(No Model.) 3 Sheets—Sheet 1.

H. C. REAGAN, Jr.

ELECTRIC RAILWAY.

No. 570,565. Patented Nov. 3, 1896.

Fig. 1.

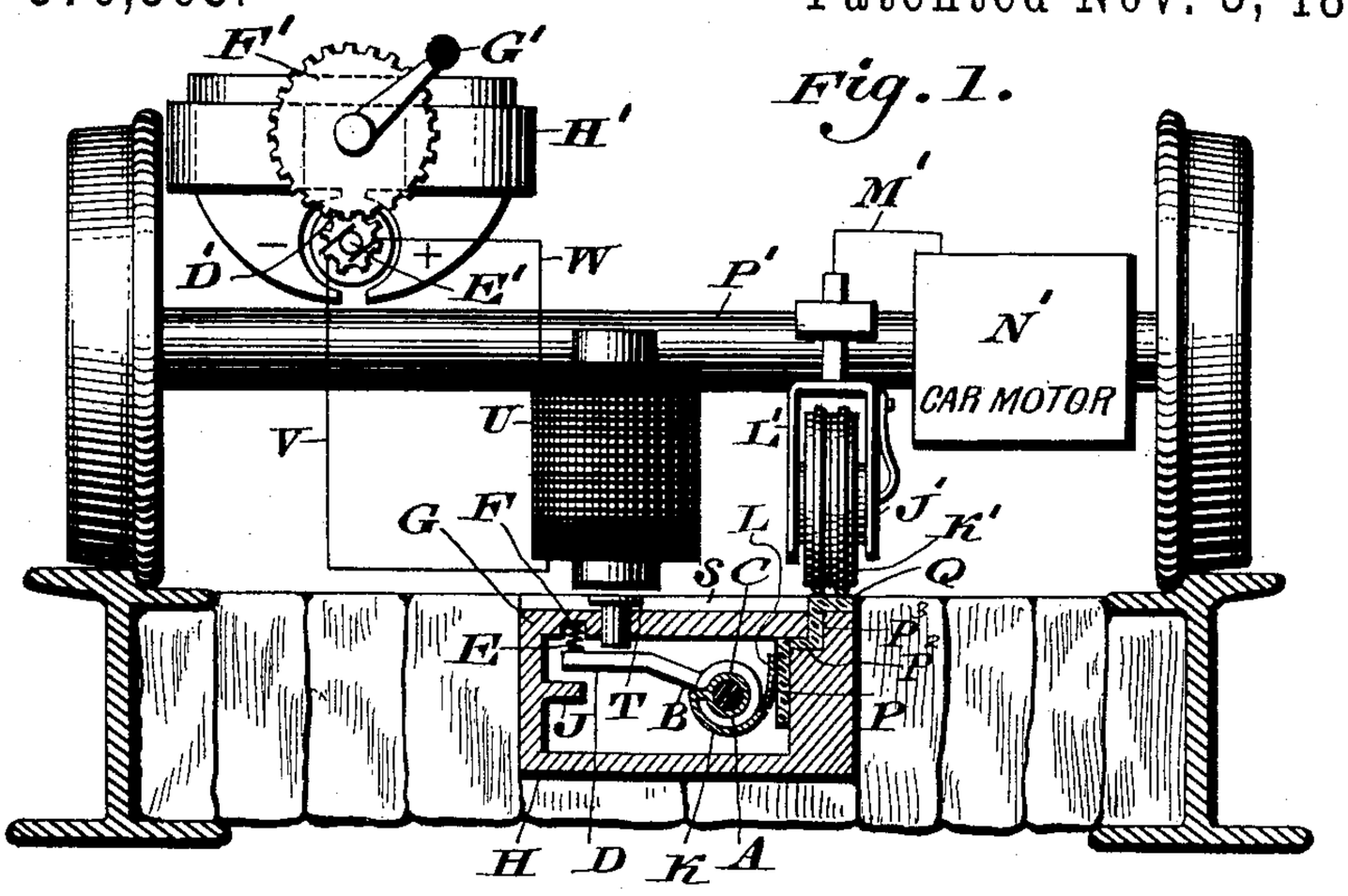


Fig. 2.

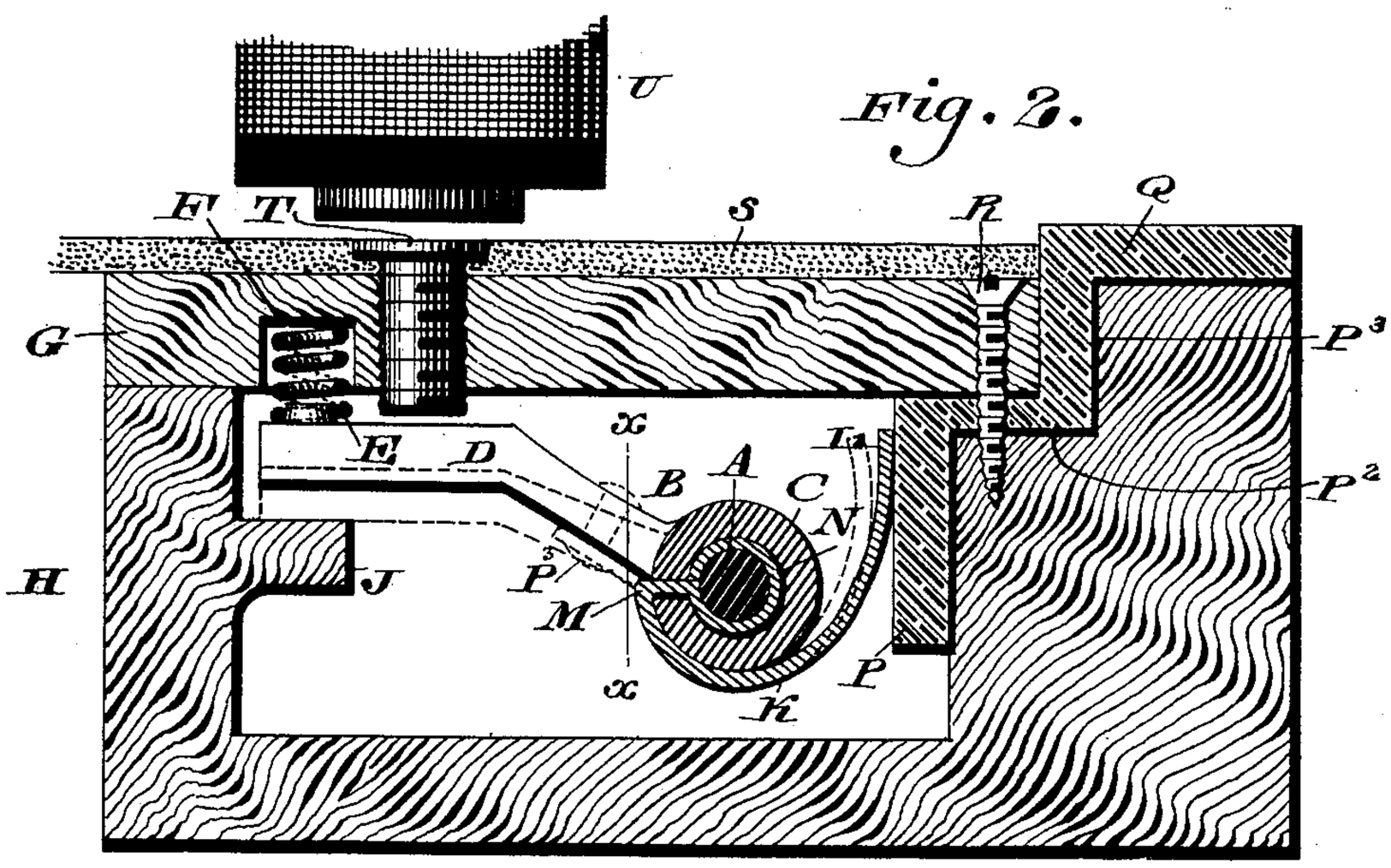


Fig. 3.

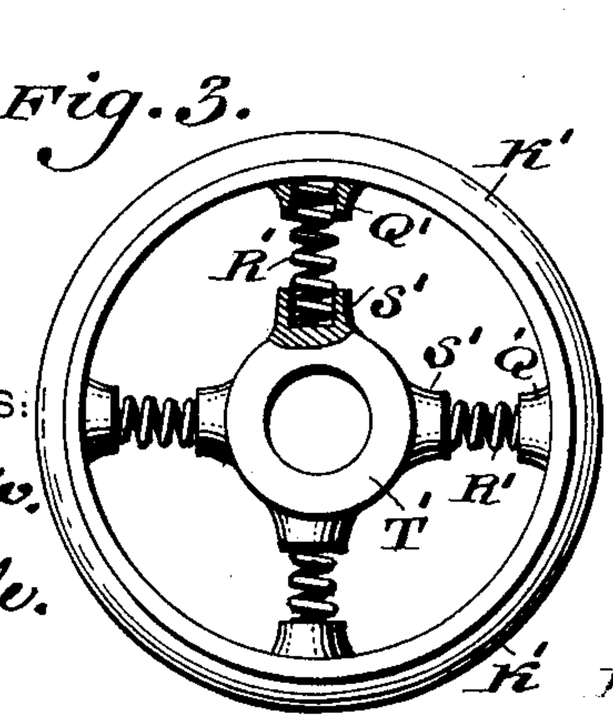
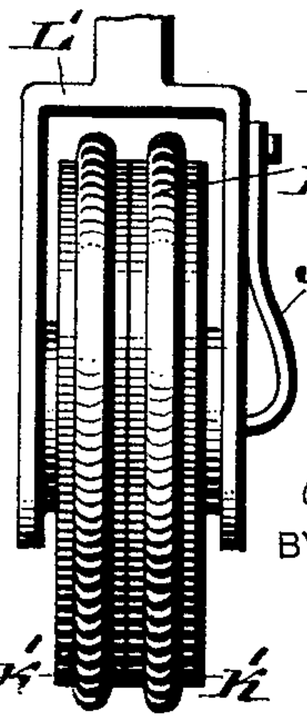


Fig. 4.



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(No Model.) 3 Sheets—Sheet 2.

H. C. REAGAN, Jr.

ELECTRIC RAILWAY.

No. 570,565. Patented Nov. 3, 1896.

Fig. 5.

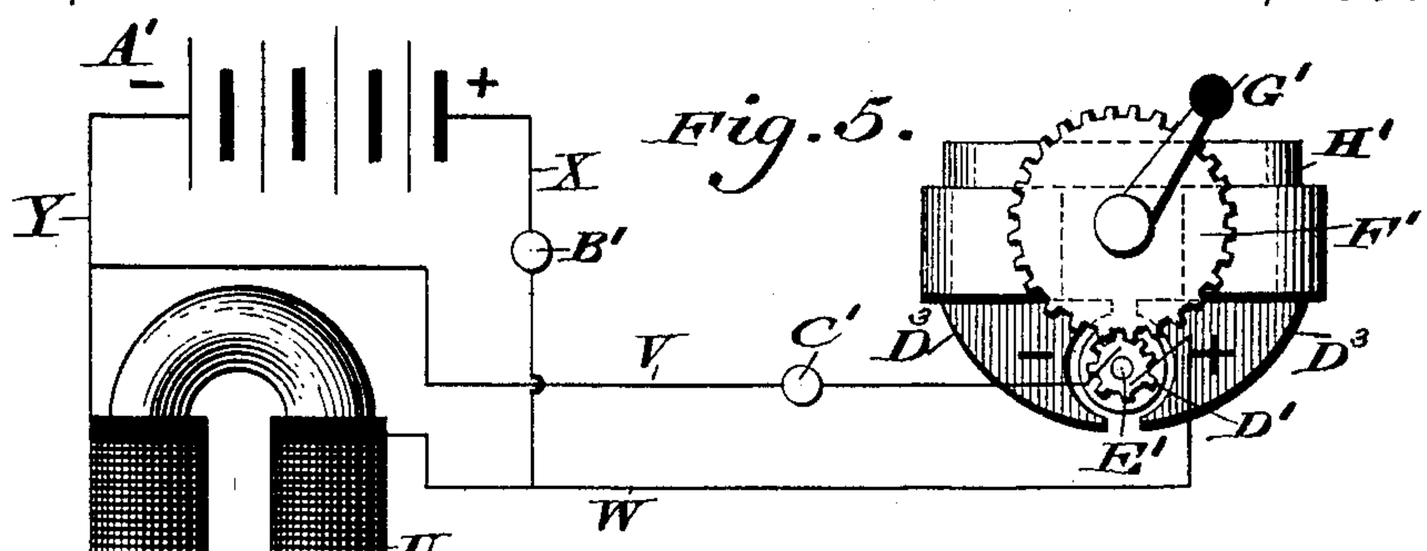


Fig. 6.

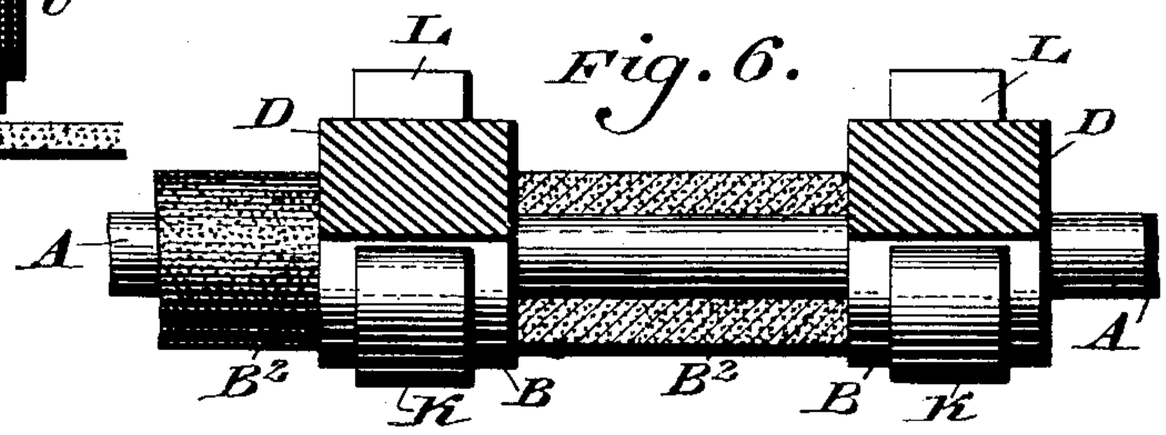


Fig. 7.

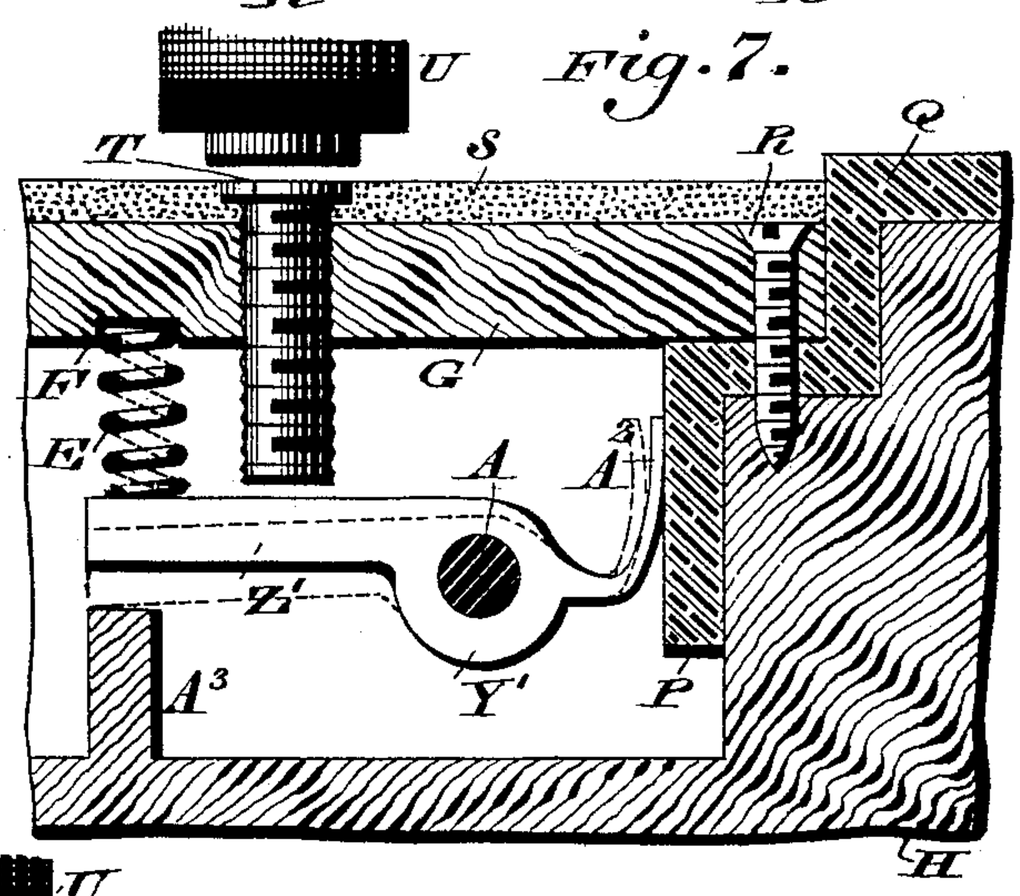
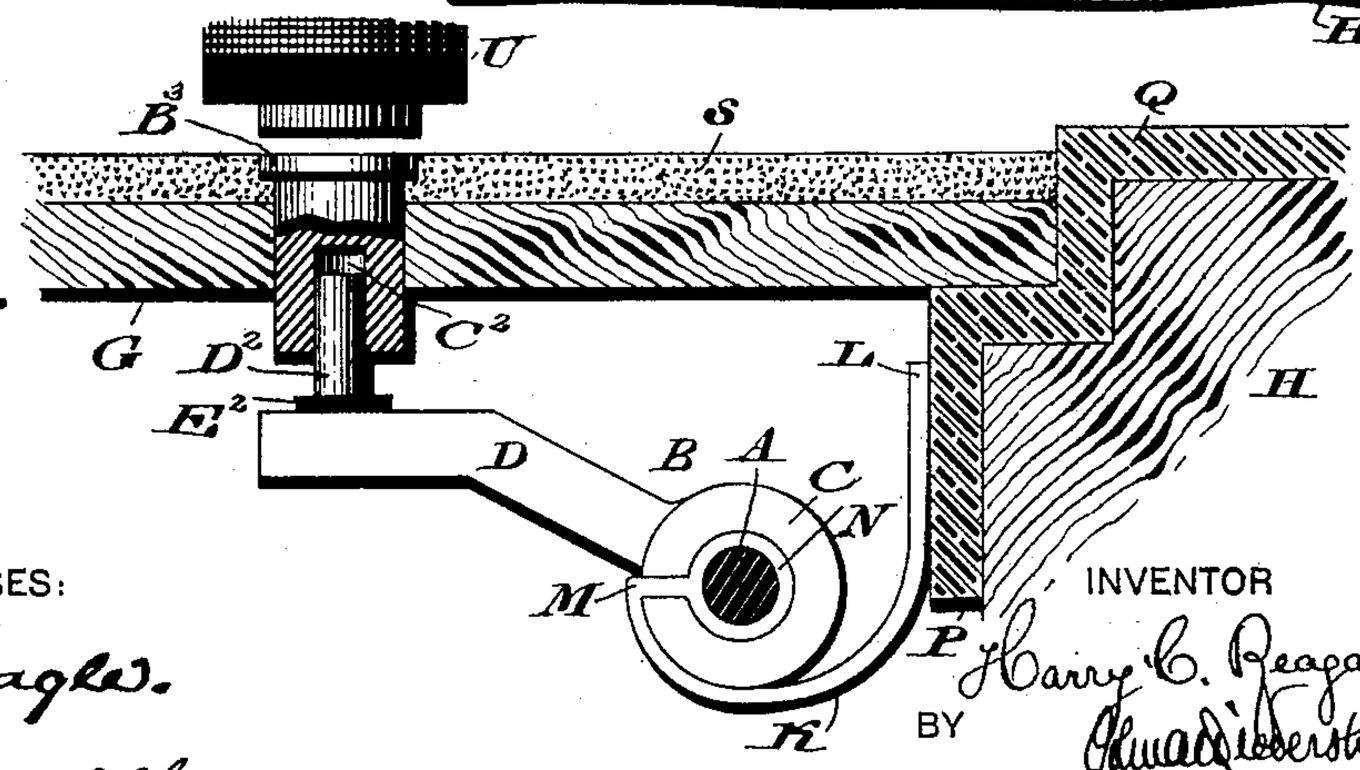


Fig. 8.



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ELECTRIC RAILWAY.

No. 570,565. Patented Nov. 3, 1896.

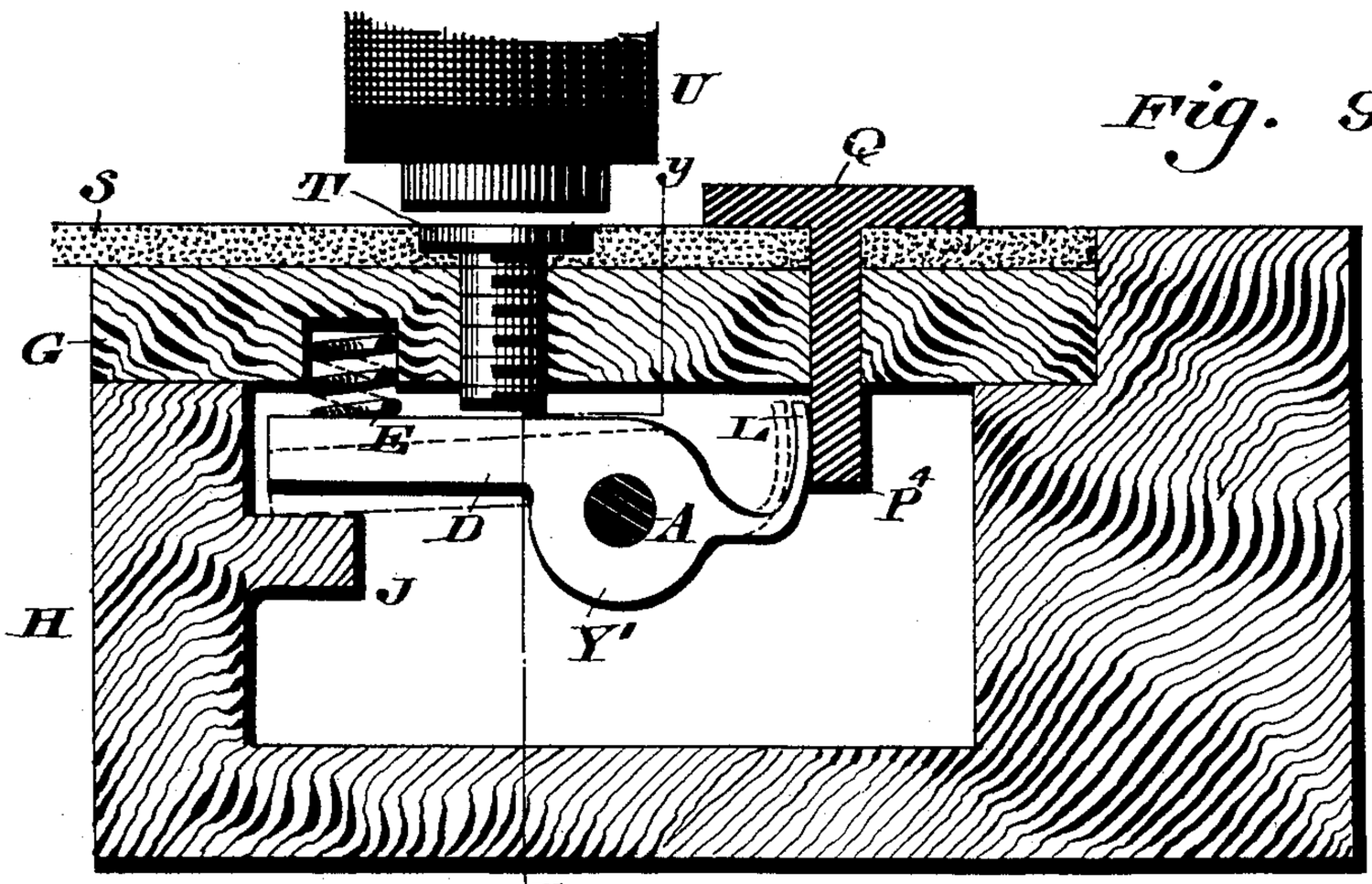


Fig. 9.

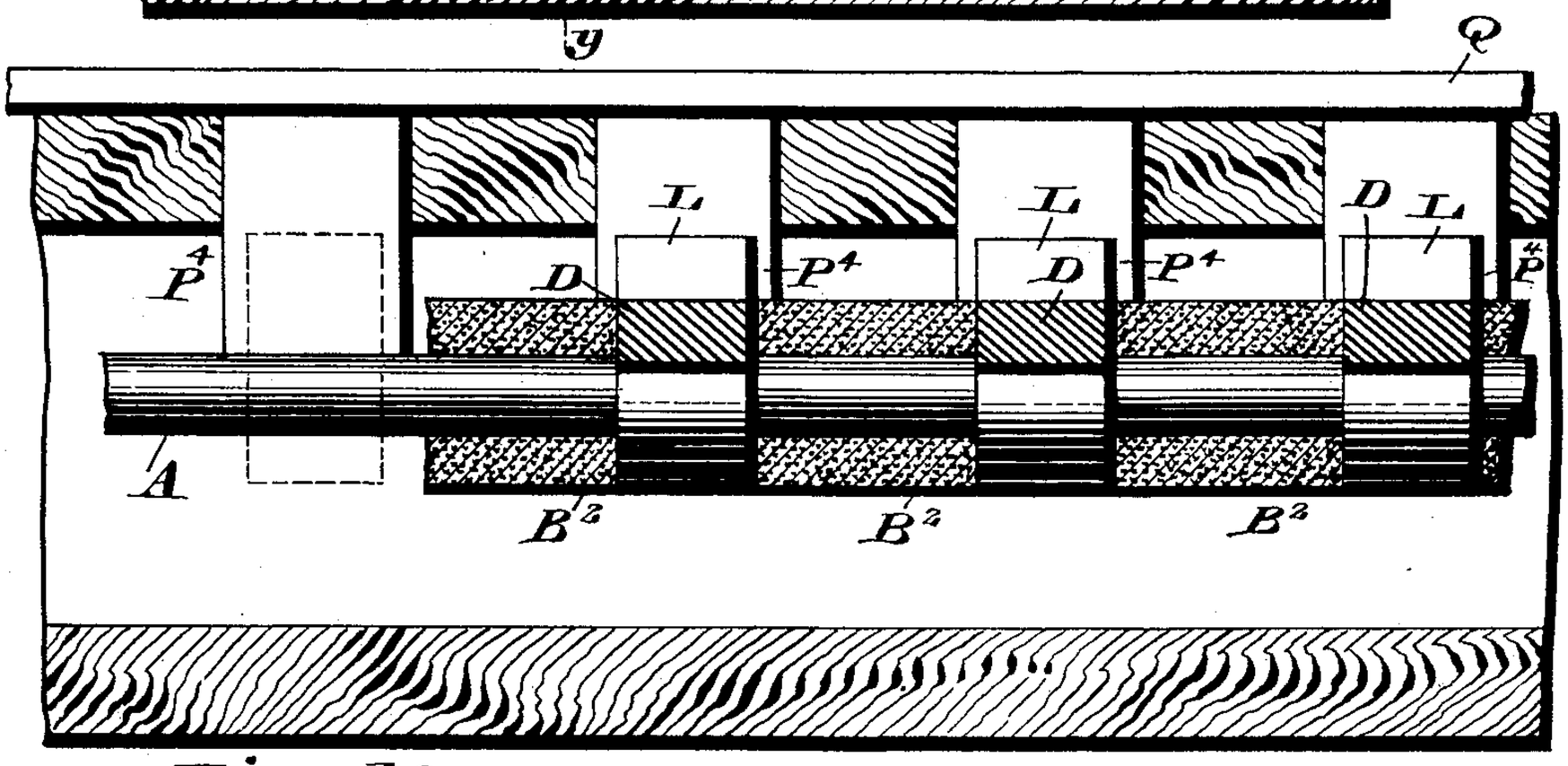
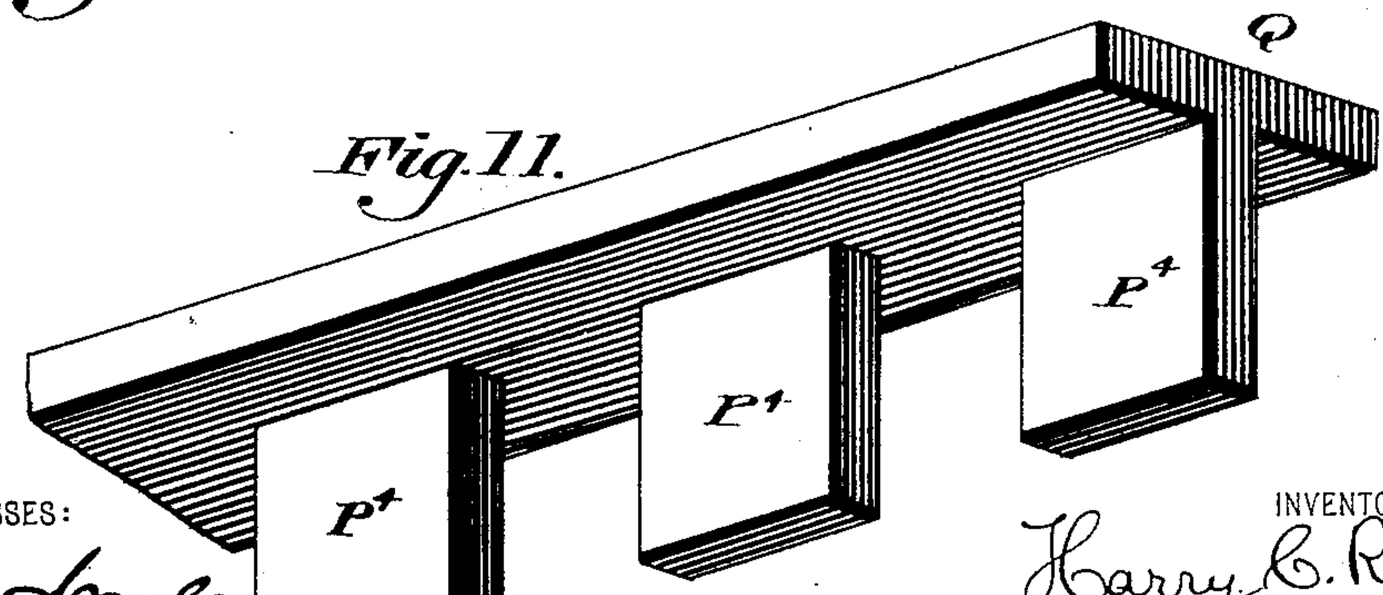


Fig. 10.

Fig. 11.



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ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 570,565, dated November 3, 1896.

Application filed March 11, 1896. Serial No. 582,704. (No model.)

To all whom it may concern:

Be it known that I, HARRY C. REAGAN, Jr., a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Electric Railways, which improvement is fully set forth in the following specification and accompanying drawings.

My invention relates to electric railways in which the feed-wire is located in a closed conduit and is adapted to be suitably supported thereon and to serve as an axis for oscillating contacts of a novel construction, said contacts having a portion thereof provided with a resilient arm or extension, by means of which the circuit is completed between the feed-wire and conductor and thence to the car-motor, said contacts being actuated at the proper time by means of a magnet carried on said car, as will be hereinafter explained.

It also consists of novel means for charging or energizing the magnet which is employed to actuate said contacts at the proper time.

It also consists of a novel construction of collector-wheel or roller, which is constructed in sections mounted on yielding supports, whereby provision is made for positively insuring that some portion of said roller will always be in contact with the conductor under all conditions.

It further consists of novel details of construction, all as will be hereinafter set forth, and specifically pointed out in the claims.

Figure 1 represents a diagrammatic view of an electric railway embodying my invention, the same being shown as especially adapted to an underground conduit, which latter and its adjuncts are shown partly in section, the other portions being in elevation. Fig. 2 represents, on an enlarged scale, a transverse sectional view of an underground conduit, feed-wire, and oscillating contact mounted thereupon and its adjuncts. Fig. 3 represents, on an enlarged scale, a side elevation of a roller or collector-wheel employed, a portion of the same being shown in section. Fig. 4 represents a front elevation of Fig. 3. Fig. 5 represents a diagrammatic view of a small charging-motor or generator employed, the same being similar to the one shown in Fig. 1, but here shown as in detached position. Fig. 6 represents a section on line $x\,x$, Fig. 2, showing a portion of the feed-wire, an oscillating contact mounted thereon, and insulating or non-conducting material or washers therebetween. Fig. 7 represents a transverse sectional view of an underground conduit, showing an oscillating contact mounted on the feed-wire, which has one arm of reduced thickness, so as to impart the necessary resiliency thereto. Fig. 8 represents a transverse sectional view of a portion of an underground conduit, showing a modified form of device for attracting the oscillating contacts which are mounted upon the feed-wire. Fig. 9 represents a transverse section of a modified form of conductor and its adjuncts. Fig. 10 represents a sectional view of the same on line $y\,y$, Fig. 9. Fig. 11 represents a perspective view of said conductor removed.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings, A designates a longitudinally-extending feed-wire, which is supported within the closed conduit H in any suitable manner, and has mounted thereon the oscillating contacts B, the same consisting of the body portion C, which has extending therefrom the arm or iron armature D.

E designates a spring which is adapted to have one end seated within a pocket or cavity F, while its other end is in contact with a suitable portion of the arm D, thus tending to press the latter downwardly.

G designates the top portion of said conduit H, which it will of course be understood is composed of any suitable non-conducting material, and is shown in the present instance as being located underground and between the car-tracks.

J designates a ledge or stop located within said conduit II, upon which the arm D is adapted to rest after the car and the magnet have advanced beyond it, as will be hereinafter explained.

K designates a spring-contact which is mounted upon the feed-wire A, the extremity L thereof being adapted to contact with the conductor P at the proper intervals, which

latter, it will be understood, is made in sections having insulation therebetween.

N designates a sleeve-like body portion of the contact K, to which the latter is attached by means of the portion M, although it is evident that, if desired, the contact K can be secured directly to the armature D by means of a pin or rivet P^3, as indicated in Fig. 2, it being understood that said armature D and the spring-contact K are thus enabled to oscillate freely in unison upon the feed-wire A.

The conductor P is preferably of angular shape, being composed of the members P^2, P^3, and Q, the laterally-extending exterior member Q being located without the conduit, and said conductor being held in position between the top G and a side of the insulated conduit by means of the screws R or other similar devices.

S designates an asphaltum or other paving which is of suitable non-conducting material, which is placed over the top G of the insulated conduit H.

T designates a pin or stud, of iron or other suitable conductive material, which passes through the paving S and the top G of the conduit, so that its free end terminates at a point adjacent the armature D, but normally out of contact therewith, the function of said pin being to form a magnetic path into the conduit to the armature D, it being understood that a number of said pins are affected by the magnet employed at the same time.

U designates a magnet which is supported upon the car in any suitable manner so as to travel therewith. V and W designate conductors leading from said magnet to the commutator-strips of a suitable small hand-generator H', the said magnet U, as well as the conductors V and W, having leading therefrom the conductors X and Y, which are in communication with the positive and negative poles, respectively, of the battery A', which, it will be understood, is also carried upon the car, switches B' C' being inserted in the circuits or conductors X and V, respectively, the function of which will be evident.

D' designates a pinion which is mounted upon the shaft E' of the generator H', the latter being provided with the pole-pieces D^3, and having commutators of usual construction, with which the conductors V and W are connected.

F' designates a gear which is in mesh with the pinion D', said gear being rotated by means of the crank-handle G', whereupon it will be seen that a few rotations of said gear F' will cause the magnet U to be energized whenever desired for the purpose of attracting the armature D upwardly toward the pins T for the purpose of making a contact between the resilient arm or strip L or its equivalent and the conductor P.

J' designates a collector-wheel which is shown in detail in Figs. 3 and 4, the same consisting of a plurality of disks or rings K', which are provided with grooves or ridges, as shown in Figs. 1, 3, and 4, the several disks composing said wheel being supported by means of the yoke L', which, it will be understood, is carried upon the car in any suitable manner, the conductor M', which leads from said yoke L' to the car-motor N', mounted on the axle P', serving to complete the circuit between the feed-wire A and said motor, as will be understood from Fig. 1.

Q' designates sockets which may be of any desired number, the same being located within the inner periphery of the rings K' and having one end of the springs R' seated therein, the other ends of the latter being seated in the sockets S', which are located in the hubs T', it being of course apparent that the number of sockets Q' and S' must be in alinement with each other when the springs R' are inserted therein, said springs having the function of yielding spokes, whereby it will be seen that if any slight obstruction, as a pebble, stick, &c., is encountered on the conductor Q one or the other of the disks K' will still remain in contact with said conductor, since, if its neighbor is raised by the obstruction, it will not necessarily raise the adjacent ring by reason of the yielding connection between said rings and the hubs P'.

In Fig. 7 is shown another embodiment of the principle of my invention, Y' designating the body portion of the oscillating contact, which is mounted on the feed-wire A, as before, and has the arm or iron armature Z' attached thereto and projecting therefrom, as indicated, while the opposite extremity of said contact is of reduced thickness, as indicated at A^2, and is thus caused to be more or less resilient and thus impart a downward movement to the armature Z' after the contact has once been made between it and the conductor P, said downward movement being positively assured by the spring E, while the abutment A^3 serves as a support for said arm or armature Z' when the contact is broken.

In Fig. 8 the construction is substantially the same as in Figs. 1 and 2, the only difference being that the pin T is replaced by the pin B^3, which has in its lower extremity the socket C^2, in which is inserted the pin D^2, suitable insulation E^2 being attached to the extremity of the latter, whereby it will be apparent that the arm or armature D will never come directly in contact with said pin D^2.

In Fig. 6 is shown the manner of insulating the contacts B from each other, the same being threaded upon the feed-wire A and each having interposed between itself and its neighbor the sleeves or washers B^2, of suitable fibrous or other non-conducting material, the object of which is evident.

The operation is as follows, reference being first had to Figs. 1 and 2: The contacts B normally assume the position seen in dotted lines, the extremity of the iron arm or

armature D resting upon the ledge or abutment J and the spring-contact L being then removed from contact with the conductor P, the spring E also assisting to hold the arm D in its inferior position, in which position the circuit is broken. As the car progresses, the magnet U, when it reaches the pins T, will cause the lines of force to enter the same, and thus will instantly attract the armature D, the same then assuming the position seen in full lines in Figs. 1, 2, 8, and 9, whereupon it will be seen that the circuit is completed from the feed-wire to the conductor P and thence to the lateral portion or tread Q and through the wheel J′ and its connection to the car-motor N′. After the progression of the car the magnet U, moving therewith, leaves the pins T, and the contacts D, falling by gravity, their movements being assisted by the spring E, assume the position seen in dotted lines, the circuit between the feed-wire A and the conductor P thus being broken, while the downward movement of the armature D is aided through the agency of the spring-contacts L, as will be evident. The operation in Figs. 8 and 9 is substantially the same, the resilient contact A^2 being the full equivalent of the contact L′. (Seen in Figs. 1, 2, and 9.)

When for any reason it is desired to energize the magnet U, so as to cause the lines of force to pass through the pin T, and thus attract the armature D, Z′, or U′, as the case may be, it is only necessary to employ the auxiliary device seen in Figs. 1 and 5 and to give a few turns to the crank-handle G′ of the small generator H′, which is to be carried on the car, whereby the magnet will be instantly energized, provision being also made for utilizing the battery A′ with said magnet, as indicated in Fig. 5, said magnet being normally in connection with the main circuit.

The construction in Fig. 9 is substantially the same as in Fig. 2, except that the pin T is now designated as B^3 and is provided with a socket C^2, in which the pin D^2 is inserted, said pin having insulation E^2, of any suitable non-conducting material, attached to its extremity, so that the armature D will never come in contact with said pin D^2 under any circumstances, it being understood that this is the case in the other constructions.

I desire to call especial attention to the function attained by the employment of the resilient portion of the contacts L, U′, or A^2, (seen, respectively, in Figs. 1, 2, 7, 8, or 9,) since it will be evident that by reason of the resiliency of said contacts the tendency will be for the armature D to be sprung back after the circuit is once completed and to fall upon the abutment J or A^3, as the case may be, the downward movement of said armature being further positively assured by reason of the spring E.

The manner of operation of the conductor-wheel J′ has been already explained and it is thought will require no further description.

In Figs. 10 and 11 I have shown the preferred manner of constructing the conductor P, it being noted that that portion of the same which extends within the conduit may be recessed at intervals intermediate the contacts, there being as many depending arms P^4 as there are contacts, thus effecting a great saving of material and reducing the weight and expense to a minimum.

If desired, instead of recessing the depending portion of the conductor P, depending pins may be attached thereto which have the same function, as is evident.

The arm or armature D is in practice made of magnetic material, while the resilient strip L is of non-magnetic material.

It will of course be understood that various changes may be made in the manner of mounting and assembling the different elements constituting my invention which will come within the scope of the same, and I therefore reserve the right to make such changes as will come within the spirit of my invention, and do not desire to be limited in every instance to the exact construction I have herein shown and described.

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

1. In an electric railway, a feed-wire, a conduit, a conductor supported therein, a contact movably mounted on said feed-wire, said contact having a suitable body portion, a sleeve surrounding the feed-wire and engaged by said body portion, said sleeve having a resilient arm extending therefrom, and adapted to complete the circuit between said feed-wire and conductor at proper intervals.

2. In an electric railway, a feed-wire, an oscillatory contact mounted on the latter and provided with a magnetic arm or armature, and a resilient non-magnetic arm also attached to said contact.

3. In an electric railway, a conduit of non-conducting material, a feed-wire suitably supported therein, a conductor passing through the top of said conduit, an oscillatory contact mounted on said feed-wire and having an arm or armature of magnetic material, a resilient non-magnetic arm also mounted on said contact, and a spring for actuating said armature so as to break the contact between said resilient arm and the conductor.

4. In an electric railway, a feed-wire, an oscillatory contact mounted thereupon, and provided with a magnetic arm or armature, a resilient non-magnetic arm also attached to said contact, a conductor located in the path of said resilient arm, means for causing a contact between said resilient arm and conductor, and means for conveying the electricity from said feed-wire to the car-motor.

5. In an electric railway, a collector-wheel

composed of a plurality of rings, a hub on which said rings are mounted, and yielding devices intermediate said hub and rings.

6. In an electric railway, a collector-wheel composed of a plurality of rings, a hub on which said rings are mounted, sockets in the latter and said rings, and springs seated in said sockets and adapted to form yielding spokes.

7. In an electric railway, a closed conduit of non-conducting material, a conductor supported therein, a feed-wire located in said conduit, oscillatory contacts mounted on said feed-wire, and having washers of insulating material therebetween, one arm of said contacts being of magnetic material, and the other arm being of resilient and non-magnetic material, in combination with a collector-wheel and connections therefrom to a car-motor.

8. In an electric railway, a conduit of non-conducting material, a feed-wire suitably supported therein, an oscillatory contact mounted thereupon, and having a resilient arm, an angular-shaped conductor located in said conduit, and having depending portions adapted to complete the circuit when the contact is made, and a stop for said contacts.

9. In an electric railway, a car, a car-motor, a feed-wire, a conduit therefor, an oscillatory contact mounted thereon having a resilient arm, a conductor-wheel, and a magnet mounted on said car, connections from said conductor-wheel to said car-motor, an auxiliary charging-motor, and connections therefrom to said magnet.

10. In an electric railway, a closed conduit, a feed-wire supported therein, oscillatory contacts mounted on said feed-wire, and having a resilient arm, a magnet adapted to be supported on the car, a conductor, means for making a circuit between said conductor and the car-motor, a charging-motor, a battery, and connections intermediate said battery, motor and magnet.

11. In an electric railway, a magnet, a non-conducting conduit, a feed-wire supported therein, an oscillatory contact mounted thereupon, and having an armature and a resilient arm attached thereto, an angular-shaped conductor located in said conduit, means for holding said conductor in position, and a pin of magnetic material located in said conduit for the purpose of producing a short magnetic path between said magnet and armature, in combination with means for oscillating said contact.

12. In an electric railway, a car, a magnet carried thereby, a conduit, a conductor located in the side of said conduit, a feed-wire supported therein, a contact device mounted thereon and provided with a resilient arm and an armature, and pins of suitable magnetic material projecting into the interior of said conduit in proximity to said armature, for the purpose of producing a short magnetic path between said magnet and armature.

13. In an electric railway, a car, a car-motor, a conduit, a conductor located partially within and partially without the same, a feed-wire supported within said conduit, an oscillatory contact mounted upon said feed-wire, and provided with a resilient arm, a magnet supported on said car, means for conveying the electricity from said conductor to said car-motor, an auxiliary motor and connections from the latter to said magnet, in combination with pins of suitable magnetic material located in proximity to said contact, for the purpose of producing a short magnetic path between said contact and the exterior of said conduit.

14. In an electric railway, a collector-wheel composed of a plurality of rings separated from each other, and a hub therefor, each ring having spokes composed of springs common to said rings and hubs.

15. In an electric railway, a car, a car-motor, a conduit, a feed-wire located within said conduit, an oscillatory contact mounted on said feed-wire, and having a resilient arm, means for conducting electricity from said conductor to the car-motor, a magnet carried by said car, an auxiliary charging-motor and connections from the latter to said magnet, whereby the latter can be energized when desired.

16. In an electric railway, a car, a magnet carried thereby, a car-motor, a conduit, a conductor located in a side thereof, means for conveying electricity from said conductor to said car-motor, a feed-wire supported in said conduit, an oscillatory contact device mounted on said feed-wire and provided with a resilient arm and an armature, and pins of suitable magnetic material projecting into the interior of said conduit, in proximity to said armature, for the purpose of producing a short magnetic path between said magnet and armature, in combination with an auxiliary charging-motor and connections therefrom to said magnet.

17. In an electric railway, a conduit, a conductor located in a side of said conduit, a feed-wire supported in said conduit, an oscillatory contact device mounted on said feed-wire and provided with a magnetic armature and a resilient non-magnetic arm, pins of suitable magnetic material located in proximity to said armature for the purpose of producing a short magnetic path between said magnet and armature, a magnet carried by the car, means for conveying electricity from the feed-wire to the car-motor, an auxiliary charging-motor and connections therefrom to said magnet.

18. In an electric railway, a car, a car-motor, a feed-wire, a conduit therein, an oscillatory contact mounted on said feed-wire and having a resilient arm, a conductor located adjacent to said conduit, means for conveying electricity from said conductor to the car-motor, a magnet carried by said car, an auxiliary

charging-motor and connections from the latter to said magnet.

19. In an electric railway, a conduit, a feed-wire supported therein, an oscillatory contact mounted on said feed-wire and having a resilient arm, a conductor located in proximity to said conduit, against which said arm is adapted to contact, and means for conveying electricity from said conductor to a car-motor, in combination with a magnet, a battery, an auxiliary charging-motor, and conductors common to the latter and to said battery and magnet.

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