

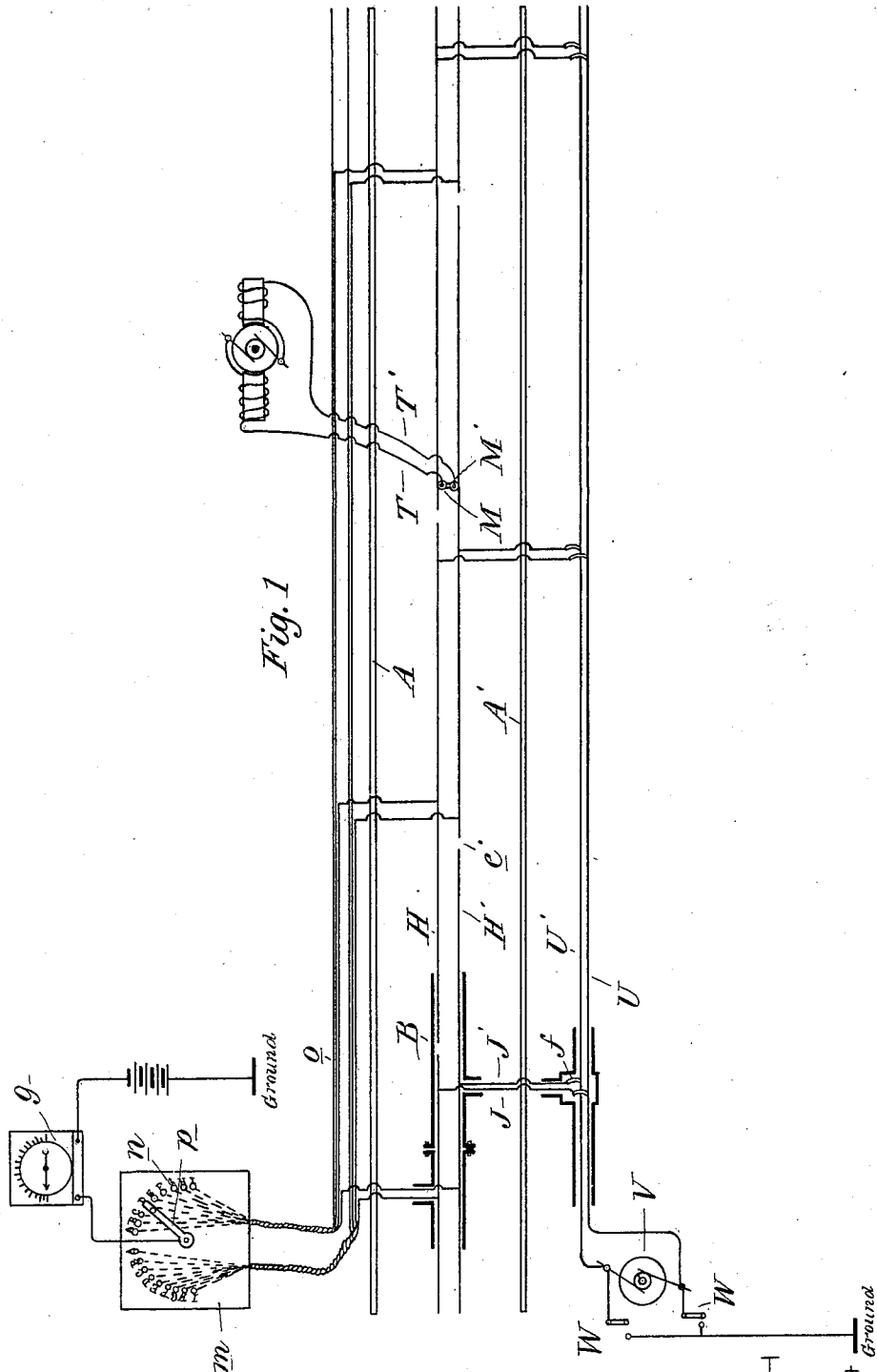
(No Model.)

2 Sheets—Sheet 1.

J. F. CUMMINGS.
ELECTRIC RAILWAY SUPPLY SYSTEM.

No. 516,565.

Patented Mar. 13, 1894.



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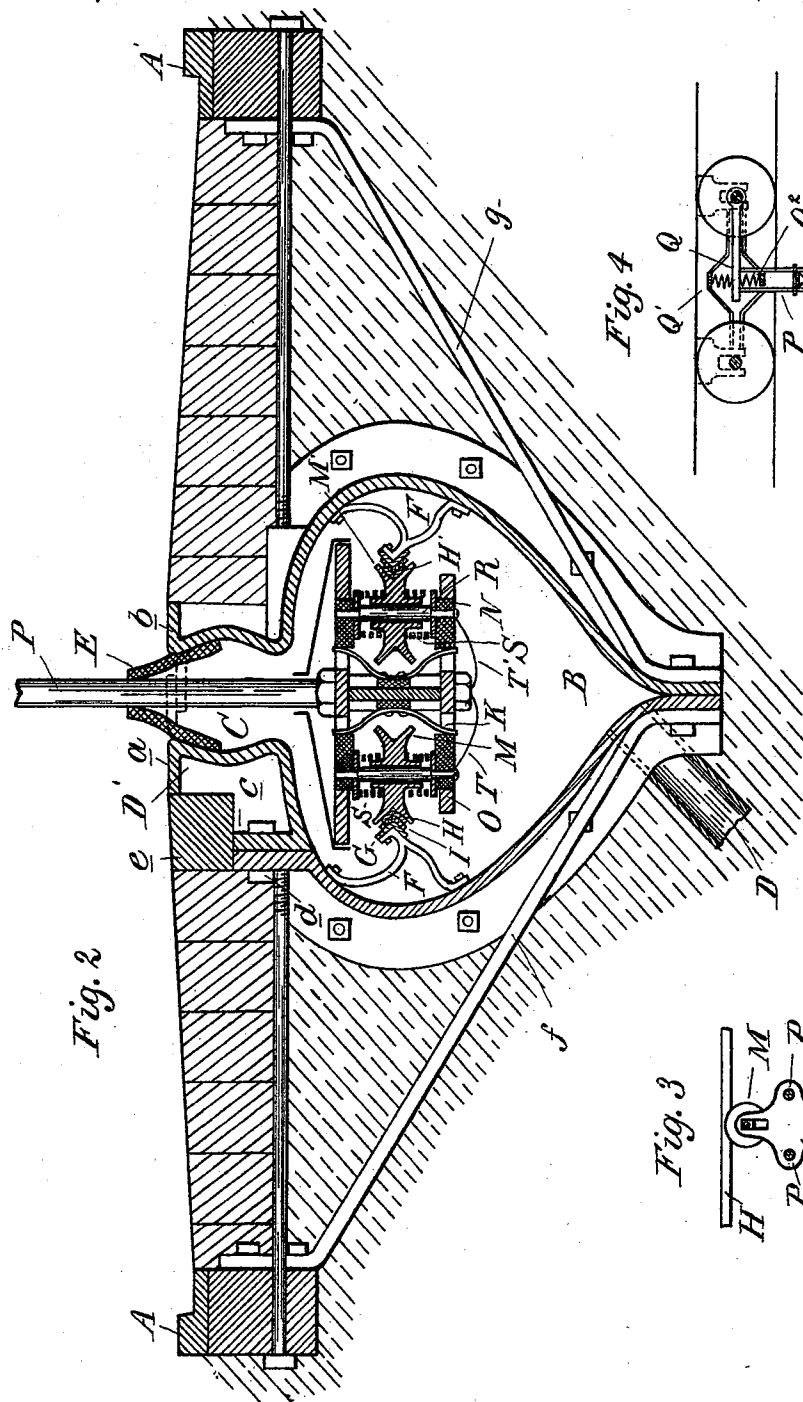


Fig. 4

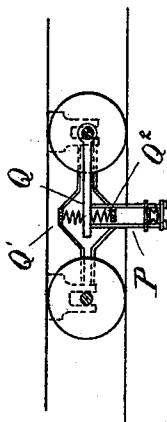
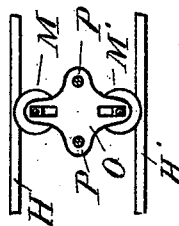


Fig. 3



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UNITED STATES PATENT OFFICE.

JAMES F. CUMMINGS, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-HALF TO
EUGENE M. ENGLEMAN, OF MILWAUKEE, WISCONSIN.

ELECTRIC-RAILWAY SUPPLY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 516,565, dated March 13, 1894.

Application filed September 22, 1892. Serial No. 446,557. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. CUMMINGS, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to that class of electric railway in which the motor on the car is maintained in traveling contact with an electric conductor or conductors in an underground conduit, and the object of my invention is to devise a construction in which interruption of traffic from causes incidental to the underground system are least liable to occur and to provide means for making repairs and keeping the system in running condition if any of the usual causes of break down, such as the grounding of conductors occur.

To this end my invention consists in an improved construction of conduit, traveling contacts, and conductors, whereby the objects of my invention are sought to be obtained, all as more fully hereinafter described and specifically set forth in the claims.

In the drawings, Figure 1 is a diagram plan, showing the system of distribution and appliances for testing the conductors thereof, which I preferably employ. Fig. 2 is a cross section through my improved conduit. Fig. 3 is a diagram plan of the traveling contact device and Fig. 4 is a diagram side elevation of the same in connection with the car.

A A' represent the two track rails.

B is the underground conduit containing the supply conductors. This conduit is substantially of known construction in so far that it represents a cast iron tube provided with an open slot C. It is built in sections of suitable length bolted together and made water tight and is provided at intervals with connections D for keeping the interior free of water. The form of tube which I show in the drawings embodies however, several new features, the principal one is that it is provided with a removable section D' on one side of the central slot. To this end the tube is provided along the slot with two upwardly projecting

outwardly bulging guard flanges *a b*, which extend about the depth of the pavement and form abutments therefor. On one side this flange with a portion of the adjoining wall is cast separate and removably secured by means of flanges *c* and bolts *d* or other equivalent means, whereby a detachable section is obtained for the purpose of ready access into the interior of the tube without disturbing the pavement, which at this point is completed by a removable strip *e*. The cross section of the tube is preferably heart shaped cast in halves with flanges along the bottom for bolting them firmly together, I also preferably tie the conduit and the rail supports together by means of lateral braces *f g* connecting the top and bottom of the conduit at intervals with the rails or their supports, whereby the parts are firmly held in their relative positions.

The slot C is preferably provided with two elastic flaps E secured along the inner side of the flanges *a b* and adapted to fold and close over the slot from opposite sides, and thereby prevent the ingress of extraneous matter into the conduit. The bulging form of the flanges assists the closing down of the flaps or holds them in roof like position if they should not properly fold down.

Within the conduit are supported by means of brackets F, the longitudinal supports G which are preferably metallic angle bars, so as to give them lateral strength and to these naked conductors H H' which are preferably of similar cross-section are secured and insulated therefrom by insulating strips I interposed between, all so arranged, that the two conductors are parallel to each other, with their contact faces exposed inwardly at equal distances on opposite sides of the vertical center through the slot of the conduit. The contact device is intended to pass through the space between the conductors in contact with both, and it consists of two horizontal grooved travelers M M', which are journaled in insulating sliding boxes N, of a frame O suspended by hangers P from an equalizing bar Q carried by the car. The travelers are spring pressed laterally to hold them firmly in metallic contact with the conductors H H', the drawings showing to this end springs K which press against

the inner ends of the sliding boxes in which the shafts R of the travelers are secured. The travelers are made vertically, self-adjusting by being loose upon their shafts and held between flat coiled springs S. Each traveler is in proper metallic contact with one of the conductors T T' through the coiled springs S which bear against the wheels at their inner ends, and at their opposite ends against the metallic washers which are sleeved on the stationary spindles of the wheels whereby independent electric connections are made through the medium of the travelers with the conductors H H'. The latter are electrically discontinuous or formed in sections of suitable length, the electric breaks being indicated at e', Fig. 1. The sections of each conductor are connected through suitable feeders J J' with the two main conductors U U', which form the circuit of the generator V. The main conductors U U' are insulated and preferably inclosed in suitable conduits buried in the ground under the side walks or wherever convenient with suitable junction boxes accessibly located wherever the feeders are taken off and these feeders are provided with safety fuses f which may be located within the junction boxes. The two conductors T T' are insulated from each other and pass through the hanger P to connect the circuit of the motor car with the conductors H H'. The equalizing bar is pivotally secured to one of the axles or to the frame of the truck by a horizontal shaft or axle passed through an eye formed in the end of the bar so that the same may have a swinging vertical movement, and is held suspended by the equalizing springs Q' Q², free to allow the traveling contacts to adjust themselves to the inequalities of the track. The generator is provided with two switches W W' by means of which either pole of the dynamo may be connected with a ground.

Considering the operation of my system as far as described it will be seen that the inconvenience arising from the formation of short circuits or grounds of the trolley conductors are reduced to a minimum, as it will be seen that the motor may now be supplied in different ways.

Considering my construction as described and shown, I claim that it does away with many of the disturbances to traffic to which other constructions are liable, thus by means of the laterally spring pressed and vertically self adjusting contact wheels, I maintain the best of metallic contact at all times and provide efficient means for overcoming troublesome short circuits arising from various contingencies which experience has shown must be guarded against. Thus if for instance one or more sections of either conductor should become grounded it would make no difference, but should a section of the other conductor also become grounded the safety fuse in the feeder thereof, would blow out and thus disconnect the section of the conductor, but traffic may be maintained just the same

by grounding that pole of the dynamo the conductor of which is grounded, as thereby a ground connection is provided for the current when the car passes over the cut out section of the conductor. In connection with the facilities provided for making repairs by making the interior of the conduit readily accessible, repairs may thus be expeditiously carried on without interfering with the traffic of the cars.

In order to test the distributing conductors and find if any ground exists anywhere and to locate the same quickly, I provide an indicating system which consists of a switch board m, having a series of fixed contacts n which are separately connected by the test wires o with the sections of the distributing conductors so that each section thereof is represented by a contact on the switch board. A movable contact p is adapted to contact with any one of the contacts n and thereby connect any section of the distributing conductors in circuit with a battery, one terminal of which is attached to the movable contact while the other is grounded. A galvanometer g or other suitable indicating device operated by the passage of the current is interposed between the switch m and the battery. By passing the movable contact *seriatim* over the fixed contact a ground on any one of the sections will be readily detected by the passage of the current through the respective test wire, said current manifesting its presence on the indicating device. Thus by making frequent tests any short circuit in the distributing conductors can be readily located, as the contacts are suitably marked to identify the proper section of the distributing conductor.

The means for testing the sections of the distributing conductors, I have described in another application and therefore I do not herein make any claim.

What I claim as my invention is—

1. The combination with the motor, the car, the conduit and the two distributing conductors therein with which said motor is in traveling connection, of a contact device having rotary laterally spring pressed travelers arranged horizontally and contacting with the inner faces of said conductors respectively, and springs engaging the travelers on opposite sides substantially as described.

2. The combination with the motor, the car, the conduit and the two distributing conductors therein with which said motor is in traveling connection, of a traveling contact device suspended from the car and provided with two independent laterally and vertically spring pressed rotary travelers arranged horizontally and contacting with the inner faces of said distributing conductors, substantially as described.

3. The combination with the motor, the car, the conduit and the distributing conductors therein with which said motor travels in connection of a traveling contact device comprising a spring pressed equalizing arm horizon-

5 tally pivoted at one end to the car and two horizontal travelers secured to the opposite end of said arm and adapted to connect with the inner faces of the distributing conductors, substantially as described.

10 4. The combination with the conduit, car, motor and distributing conductors, of a contact device suspended from the car, consisting of a supporting frame located in the conduit, and a plurality of independently, vertically and laterally movable, travelers loosely mounted in the frame, and arranged horizontally substantially as described.

15 5. The combination with the distributing conductors arranged in an underground conduit, and the motor car in traveling, connection with said conductors, of a contact device consisting of a spring pressed equalizing arm suspended at one end only from the car and 20 two travelers connected to the free end of said arm in vertical and lateral self adjusting traveling contact with the inner faces of the distributing conductors, substantially as described.

25 6. The combination of the underground slotted conduit, the two insulated distributing conductors constructed of angle bars secured in said conduit in parallel relation to each other and the motor car provided with

a traveling contact device connecting the motor with the distributing conductors, said contact device comprising an arm suspended from the car and two grooved horizontal travelers carried by and adjustable in a lateral and vertical direction independent of said arm between the conductors and in contact with the angular faces thereof, substantially as described. 35

7. The combination of the underground slotted conduit, two insulated distributing conductors secured in said conduit in parallel relation to each other and constructed in electrically divided sections, a generator provided with two insulated main conductors and ground connections controlled by switches, 45 feeders connecting the main conductors with the sections of the distributing conductors, safety fuses in said feeders and a motor car provided with a traveling contact connecting the motor with the distributing conductors, 50 substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES F. CUMMINGS.

Witnesses:

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