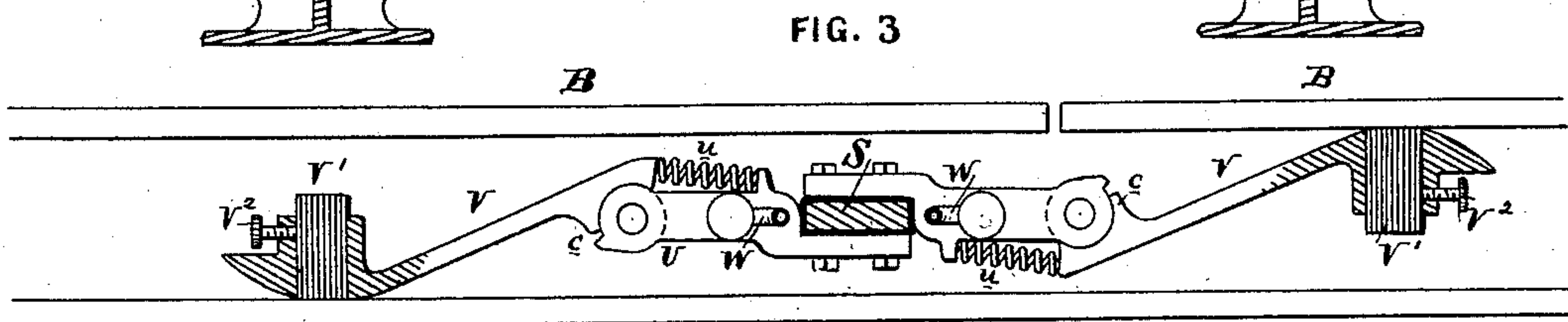
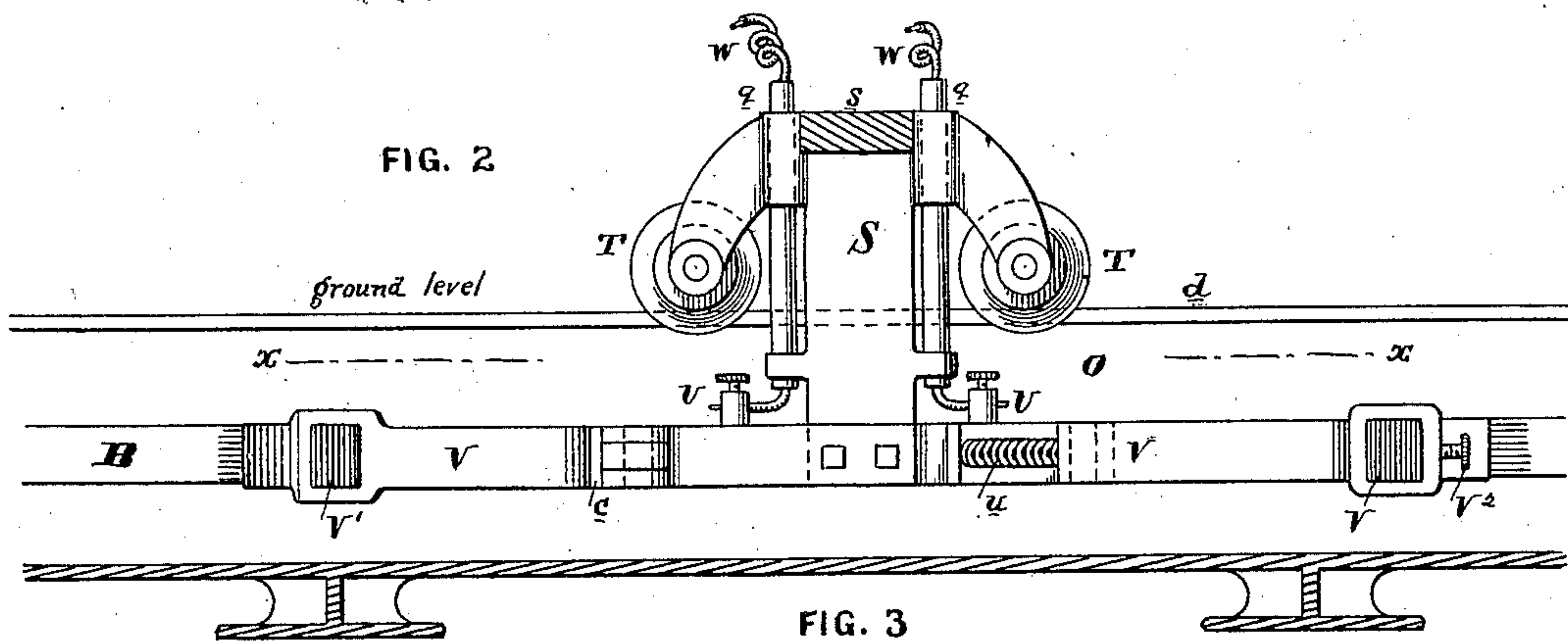
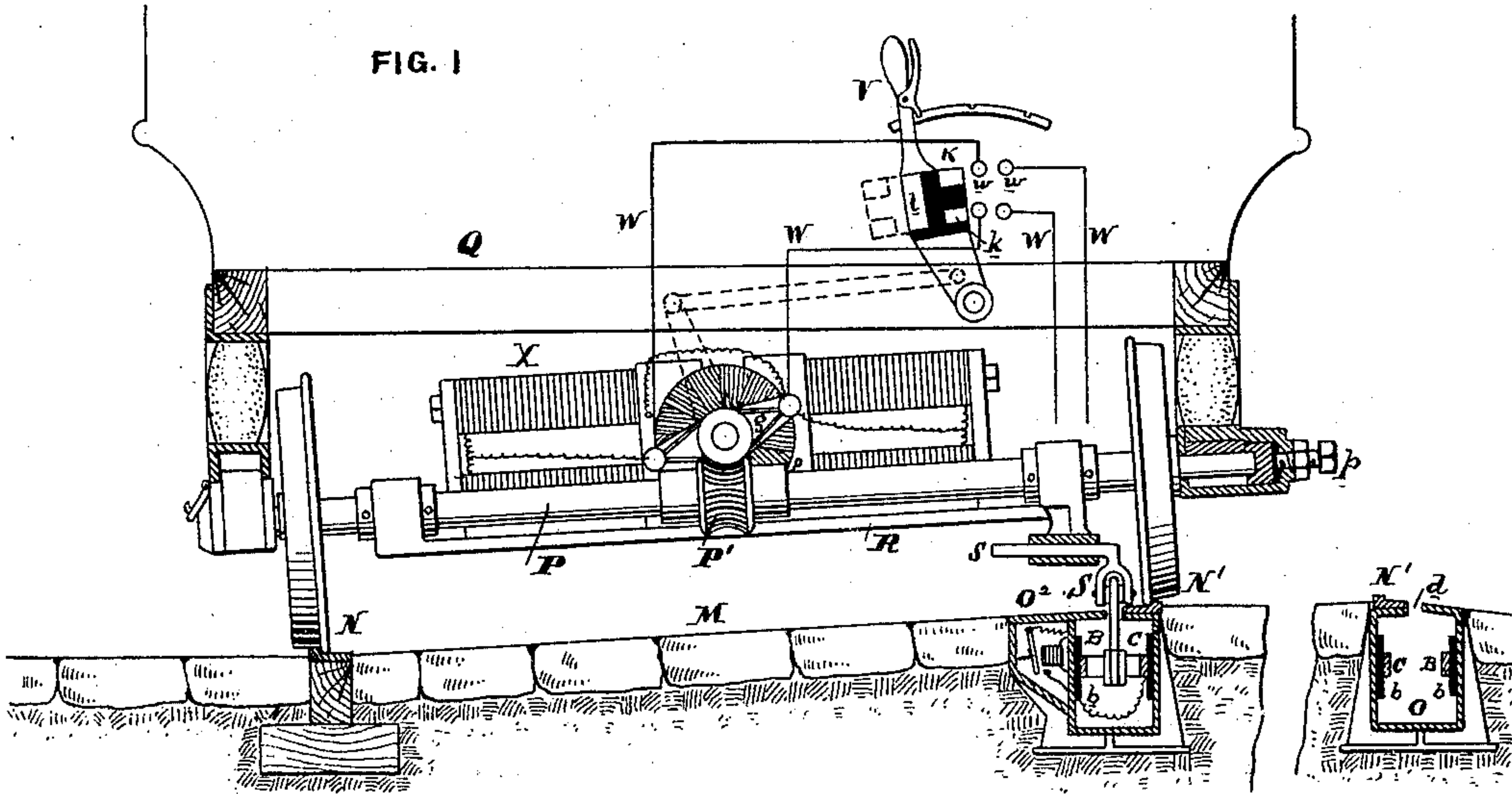


(No Model.)

R. M. HUNTER.
ELECTRIC RAILWAY.

No. 430,025.

Patented June 10, 1890.



Attest:
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UNITED STATES PATENT OFFICE.

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ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 430,025, dated June 10, 1890.

Original application filed February 17, 1886, Serial No. 192,187. Divided and this application filed September 13, 1888. Serial No. 285,295. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH M. HUNTER, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Electric Railways, of which the following is a specification.

My invention has reference to electric railways; and it consists in certain improvements, all of which are fully set forth in the following specification and shown in the accompanying drawings, which form part thereof.

This application, case 70, is a division of my application filed February 17, 1886, Serial No. 192,187.

The objects of my invention are, first, to arrange the rails of a straight railway on different levels and place the conduit containing the working-conductors next to the highest rail, so that the water and slush shall run away from the conduit and also be out of the line of travel of the horses; second, to provide a car with wheels of equal diameter and adapted to run upon a railway with rails on different levels, and in which the body of the car shall be horizontal; third, to provide the car with an improved device for taking the electric current from the working-conductors within the conduit; fourth, to provide an improved form of brush to take electricity from the working-conductor, which shall be capable of running either way and compensate for wear; fifth, my object is also to provide an electric railway with a slotted conduit containing the bared working-conductors, a depending frame from the electric motor, in which the said frame passes through the slot and contains conductors insulated from the frame and from the sides of the slot, and receive the current from the bared conductors; sixth, further to provide the depending brush-holder which enters the slot with a connection to the axles of the motor or car and with freedom to lateral movement to suit itself to the irregularities of the slot in the conduit; seventh, to provide, in an electric railway, a motor with cut-out devices carried by the car to cut out the motor without breaking the continuity of the line-current; eighth,

to provide a double-track electric railway with two conduits, each containing one or more electric conductors close to the adjacent rails of the two tracks, and furnish the electrically-propelled vehicles with suitable current-collecting devices entering said conduits.

The foregoing are the essential objects of the invention, and of necessity comprehend objects of minor importance incident to the details of construction.

In the drawings, Figure 1 is a cross-section of road-bed and car, showing arrangement of conduit. Fig. 2 is a side elevation of the brush-holding mechanism, and Fig. 3 is a sectional plan view of the same on line *x x*.

The system for which my improvements in the motor-connections are well adapted is the series system, in which the line-current includes the motors in series such as set out in my application referred to, but may be used with the motors in parallel or otherwise. The positive and negative conductors are arranged parallel to each other and to the track.

B and C are the two working-conductors, the current passing from conductor B through the motor to conductor C.

The railway may be constructed as desired; but in this application I will set out a construction of road-bed particularly adapted to wet climates.

Referring to Figure 1, M is the roadway, and is slightly inclined, one rail N^2 being higher than the other rail N, so that all water will run from the upper rail toward the lower rail. If the streets have double tracks, then the highest rail of the other track would be next to the rail N' , so that the roadway slopes from the center to the sides. (See Fig. 1.) Supporting the upper rail N' , I provide a conduit-casting O, in which the positive and negative bared working-conductors B C are secured, and said conduit is provided with a longitudinal slot *d*, arranged in its upper part. It must be borne in mind that I do not claim raising one rail higher than the other, broadly, as that is done in all railways on curves to overcome centrifugal force; but I do deem it

broadly novel when applied to straight roads with the objects in view. The car-body Q is preferably horizontal; but the truck is supported at the same incline as the road-bed, as shown in Fig. 1, as it is necessary to have the wheels of the car of the same diameter. In practice this incline would be small, and is exaggerated in the drawings. Suitable thrust-boxes *p* might be used to take the thrust of the car-body upon the upper ends of the axles. The conduits may be of any suitable construction, and it is evident that the slots thereof might be upon the outside of the tracks, so long as the conduits are close or adjacent to the rails of the two tracks which are nearest together.

R is the motor-frame, and is carried by the axles P, and is provided with a guide-box *r* directly under one of the axles. Guided laterally and loosely in this guide-box is the slide *s*, to which is secured the vertical frame S, which extends down through the slot *b* and carries the brushes.

T are guide-wheels having hubs, the thin portions of the peripheries running in the slot *d*, and arranged one in front and one in the rear of the frame S, insuring it from scraping on the sides of the slot and also keeping the slot open. These wheels T may also support the collector against downward movement. To the bottom of the frame S are secured the arms U, which are insulated from each other and from the frame, and said arms have hinged to them the brush-holders V, which preferably point in opposite directions, and are pressed toward the conductors C D by springs *u*, and their movements toward the conductors are limited by stops *c*. The holders V have their ends curved so as to run in either direction, and have slots through which the contact strips or brushes V' pass and are clamped by the screws V².

Projecting down from the frame S at its upper part and extending through the slot *b* of the conduit between the wheels T and the vertical part of the frame S are the tubes or conductor-guards *q*, of any desired shape, through which the insulated conductors W pass, and which conductors are connected to the arms U or their brushes and convey the current to the motor on the car. The wheels T and frame S will prevent undue wear coming upon the tubes at their parts adjacent to the slot of the conduit. These conductors W pass up to the motor X, carried by the car, and have their continuity broken and their ends terminating in contact-pieces *w*. A circuit-controller lever Y, having contact-plates *k* and *l*, works over said contact-pieces *w*, so that the motor may be connected with the working-conductors by bringing the plates *k* over the contact-pieces *w*, bridging the breaks in the wires W W; or by shifting the plate *l*, so as to connect the two pieces *w* of the conductors away from the motor, the motor may be cut out and the continuity of the line-series circuit be maintained.

The collecting devices may be of any suitable construction when considering my invention broadly with reference to the conduits. When the collector travels in any irregularity of the slot, it slides laterally in its guide on the axles and compensates for such irregularity.

The conductors B C may be secured to the walls of the conduit in any way as to secure insulation, and these walls, if desired, may be provided with insulated coverings *b*, into or upon which the conductors are secured.

While I prefer the construction shown, I do not limit myself to the details thereof, as they may be modified in various ways without departing from my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric railway, the rails and road-bed, in combination with a conduit arranged close to one of said rails, an electric conductor within said conduit, an electrically-propelled vehicle, and a laterally-movable current-collecting device movable with relation to the vehicle and extending into the conduit.

2. In an electric railway, the rails and road-bed, in combination with a conduit arranged close to one of said rails, an electric conductor within said conduit, an electrically-propelled vehicle, and a laterally-movable current-collecting device connected to the vehicle by a frame supported by the axles independent of the car-body.

3. The combination, with the movable car, of the depending frame or carrier having an insulated conductor attached thereto which extends into the slotted conduit to make contact with fixed conductors therein, the said carrier being provided with supports to allow freedom of lateral movement to accommodate it to inequalities in the slotted conduit and conductors.

4. In an electric railway, the rails and road-bed, in combination with a conduit arranged close to one of said rails, an electric conductor within said conduit, an electrically-propelled vehicle, a laterally-movable current-collecting device connected to the vehicle by a frame supported by the axles independent of the car-body, and having a transverse guideway in which the collectors slide.

5. The combination of two parallel railway-tracks with an electric conduit for each track arranged close to the adjacent rails of their respective tracks, and an insulated bared working-conductor in each of said conduits.

6. The combination of two parallel railway-tracks with an electric conduit for each track arranged close to the adjacent rails of their respective tracks, an insulated bared working-conductor in each of said conduits, electrically-propelled vehicles for said tracks, and current-collecting devices carried by the said vehicles on adjacent sides, extending into said conduits and making connection with the working-conductor.

7. The combination, with a railway and an electric locomotive thereon, of a stationary supply-conductor parallel with the railway, and a contact conductor resting constantly upon said supply-conductor and supported from the locomotive by a connecting device capable of lateral movement.

8. In an electric railway, a line-working conductor arranged parallel to the track, in combination with an electrically-propelled vehicle and a current-collecting device connected thereto on a vertical or substantially-vertical axis and making a running contact with the conductor.

9. The combination of a slotted conduit beneath the surface of an electric railway, having bare conductors therein, a carrier suspended from the car and entering said slot, and an insulated conductor electrically independent of said carrier, but attached thereto and terminating at one end in contact-pieces bearing against said bare conductors, and at the other end in electric connection with the motor.

10. In an electric railway, the combination

of a car-body supported on springs, an electric motor, a worm on the motor-shaft, a worm-wheel on the axle gearing with the worm, a source of electric power for the motor, reversing-switches for reversing the motor, and a frame carried by the axles to support the motor independent of the car-body sleeved on the axle to which the worm-wheel is secured.

11. In an electrically-propelled vehicle, the combination of the axles, a car-body supported on springs, a worm-wheel secured on the axle, an electric motor arranged with field-magnets transversely to the length of the vehicle and having its shaft arranged longitudinally on the vehicle, a worm on the motor-shaft meshing with the worm-wheel, and a frame journaled on the axle carrying the worm-wheel independent of the car-body.

In testimony of which invention I hereunto set my hand.

RUDOLPH M. HUNTER.

Witnesses:

E. M. BRECKINREED,

ERNEST HOWARD HUNTER.