and motor.

I claim as my invention—

1. The combination, with a suspended car having supporting-wheels mounted at or near the top thereof, and an elevated track-supporting structure, of an electric motor located upon the top of the car, and driving-connection between the said motor and the supporting-wheels, substantially as described.

2. The combination, with a suspended car having supporting-wheels mounted at or near the top thereof, an elevated track-supporting structure, and electric conducting-wires supported thereby, of an electric motor located upon the top of the car, suitable electric connection between said conductors and the motor, and driving-connections between the said motor and said supporting-wheels, substantially as described.

3. The combination, with a suspensory car constructed with a rigid main frame at the top and a relatively light car-body located below and suspended from said frame, and supporting-wheels mounted upon said frame, of an electric motor located upon said frame, and suitable driving-connections between the motor and the supporting-wheels, substantially as described.

4. The combination, with the track-supporting structure, a suspended car thereon, an electric motor upon the car, and wires along the track-structure for transmitting an electric current to the motor on the car, of stationary hangers M, provided with insulated arms m, for the support of the conducting-wires, standards N upon the car, constructed to overhang the supports m, and suitable electric connections between said standards and the motor, substantially as described.

5. The combination, with the track-structure, stationary conducting-wires, and a car, of the stationary hangers M, provided with V-shaped insulated arms m, standards N upon the car, provided with pulleys N′, constructed to overhang the arms m, and electric connections between the pulleys and the motor, substantially as described.

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

WILLIAM F. SHERMAN.

Witnesses:
C. CLARENCE POOLE,
W. C. ADAMS.