

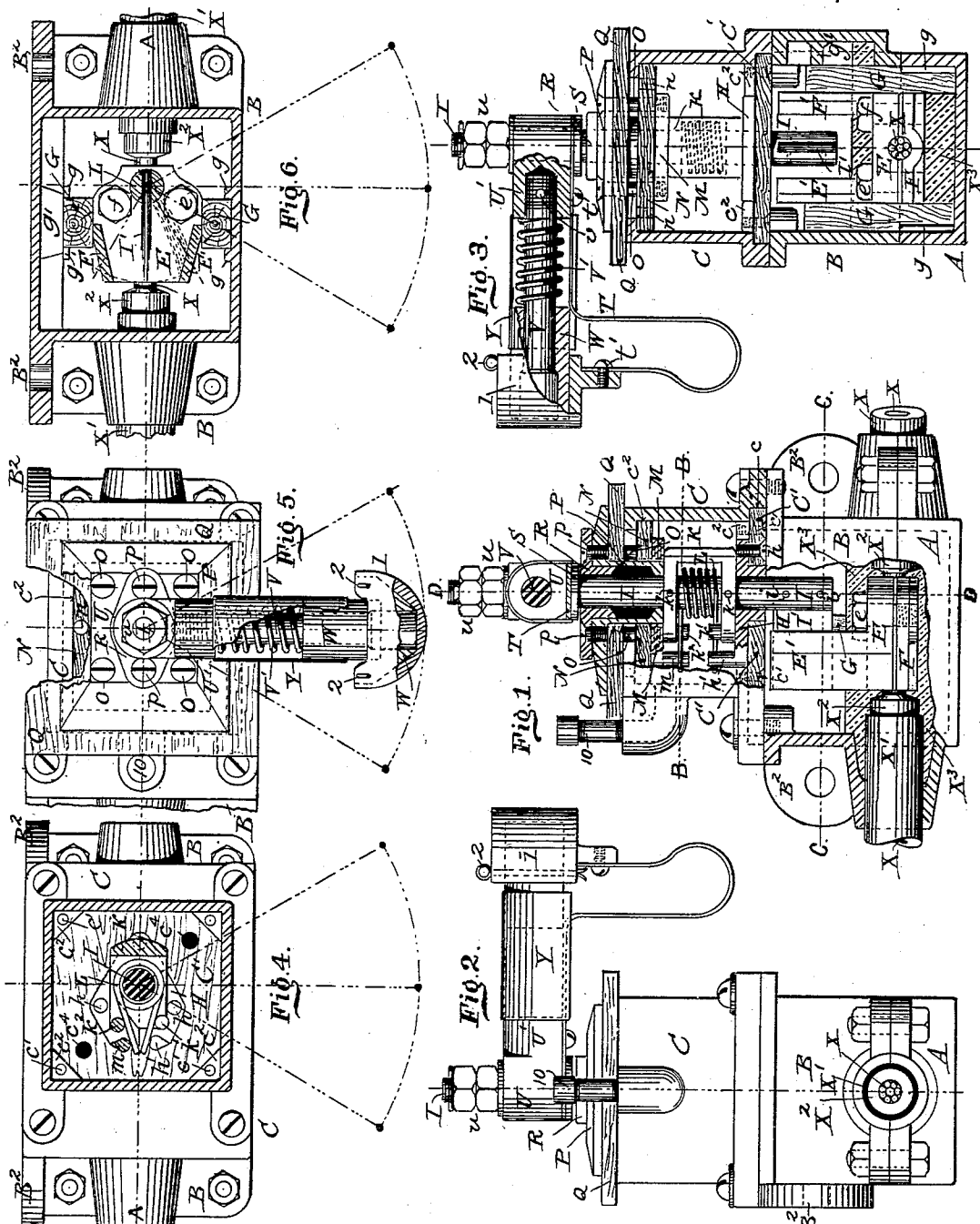
(No Model.)

2 Sheets—Sheet 1.

J. H. DALE.
ELECTRIC RAILWAY.

No. 509,072.

Patented Nov. 21, 1893.



WITNESSES:

B. W. Miller.
C. F. Senner.

INVENTOR

John H. Dale

BY
Palmer, Davidson & Wright

ATTORNEYS

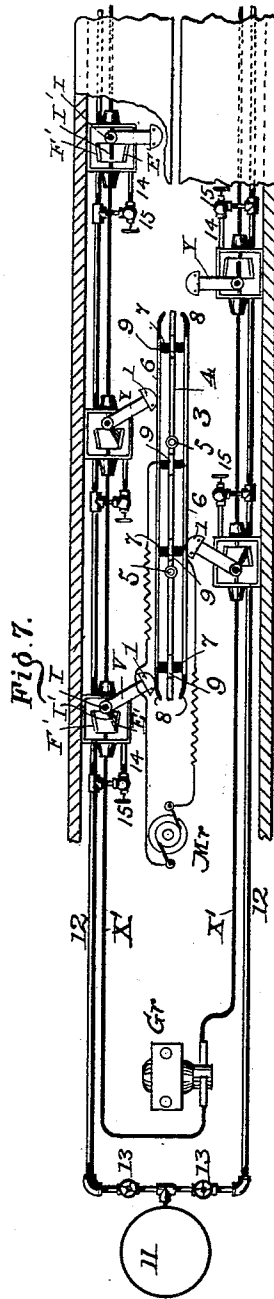
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Waldron, Davis & Wright

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UNITED STATES PATENT OFFICE.

JOHN H. DALE, OF NEW YORK, N. Y., ASSIGNOR TO THE UNIVERSAL ELECTRIC COMPANY OF THE CITY OF NEW YORK, OF SAME PLACE.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 509,072, dated November 21, 1893.

Application filed March 1, 1893. Serial No. 464,229. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. DALE, a citizen of the United States, residing in New York, county and State of New York, have
5 invented certain new and useful Improvements in Electric Railways, of which the following is a specification.

My invention relates to that class of electric railways in which closed contact boxes
10 are located at intervals in a conduit and in which a shoe or brush, carried by the car, acts upon the switch or contact making arm of each box, during the traverse of the car.

The invention comprehends certain improvements in the construction of the contact boxes and their appurtenant devices whereby a good and reliable contact from the working
15 conductor to the motor on the car is insured, the car may be run backward or forward at will, danger of breakage avoided, and parts liable to wear readily replaced. To this end I have devised an organization of devices hereinafter described, and shown in the accompanying drawings, in which—

25 Figure 1 is a view partly in section, and in side elevation, the wall of the box being broken away. Fig. 2 is an end elevation; Fig. 3 a view partly in transverse section at right angles to Fig. 1 and partly broken away;
30 Fig. 4 a horizontal section on the line B B of Fig. 1; Fig. 5 a plan view partly broken away; Fig. 6 a horizontal section on the line C C of Fig. 1, and Fig. 7 a diagrammatic view illustrating the conduit and the general operation
35 of the system.

I prefer to construct the box in three sections, A, B, C, each of which may be made of cast metal or otherwise. The lower sections A and B are so formed that the main lead or
40 working conductor X is clamped between them, the construction being as follows:—The conductor of which X' may be the lead sheath or other exterior cover, and X² the insulation, is treated in the same manner as
45 where ordinary joints are to be made, that is to say, the exterior cover is cut away for a certain distance and the insulation is cut away for a less distance so that it projects beyond the cover, the bare conductor being
50 thus exposed. The exterior cover is clamped

between the semi-circular projections from the two sections A B in an ordinary manner. Two contact pieces E F are then clamped upon the conductor by screw bolts *ef*, and from each of them projects upwardly a contact plate, the plate E' being part of E, and
55 F' a part of F, the plates being opposite each other, and separated at a convenient distance as shown. The contact plates E' and F' may be respectively cast with or secured to the contact pieces E and F, in any ordinary way.
60 In order to hold the contact pieces E, F, in position laterally, I place two pieces of insulating material preferably of wood G G, at the sides of the lower portions of the box, as indicated. The lower section A, of the
65 box is provided with ribs *g*, which form a groove or seat for the wooden pieces G G, and in order to support the upper end of one of the wooden pieces, I form a rib or projection *g'*, on one wall of the section B of the box.
70 When the contact pieces have been clamped upon the conductor, and the sections B B clamped together, a filling of melted insulating material is poured in to a sufficient depth to cover the conductor and the lower parts of
75 the contact pieces bolted thereto as illustrated, X³ representing the insulating material. In this manner, and as will be seen from Fig. 7, the main lead from the generator may
80 pass through the series of boxes. I thus avoid the ordinary lateral connections which are usually made in such cases, thus reducing the number of joints and consequently simplifying and improving the general construction.
85 The section B of the box is provided with lateral lugs or ears B², having bolt holes by which the box may be secured to the wall of the conduit or its support within the conduit. The parts having been thus far assembled, the
90 upper section C, of the box may be placed in position and bolted to the section B, as shown. The bottom of the upper section C, is recessed at *c* for the reception of a plate or diaphragm C', of insulating material, preferably wood.
95 This plate is secured in position by screws *c'*, that engage lugs *c*², formed in the corners of the upper section C, and is perforated and receives the hub of a metal plate H, which is bolted thereto by screws *h*. The shaft I, that
100

carries the contact brush I', has its lower bearing in the hub of the plate H. This shaft as hereinafter described is to be partially rotated in opposite directions from the normal position so that the brush I', will make contact with either of the contact plates E' F', accordingly as the car is moving forward or back. The brush I' may be composed of a series of sheets of copper or other suitable conducting material and its butt or end lies in a slot in the lower end of the shaft I, and is secured by pins *i*. Above the plate H, a U-shaped frame or yoke K, is pinned to the shaft, as at *k*, its arms being arranged transversely to the axis of the shaft and between them a spring L, is coiled around the shaft. The lower projecting end of the spring is held by a pin *h'*, projecting from the face of the plate H, and the upper projecting end is held by a similar pin *m*, projecting from the face of the plate M, arranged above the yoke, as hereinafter described. The yoke K, also carries two stops *k' k''*, which also engage the projecting ends of the spring L. The strain of the spring serves to hold the shaft in such position that the brush I' occupies the central position between the two contact plates E' F', out of contact with both of them as illustrated in Fig. 6. When the shaft is partially turned in one direction as hereinafter described, one of the projecting ends of the spring bears against the corresponding stops *m*, or *h'*, and the spring is compressed, the opposite end being then acted upon by the pin or lug *k'*, or *k''*, on the yoke K, and consequently when the force which tends to turn the shaft in either direction is removed, the spring causes it to assume a normal position with the brush out of contact with either of the plates E', F'. The interior of the section C, above the yoke K, is recessed as at *c'*, and receives a plate or diaphragm N of insulating material, preferably wood. This plate N, is clamped in position by bolts O, which pass through the top plate or flange of a packing box P, and through a plate Q, also preferably of wood, interposed between it and the upper edge of the section C. The packing box extends as shown through the plates Q and N, and the metal plate M, arranged on the under side of the wooden plate N, and into which the screws O enter. These parts are, therefore, firmly clamped together and the upper opening of the section C tightly closed. The shaft I, passes through the packing box P, and through a follower or gland R, that is bolted to the flange of the packing box by screws *p*. The boxes may be packed with any suitable material placed in the packing space indicated by the black shade. When the parts thus far described have been assembled and properly bolted together, the boxes will be closed and all the parts be in the proper normal position. The shaft A, as before stated, has its bearings in the metal plates H and M, and in the packing box P.

The upper portion of the shaft beyond the follower R, is squared and its end is screw-threaded. A washer S, is placed over the end of the shaft and rests upon the shoulder formed by the squared portion thereof. A plate spring T, having a suitable aperture at its end is then placed over the shaft and brought against the washer S. A block U, having a squared bore is then placed upon the squared portion of the shaft, and clamped in position by nuts *u*. The block U, has a lateral projection U', that is tapped to receive a rod V, that screws into it, and is secured by a pin *v*. The outer end of the rod enters loosely part way into the bore of a casting or end piece W, but does not extend normally to the end thereof where the bore is preferably enlarged. The casting may be shaped substantially as indicated in Figs. 3 and 5, and between the casting and block a spring V', envelops the rod and may be secured to the casting W and to the block U or rod V. To exclude dirt a shield Y, is placed over the casting and rod and is soldered to the casting W, so that pressure upon the casting permits it to yield or move inwardly toward the shaft. A contact head *l*, conforming in interior shape to the casting W, is mounted upon or envelops it and is secured thereto by split pins *2*. The outer edge of this head is rounded or curved and is preferably a segment of a circle and preferably a semi-circle. The plate spring T, which is attached to the block U, by a screw *t*, extends parallel with the rod V, for a short distance and is then bent down and up again as shown and is attached to the contact head *l*, at *t'*, as indicated. The torsion of the spring serves to hold the contact head in a normal horizontal position while it is free to be pressed in by the brush or shoe carried by the car and to be pressed out by the spring V', as well as the spring T. At the same time, the contact head may readily be removed when worn and a new one substituted, this being done by removing the screw *t'*.

Such in detail is the construction which I have shown in the drawings. The details may, no doubt, be varied in some respects without departing from my invention.

In the diagram, Fig. 7, the general organization and operation are shown. The drawings indicate an ordinary slotted conduit. Gr indicates the generator and X', the leads running through the boxes. Mr indicates the motor on the car and 3, the contact shoe carried thereby. This shoe may consist as shown of a central bar 4, preferably jointed at 5, 5, to facilitate turning curves and two side contact plates 6, 6, connected with the center bar by insulating blocks 7. At the ends of each plate 6, insulating material 8, projects beyond the ends of the plates. At 9, any suitable hangers from the car may be connected to the center bar 4. They may be flat bars of metal adapted to pass through the slot. The shape of the contact heads and their capacity to turn as already described insures a good con-

tact, and the fact that they may yield radially with reference to the shaft in the box, obviates any danger of breakage, whether the car be moving forward or be stopped and backed. The arrangement is preferably such that the brush or shoe carried by the car shall always be in contact with two of the contact heads.

To improve the insulation I prefer to provide each box with an oil inlet 10, (Figs. 1 and 2,) to which an oil circulating or pressure pipe system is connected, as shown in Fig. 7, in which 11 is a pressure reservoir or pump, and 12, the distributing pipes having cocks 13. Each box may be connected with the pipe system by a branch or lateral connection 14, having a cock 15. It is designed that the interior spaces of the box shall be filled with oil, and to insure this, the wood plates or diaphragms C' and N, are perforated, the perforation of C', being shown at c', Fig. 4, and the perforations of plate N, are indicated at n, in Fig. 5, and by dotted lines in Fig. 3.

So far as I am aware, I am the first to provide, in systems of this kind, a switch arm that may be moved laterally to establish contact and is capable of yielding endwise to prevent breakage, when the car is backed; also the contact head forming part of the switch arm, which is capable of rocking or turning; and I desire to claim these features broadly since it is obvious that the details of construction by which such results may be accomplished may be varied.

I claim as my invention—

1. In an electric railway, the combination of the contact box through which the main lead or conductor passes, two contact pieces (E, F), between which the conductor is clamped, two contact plates projecting therefrom, the two plates being parallel and separated, a contact brush within the box, arranged between the two plates, and normally out of contact with both of them, its operating devices and means whereby the shoe of the passing car may move said brush in either direction accordingly as the car is moving in one direction or the other to complete the circuit through either contact plate, substantially as set forth.

2. In an electric railway, the combination substantially as set forth, of the sectional box, the conductor passing therethrough, contact plates (E' F') connected with the conductor within the box, arranged parallel with, but separated from each other, a filling of solid insulating material, covering the bared conductor and its connection with the plates (but not entirely covering the plates), a contact brush arranged within the box between the contact plates, but normally out of contact with either of them, and means whereby the contact shoe of a passing car may move the brush to complete the circuit through either of the contact plates.

3. The combination, substantially as set forth, in an electric railway, of the fixed closed

box, its contained contact with which the insulated lead of the circuit is connected, a shaft partly inclosed within and having its bearing in the box, its contact within the box, a spring within the box and acting upon the shaft to maintain its normal position, and a laterally projecting switch contact arm adapted to be operated by and make contact with the contact shoe of a passing car.

4. The combination, substantially as set forth, in an electric railway, of the fixed closed box, its contained contact with which the insulated lead of the circuit is connected, a shaft partly inclosed within and having its bearing in the box, its contact within the box, a spring within the box and acting upon the shaft to maintain its normal position, and a projecting laterally movable endwise yielding switch contact arm adapted to be operated by and make contact with the contact shoe of a passing car.

5. The combination, in an electric railway, of the sectional box, the main conductor clamped between two sections thereof, the contact plates attached to the conductor, the filling of insulating material, the brush normally lying between the two contact plates, its shaft, the plate H in which the shaft has its bearings, the partition C', the yoke and spring on the shaft, the plate M and partition N, the packing box and securing bolts and the arm projecting laterally from the shaft and adapted to be swung in either direction by the passing cars, substantially as set forth.

6. The combination, substantially as set forth, of the closed box and its contained contact devices and shaft, and the projecting switch arm for operating the shaft, said arm being capable of yielding radially with reference to the shaft.

7. The combination, substantially as set forth, of the box and its contained contact devices and operating shaft, the switch arm projecting laterally from the shaft and having a contact head capable of yielding radially with reference to the shaft and rocking axially.

8. The combination with the box and its contained contact devices and shaft, of the switch arm that operates the shaft, said arm having a curved or rounded contact head capable of yielding and turning, substantially as set forth.

9. The combination with the box and its contained contact devices and shaft, of a switch arm for operating the shaft, said arm having a contact head, and springs which permit the head to yield radially and turn, substantially as set forth.

10. The combination of the box and contained contact devices and shaft, the block on the outer end of the shaft, the rod carried by the block, the casting or end piece carried loosely on the end of the rod, the interposed spring and the segmental shaped contact head carried by the casting or end piece.

11. The combination of the shaft, the block carried thereby, the rod supported in the

block, the end piece carried by the rod, the shield, the spring interposed between the block and end piece, the contact head carried by the end piece and the torsion spring that
 5 holds it normally horizontal but permits its partial turning.

12. In a contact device for an electric railroad, the contact head arranged in the conduit and adapted to be swept by the shoe of
 10 the passing car, said head being capable of yielding endwise and turning, for the purpose set forth.

13. In a contact device for an electric railway, the contact head arranged in the conduit and adapted to be swept by the shoe of
 15 the passing car, said head having a curved or rounded contact face and being capable of yielding endwise and turning, for the purpose set forth.

20 14. In an electric railroad system, the combination with the brush or contact making device, carried by a car, of a laterally mov-

able endwise yielding switch arm operated by the brush, for the purpose set forth.

15. In an electric railway conduit system, a
 25 contact containing box made in two sections, an electric conductor passing through the box and projecting from opposite sides thereof between the upper and lower sections and electrically connected with the contacts, a
 30 shaft partially inclosed within said box and containing a brush adapted to connect with the contacts, another box section connected with the contact-containing box, and a spring arranged within said last mentioned box and
 35 connected with the shaft to control the normal position thereof.

In testimony whereof I have hereunto subscribed my name.

JOHN H. DALE.

Witnesses:

FRANK S. OBER,
 EDWARD C. DAVIDSON.