

(No Model.)

R. M. HUNTER.  
ELECTRIC RAILWAY.

No. 403,754.

Patented May 21 1889.

FIG. 1.

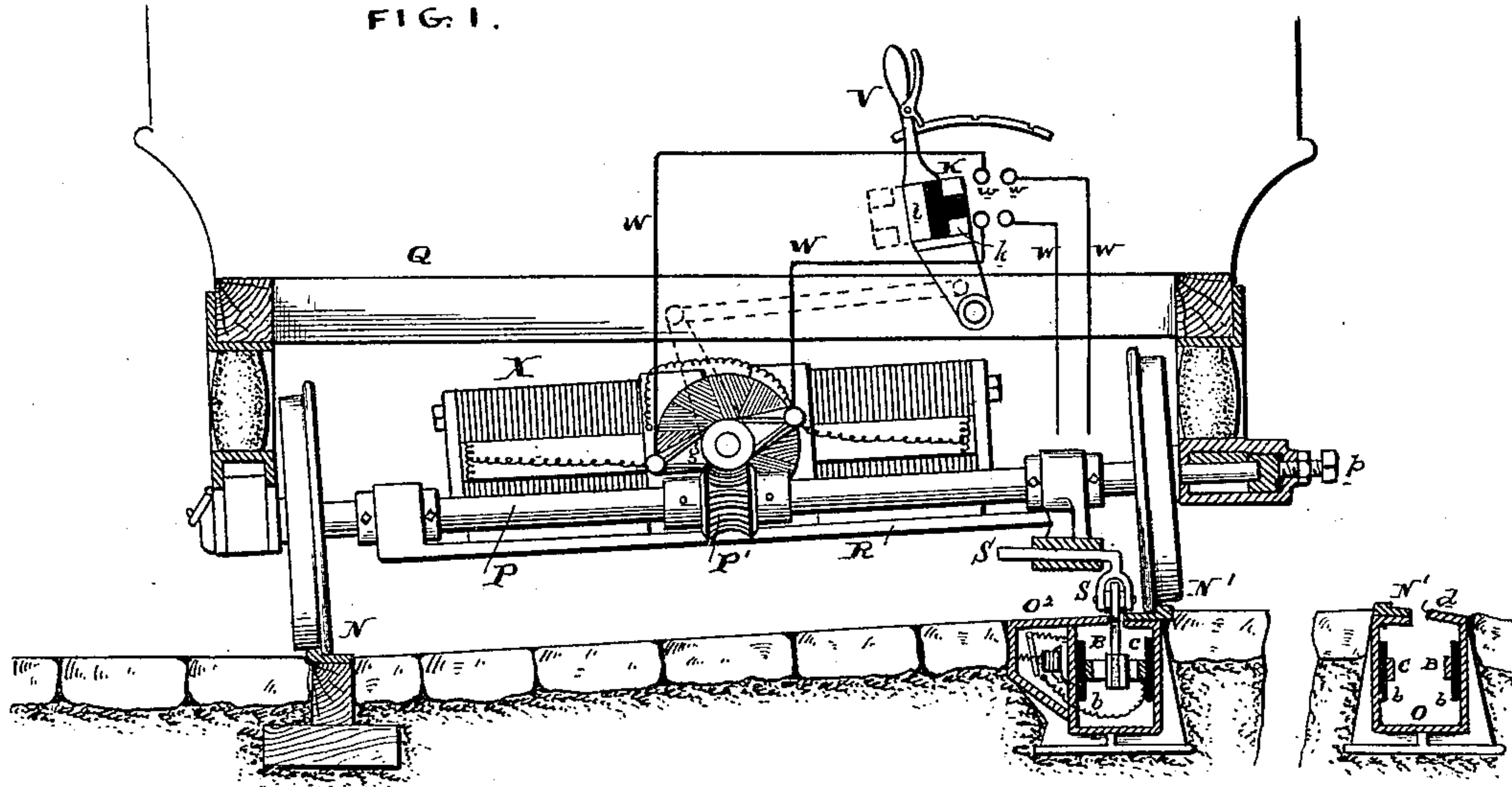


FIG. 2.

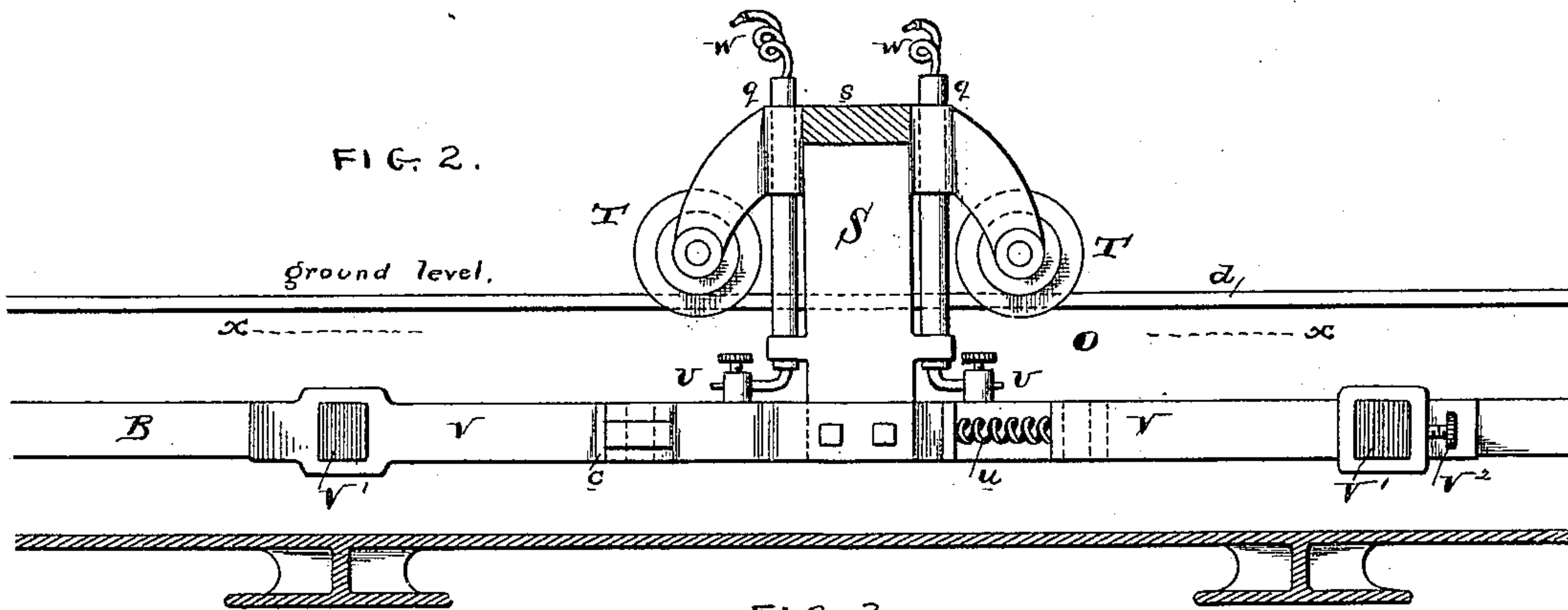
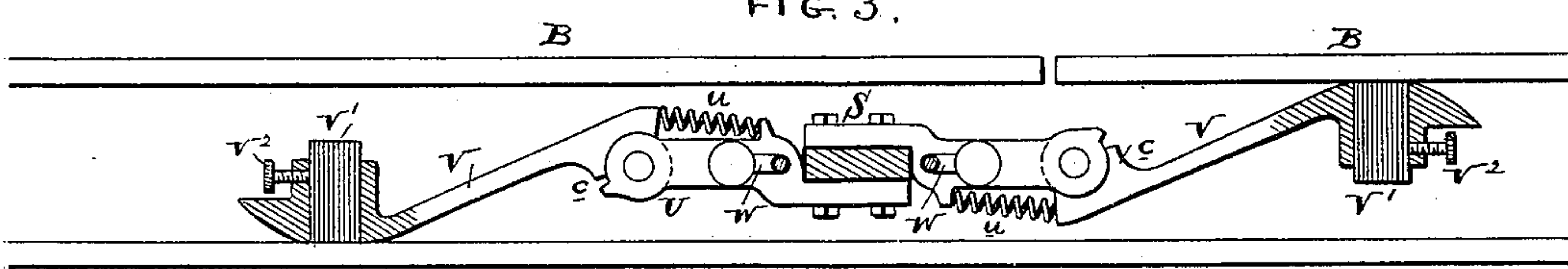


FIG. 3.



WITNESSES:

Henry Drury  
David S. Williams

**INVENTOR:**

*André Gide*



# UNITED STATES PATENT OFFICE.

RUDOLPH M. HUNTER, OF PHILADELPHIA, PENNSYLVANIA.

## ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 403,754, dated May 21, 1889.

Original application filed February 17, 1886, Serial No. 192,187. Divided and application filed September 13, 1888, Serial No. 285,295. Again divided and this application filed April 8, 1889. Serial No. 306,397. (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, (Case 93,) of which the following is a specification.

My invention has reference to electric railways; and it consists of 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 93) is a division of my application, Serial No. 285,295, filed September 13, 1888, which in turn was a division of my application, Serial No. 192,187, filed February 17, 1886.

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, to provide an electric railway having a slotted conduit containing the bared working-conductors with 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, 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.

The foregoing are the essential objects of 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. Fig. 3 is a sectional plan view of same on line *x x*, Fig. 2.

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, Serial No. 192,187, 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 described; but in this application I will set out a construction of road-bed particularly adapted to wet climates.

Referring to Fig. 1, M is the roadway, and is slightly inclined, one rail, N', 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 these wheels are 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 V<sup>2</sup>.

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 *g*, 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, 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, and I wish it to be understood that any matters herein shown or set out, and not claimed, are not dedicated to the public, but form subject-matter of other applications, to wit: Serial No. 74,363, of 1882; No. 171,625, of 1885; No. 200,400, of 1886; No. 215,200, of 1886, and No. 268,360; No. 293,665, of 1888; No. 296,292, of 1889; and 285,295, of 1888, of which this is a division.

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

1. A road-bed for an electric railway in which one rail is higher than the other and the roadway between the rails is inclined, in combination with an electric conductor arranged at or near the higher rail, substantially as and for the purpose specified.

2. A road-bed for an electric railway in which one rail is higher than the other and the roadway between the rails is inclined, in combination with a slotted conduit arranged at or near the higher rail, substantially as and for the purpose specified.

3. A road-bed for an electric railway in which one rail is higher than the other and the roadway between the rails is inclined, in combination with a slotted conduit arranged at or near the higher rail and two working-conductors supported within said conduit, substantially as and for the purpose specified.

4. A road-bed for an electric railway in which one rail is higher than the other and the roadway between the rails is inclined, in combination with a slotted conduit arranged at or near the higher rail and two sectional working-conductors supported within said conduit, substantially as and for the purpose specified.

5. A road-bed for an electric railway in which one rail is higher than the other, in combination with a car having a horizontal body and an inclined truck or axles and wheels, substantially as and for the purpose specified.

6. A road-bed for an electric railway in which one rail is higher than the other and the roadway between the rails is inclined, in combination with a slotted conduit arranged at or near the higher rail, two working-conductors carried within said conduit, a car having inclined wheels and axles and a horizontal car-body, a frame suspended from the car and projecting down through the slot of the conduit, and brushes carried by said frame to connect with the conductors in the conduit, substantially as and for the purpose specified.

7. A road-bed for an electric railway in which one rail is higher than the other and the roadway between the rails is inclined, in combination with a car having a horizontal body and an inclined truck or axles and wheels, positive and negative working-conductors arranged at the highest end of the



road-bed, and a connection between the car and said conductors to convey electricity to the motor on the car, substantially as and for the purpose specified.

5 8. The combination of a slotted conduit, working-conductors contained therein, a frame provided with two guide-rollers to run in the slot and guide the frame, depending tubes arranged between and close to said  
10 rollers and projecting through the slot, and insulated conductors passing through said pipes or tubes and having electrical contacts with the working-conductors, substantially as and for the purpose specified.

15 9. The combination of a slotted conduit, working-conductors contained therein, a frame projecting down through the slot of the conduit and provided with two guide-rollers to run in the slot and guide the frame, brushes  
20 carried by said frame to form electrical contacts with said working-conductors, depending conductor-guards arranged between and close to said rollers and projecting through the slot, and insulating-conductors passing  
25 through said guards and having electrical contacts with the working-conductors, substantially as and for the purpose specified.

10. A brush for an electric railway, consisting of a curved arm to freely move in either  
30 direction over the conductor, and a holder to contain contact-strips or wearing-pieces arranged through the holder at the point of contact to compensate for wear, substantially as and for the purpose specified.

35 11. The brush-arm V, made with a curved end, in combination with the wearing-pieces V' to project through said arm at its place of contact with the conductor, and clamping-screw V<sup>2</sup>, substantially as and for the purpose  
40 specified.

12. In an electric railway, two sectional working-conductors, in combination with a traveling motor electrically connected therewith, and a pair of brushes or contacts connecting the motor with the conductors, the  
45 said brushes being arranged one in front or in advance of the other, substantially as and for the purpose specified.

13. In an electric railway, the combination  
50 of two working-conductors having vertical working-faces, a traveling electric motor or

locomotive, a brush-holder carried by said motor, and two brushes having vertical faces carried by said holder, and adapted to press one in contact with each of said working-con- 55 ductors, substantially as and for the purpose specified.

14. The combination, with an electric locomotive, of a slotted conduit, and two conductors extending from said locomotive into said 60 conduit in line with each other, and each having an independent connection with the locomotive, whereby each may be movable about a vertical axis.

15. The combination of a slotted conduit 65 containing the working-conductors of an electric railway with a car, a frame depending from said car capable of lateral movement relative to the vehicle, and a contact device movable on a vertical axis extending from 70 said frame and taking current from the conductors within the conduit.

16. In an electric railway, the combination of two line or working conductors from which the motors receive current, an electrically- 75 propelled vehicle having an electric motor, a motor-circuit thereon connecting with said line-conductors, and a switch to cut out the motor and complete the line-circuit through the car. 80

17. The combination of two railway parallel tracks having their adjacent rails higher than the others, with an electric conduit for each track arranged adjacent to the highest rail in each track, and an electric conductor 85 in each conduit.

18. In an electric railway, the combination of a car-body supported on springs, an electric motor, power-transmitting connections between the motor and axle, a source of elec- 90 tric supply, a reversing-switch on and moving with the car-body, flexible conductors between the reversing-switch and motor, and a frame carried by the axle independent of the car-body to support the motor. 95

In testimony of which invention I hereunto set my hand.

RUDOLPH M. HUNTER.

Witnesses:

ERNEST HOWARD HUNTER,  
E. M. BRECKINREED.