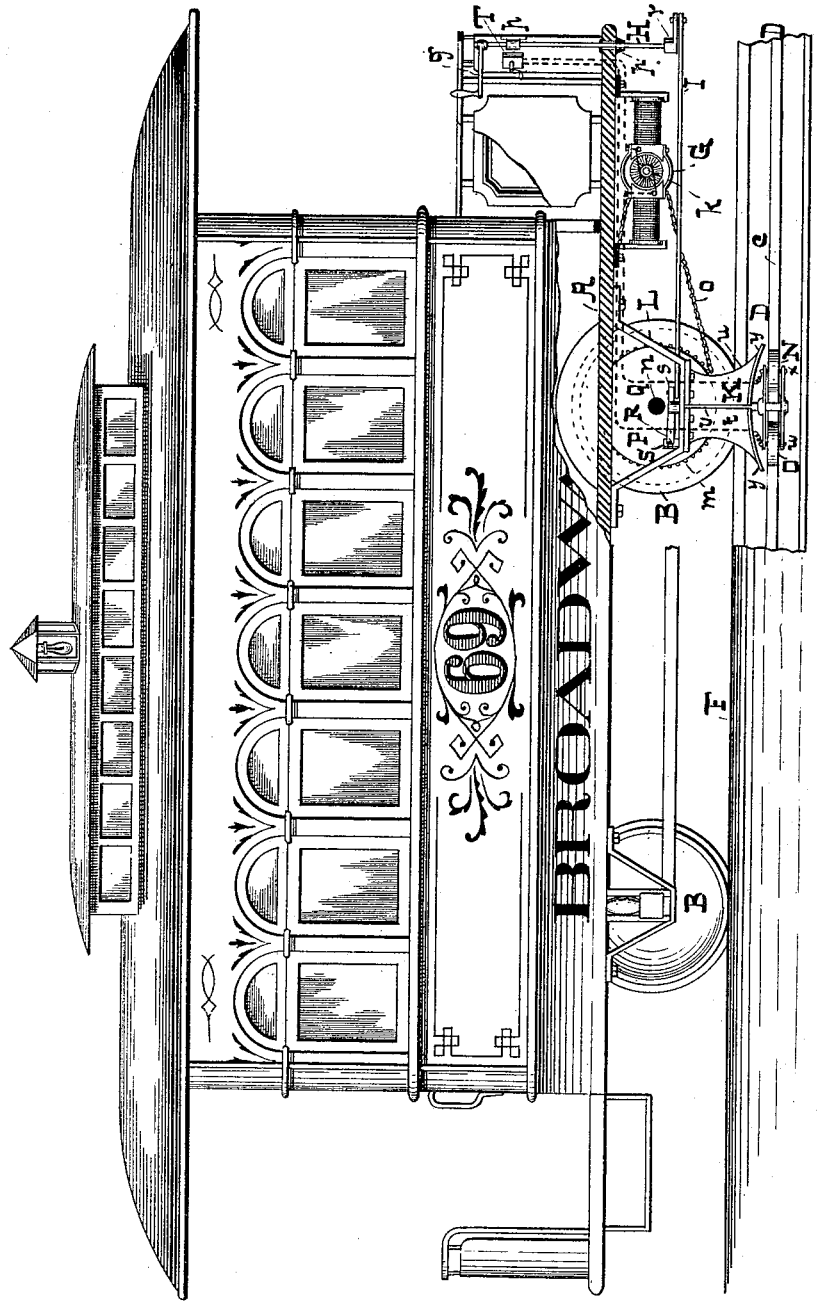
(No Model.) 2 Sheets—Sheet 1.

E. E. RIES.

ELECTRIC RAILWAY.

No. 386,085. Patented July 10, 1888.



-FIG. 1-

-WITNESSES-

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Albert H. Henderson

-INVENTOR-

Elias E. Ries,

by G. H. R. I. Ward,

Atty.

(No Model.) 2 Sheets—Sheet 2.

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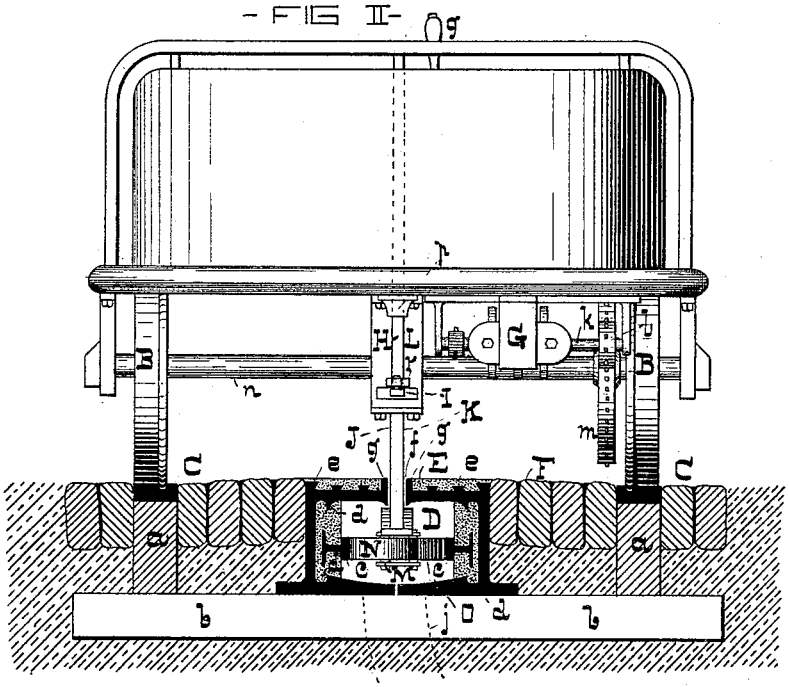
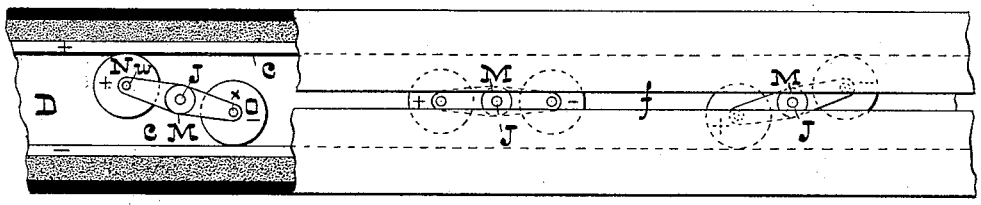
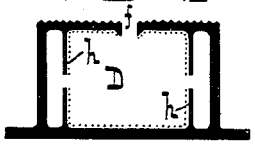
- FIG II -



- FIG III -

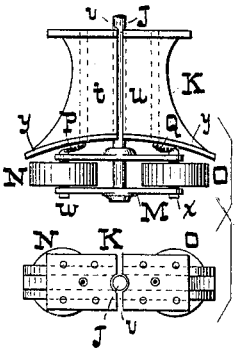


- FIG VI -

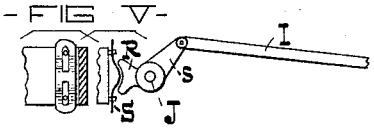


- FIG VII -

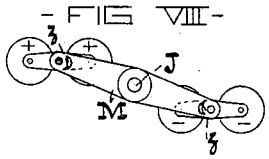
- FIG IV -



- FIG V -



- FIG VIII -



-WITNESSES-

Dan'l Fisher

Albert H. Henderson

-INVENTOR-

Elias E. Ries.

by Gifford & Howard, Atty's.

UNITED STATES PATENT OFFICE.

ELIAS E. RIES, OF BALTIMORE, MARYLAND, ASSIGNOR, BY MESNE ASSIGNMENTS, TO HIMSELF AND ALBERT H. HENDERSON, OF SAME PLACE.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 386,085, dated July 10, 1888.

Application filed January 25, 1886. Serial No. 189,631. (No model.)

To all whom it may concern:

Be it known that I, ELIAS E. RIES, of the city of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification.

This invention relates to certain improvements in electric railways of that class in which the propelling-current is conveyed to the motors or cars by means of electrical conductors extending along the line of the railway and carried in a suitable conduit.

The said invention is more particularly adapted to and designed to meet the requirements of electric street-railways; but it is also applicable to and intended to be used for elevated, suburban, and other railways.

The first part of my said invention consists in the combination, with the conducting-rails, which are contained within a suitable conduit, of contact-wheels arranged to be moved in a horizontal plane, so that by simply turning the pendent bar, to which the said wheels are indirectly connected, by means of any appropriate mechanism, from the platform or other part of the car the direction of motion of the car can be changed or the car stopped.

The second part of my said invention consists in a novel construction and arrangement of the devices whereby the pendent bar carrying the contact-wheels is supported and guided from the car-body, and also in means for deflecting from the said contact-wheels any water which may adhere to the sides of or enter the longitudinally-extending slot in the conduit at a point immediately above the said wheels.

The third part of my said invention consists in the novel construction and arrangement of certain details of the devices above alluded to, whereby they are peculiarly adapted to the uses and purposes for which they are intended, all of which will hereinafter fully appear.

In the further description of the said invention which follows, reference is made to the accompanying drawings, forming a part hereof, and in which—

Figure I is a partly-sectional side elevation of a street-railway car provided with my improvements. Fig. II is an exterior end view of the lower portion of the said car, on an enlarged scale, and a transverse sectional view of the road-bed, showing the conduit and the current-collecting devices. Fig. III is a partly-sectional top view of the conduit and the contact-wheels, and illustrates different positions which the said wheels may occupy with respect to the conducting-rails. Fig. IV shows two views of the contact-wheels and their support. Fig. V consists of two views of parts of the starting and stopping mechanism. Figs. VI and VII illustrate modifications in the construction of the conduit. Fig. VIII shows a modified construction and arrangement of the contact-wheels and their attachments.

Referring to Figs. I to V, inclusive, A is the car-platform, and B B are the car-wheels.

C C represent the track-rails, which rest on the string-pieces *a a*, secured to the cross-ties *b b* in the usual manner.

D is a metallic conduit of any suitable construction, but preferably of the form shown. This conduit may have its sections or lengths formed in two parts, as shown in Figs. II and VII, or in a single piece, as illustrated in Fig. VI, and is firmly secured to the cross-ties by means of bolts or other suitable means. The inner sides of the conduit are faced with asphalt, concrete, or some other non-conducting and non-absorbent substance, in which the conducting-rails *c c* are embedded, the rails being flanged, as shown, to secure a good hold therein. This construction of the conduit, however, is not essential to the proper operation of the current-collecting devices, hereinafter described, as said devices may be used equally well with other forms of conduits—such, for instance, as shown in my application of September 17, 1885, Serial No. 177,379, and also wherever two parallel conducting-rails are employed. The non-conducting substance may, however, be merely interposed between the rails and the sides of the conduit. The body of concrete or asphalt is held in place by means of projections *d d* on the inner surfaces of the conduit. The upper exterior surface of the conduit is also provided with a bed of asphalt or concrete, E, which is practically on a level with the pavement or street surface, which is represented by F. To admit of the application of this bed of concrete or asphalt to the surface of the conduit, the said surface of

the conduit is situated somewhat below the pavement and fitted with projections *e e*, preferably of dovetail shape, as shown in Fig. II, and the approaching edges of the upper plates of the conduit, which are separated to form the longitudinally-extending slot *f*, are provided with upward-projecting beads *g*, to retain the inner edges of the concrete, the lower edges of the beads *g* extending slightly into the conduit, as shown, to prevent any water entering the slot from running down the side walls thereof. This construction of the slot-opening also gives a broader bearing surface to the traveling frame that supports the contact devices. The conduit may have partitions *h*, instead of the projections *d d*, to retain the concrete or asphalt E in place, as shown in Fig. VI, if preferred. In this figure I have shown the interior exposed metallic portions of the conduit covered with a protective coating of enamel, asphalt, or other similar non-conducting water-proof material, the object of this coating being to prevent any escape of current from the rails to the conduit due to the entrance of foreign matter or moisture. When the conduit is to be applied to an elevated railway, its lower plate can be provided with holes or openings *i*, of any suitable shape and size, to admit of the escape of water entering the conduit through the slot *f*. In underground conduits the water is carried off through pipes *j*, one of which is shown in Fig. II in dotted lines. The pipe leads to a sewer, which is not shown.

G is an electric motor, of any approved construction, secured under the platform A of the car. The main shaft *k* of this motor is fitted in the present instance with a sprocket-wheel or chain-head, *l*, which is united to a larger sprocket-wheel, *m*, on the axle *n* of the car by means of a chain belt, *o*, though it is obvious other arrangement of driving-gear may be used. This chain is shown only in Fig. I.

H is a vertical bar supported in suitable bearings, *p p*, with a handle, *q*, at its upper end, which is within convenient reach of a person standing on the platform A of the car. Attached to the lower end of the bar H is an arm, *r*, which is united by means of a link, I, to a similar arm, *s*, at the upper end of a second vertical bar, J, which carries the contact or current-collecting devices, hereinafter described. The bar J is sustained by a guide frame or bracket, K, which in the present case is rigidly connected to the bottom of the car by means of a hanger, L. To avoid irregularities in practical operation due to movement of the car-body on its springs, the frames may be secured to a bridge-piece spanning the two axles, as may also the motor, as shown in my application for Letters Patent, Serial No. 177,379. The body of this frame K is of such thickness as to pass loosely through the slot *f* in the conduit, and the frame is in two parts or sections, *t* and *u*, the adjacent edges of which are hollowed and separated to form a cavity, *v*, for the reception of the bar J. (See particularly Fig. IV.) The bar J is preferably supported directly below the center of the axle, in order that it may not be thrown out of alignment with the center of the slot when the car is rounding a curve.

M is a yoke secured to the lower end of the bar J, to which the contact devices are fastened. These contact devices consist, preferably, of wheels N and O, having pivotal bolts *w* and *x*, which are insulated from the yoke M and connected by the leading-wires P and Q to the motor, (see Fig. I;) but brushes may be substituted for the wheels N and O without departing from the spirit of the invention. The leading-wires preferably, but not necessarily, pass through the body of the frame K, and are insulated to prevent metallic contact therewith.

The motor G is preferably of such construction that by simply changing the direction of current flowing through it from the line-conductors the armature can be made to turn in either direction, and consequently propel the car either forward or backward, as desired. I may, however, employ for this purpose a motor having permanent field-magnets, or one whose field-magnets are separately excited in any suitable manner.

In Fig. III the positive and negative conducting-rails are respectively denoted by + and —, as are also the contact-wheels connecting with the positive and negative terminals of the electro-dynamic motor.

It will be seen by reference to Fig. III that the wheels N and O, (represented toward the left of the said figure,) respectively, are in contact with the positive and negative rails, while their delineation at the right of the said figure shows a reversed position. The central representation of the wheels shows them to be in a neutral position—that is to say, they are not in contact with the rails—and the electrical current to the motor is therefore broken.

From the foregoing description it will be understood that by simply turning the handle *g* in the proper direction the contact-wheels can be made to assume any of the three positions shown in Fig. III, thereby interrupting or changing the direction of the current flowing to the motor and causing the car to be stopped or driven forward or backward, as desired.

To prevent accidental detachment of either or both of the wheels N and O from the conducting-rails *c c*, owing to the jarring of the car, irregularities in the surfaces of the rails, or from any other cause, I propose to hold the wheels or brushes, as the case may be, to the contact-rails with a yielding pressure; and to this end I provide the arm *s* with a hollow-faced lug, R, and interposed between the lug and some stationary part of the car a spring, S, which projects within the hollow face of the lug, as shown in Fig. V. With the parts relatively placed as shown in the said figure, the contact-wheels are held normally in the neutral position; but as the arm *s* is turned in either

direction the spring is compressed until the corner of the lug R has passed the center of the spring S, when the spring recoils and places a tension on the lug in the same direction in which it has been moved, and the wheels N and O are by this means held uniformly and constantly in contact with the conduit-conductors irrespective of any jolting of the car or unevenness of the conductors. To still further insure absolute contact with the conducting-rails, the yoke M, as shown in Fig. VIII, may be provided with a smaller yoke at each end, to each of which two contact-wheels are attached, and to limit the movement of these supplemental yokes they are furnished with pins *z*, which pass through slots in the yoke M.

To carry water entering the slot *f* directly over the wheels N and O past or away from the said wheels, I curve the lower end of the frame K, and provide it with a flange, *y*, as shown particularly in Fig. IV.

At T, I have shown a switch-box, which may be attached to any convenient part of the car. This switch-box may be employed when it is desired to utilize a portion of the electric current flowing through the wires P and Q for other purposes—such as for lighting, heating, or applying the brakes to the car. In such case the proper connections are made with the wires P and Q and lead to the switch-box, from which the current may readily be directed into the desired circuits. In the present instance the switch-box is included in the motor-circuit, and is designed to be used for opening this circuit in case of accident or in the event of repairs being required.

I claim as my invention—

1. In an electric railway, the combination of a conduit, a pair of insulated conducting-rails projecting from the inner sides of the conduit, a yoke supported by a bar within and susceptible of a movement longitudinally of the said conduit, means, substantially as described, applied to the said bar, whereby the yoke to which it is fastened is adapted to have a rocking motion in a practically horizontal plane, and a contact or current-collecting device attached to each end of the said yoke and insulated therefrom, substantially as and for the purpose specified.

2. In an electric railway, the combination of a conduit, a pair of insulated conducting-rails projecting from the inner sides of the conduit, a yoke supported by a bar within and susceptible of a movement longitudinally of the said conduit, means, substantially as described, applied to the said bar, whereby the said yoke to which it is fastened is adapted to have a rocking motion in a practically horizontal plane, an insulated contact-wheel or other current-collecting device attached to each end of the said yoke and insulated therefrom, a wheeled vehicle situated over and adapted to move longitudinally of the said conduit, carrying an electric motor arranged to propel the same, and wires to connect the current-collecting devices on the yoke with the said motor, substantially as specified.

3. The frame or guide-bracket carrying the pendent bar to which the contact devices are attached, and which passes through the longitudinally-extending slot in the conduit, having a downwardly-curved lower edge which is flanged to deflect water from the contact devices, substantially as specified.

4. In an electric railway, a yoke or lever movable horizontally about a central vertical axis and having insulated contact or current-collecting devices at each end thereof, substantially as and for the purpose set forth.

5. In an electric railway, parallel electrical conductors extending along the line of way, combined with contact devices carried by a yoke pivoted so as to rock laterally, and thereby bring each collector in contact with either conductor, as desired, the said yoke and its attachments being connected to adjusting devices on a moving electric motor or car, substantially as and for the purpose specified.

6. In an electric railway, a longitudinally-slotted conduit containing conducting-rails, combined with a pivoted yoke carrying at each end a contact-wheel, and a spring to hold the said wheels against the rails with a yielding pressure, substantially as specified.

7. The frame or guide-bracket entering the conduit-slot, said frame or bracket being provided with a central opening having bearings through which the pendent bar carrying the current-collecting devices extends and in which it is free to turn, said frame or bracket being also provided with an additional opening at the front and rear of the said central opening, through which the leading wires or conductors extend, substantially as and for the purpose set forth.

8. In an electric railway, the combination of a centrally-slotted conduit extending along the railway midway between the track-rails and having electrical conductors therein, a depending vertical bar or rod extending through the conduit-slot from a motor-car and carrying the contact or current-collecting devices at its lower end, the said bar or rod being capable of motion about a vertical axis, so as to bring its contact devices, respectively, into engagement with opposite conductors, or into disengagement therewith, the said bar or rod being supported from the motor-car directly below the center of one of its axles and at a point midway between the track-rails, substantially as and for the purpose set forth.

9. In an electric railway, a longitudinally-slotted conduit containing conducting-rails, combined with a pivoted yoke carrying contact-wheels, a handle on the platform of the car, connections between said handle and the yoke for operating the latter, and means for placing and retaining the contact-wheels in any of three different positions, according as it it desired to advance, stop, or back the car, substantially as set forth.

10. In an electric railway, the combination,

with parallel line-conductors extending along the line of way, an electro-dynamic motor on a car or vehicle, line-conductors to supply current to same, and collecting devices to bring said motor into circuit with said conductors, of an operating-lever controlling said current-collecting devices and capable of rocking them into three different positions with respect to the line-conductors, and circuit-connections on said collecting devices, in order that the car may be driven forward, backward, or stopped at the will of the operator by the change in the direction of the current flowing from the line-conductors through the motor by way of the current-collecting devices, substantially as and for the purpose specified.

11. In an electric railway, a metallic conduit having interior projections or partitions adapted to hold in position bodies of asphalt or other non-conducting substance, in combination with conducting-rails partially embedded in the said asphalt or other non-conducting substance and extending beyond the face of the said projections or partitions, substantially as specified.

12. In an electric railway, a longitudinally-slotted metallic conduit having a portion of its interior occupied by bodies of asphalt, concrete, or other non-conducting and non-absorbent material in which the conducting-rails are embedded, and having its remaining exposed interior metallic surfaces coated with a covering of asphalt or similar non-conducting water-proof substance, substantially as set forth.

ELIAS E. RIES.

Witnesses:
WM. T. HOWARD,
DANL. FISHER.