(No Model.)

W. B. POTTER.

CLOSED CONDUIT ELECTRIC RAILWAY.

No. 589,787. Patented Sept. 7, 1897.

FIG. 1.

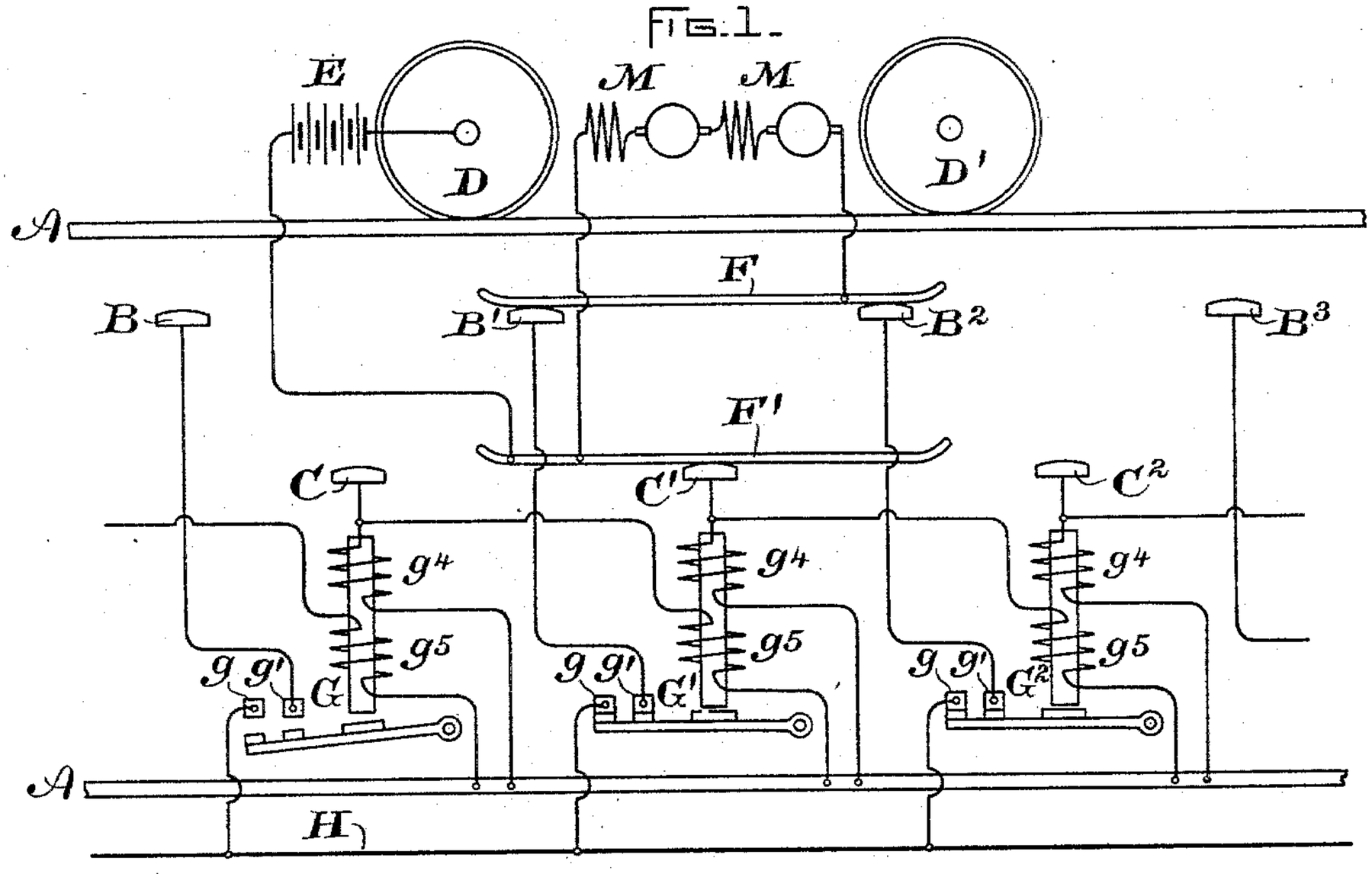
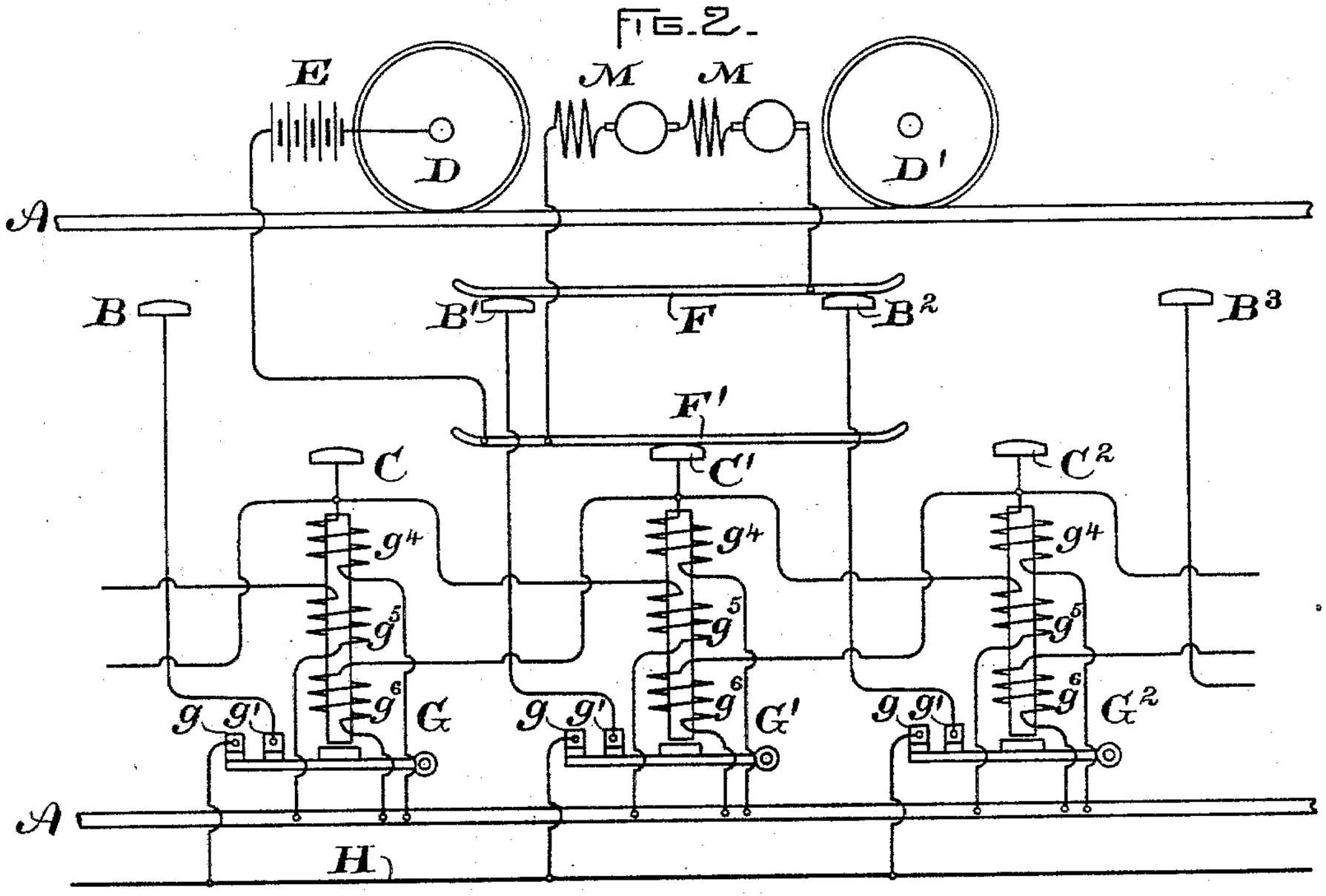


FIG. 2.



WITNESSES.
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UNITED STATES PATENT OFFICE.

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CLOSED-CONDUIT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 589,787, dated September 7, 1897.

Application filed November 18, 1896. Serial No. 612,644. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. POTTER, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Closed-Conduit Electric Railways, (Case No. 443,) of which the following is a specification.

My invention relates to surface-contact or closed-conduit systems of supply for electric railways, and has for one of its objects to provide efficient means for preventing the vitalizing of contacts in the street-surface after or before a car passes by leakage current holding up the switches when the car is not near.

It also has for its object to provide a simple and efficient way of vitalizing the high-potential contacts immediately in advance of the car, so as to allow the switches to close before the current is taken from the contact, and thus avoid liability to failure of current.

The invention is illustrated in the accompanying drawings in diagram, in which—

Figure 1 is a diagram of an arrangement employing two coils upon a switch, and Fig. 2 one in which three coils are employed.

In Fig. 1, A A are the track-rails furnishing the ground of the system. B B′ are the high-potential studs connected by the switches G, &c., to the feeder H. It will be observed that none of these connections carries any coil, the connections from the feeder to the stud being direct.

C C′ are low-potential contacts for energizing the switches G G′, &c.

D D′ are the car-wheels.

E is a storage battery.

M M are the motors carried upon the vehicle.

F F′ are the shoes for making contact.

Each of the switches G is provided with two coils g^4 g^5 and contacts g g', which are bridged when the switch is closed. The coil g^4 of each switch is in circuit between its own low-potential contact and ground, while the coil g^5 is in circuit between the low-potential contact of the switch next adjacent and ground. The two coils are connected in multiple and have separate grounds, for reasons presently to be pointed out.

The operation of the devices shown is as follows: Assuming that no current is flowing in the motors the current would flow from the storage battery E to the shoe F′. As the car moves to the left this shoe would pass from its illustrated position to the contact C, sending current through the coil g^4 on switch G, and picking up that switch, energizing the stud B in advance of its contact with the shoe F. The current from the battery divides and a part of it passes through the coil g^5 on the switch G′, holding up this latter switch, so that the shoe F takes current from the stud B′ until the shoe F′ has broken contact with the stud C. As soon as current begins to flow the storage battery E may be cut out, as the motor-current will then operate the switches G G′. It will be observed that all the coils upon the switches are upon the negative side of the motors.

In Fig. 2 the same parts are shown, except that each of the switches G has an additional coil g^6. The coil g^5 is in circuit with a low-potential stud upon one side of the switch, and g^6 with a similar stud upon the other side, while g^4 is in circuit with the stud of its own switch. Thus when the shoe F′ is in contact, as illustrated, with the stud C′ current from the battery or from the motor, as the case may be, passes through the coil g^4 to ground, closing the switch G′. Dividing, it also passes through the coil g^5, closing the switch G^2, and through the coil g^6 to close the switch G. As before, each of these coils has separate ground.

The object of separately grounding each of the coils is to protect the apparatus against the effect of leakage through a low-potential stud. If the coils were connected to a common ground-wire and this ground-wire were broken between this junction and ground, then any leakage through one of the low-potential studs—for instance, the stud C of Fig. 1—would serve to pick up switches beyond those intended. Assume, for instance, that the coils g^4 g^5 upon the switch G′ had a common ground connection and this were broken. Then current from the stud C would pass first through the coil g^5, picking up the switch G′, then by the connection between the coils through coil g^4 upon the same switch G′, thus killing the coil g^5 and opening that switch, and then to the coil g^5 upon the switch G^2, picking up that switch and energizing the

high-potential stud B^2, the second one away from the one designed.

A similar result would be manifestly obtained in Fig. 2 should the three coils of the switches shown in that figure be connected by a common wire to ground in case the wire should break. In this case studs in both directions from the car beyond those intended would be energized with consequent danger to persons and teams passing either in front of or behind the car.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A surface-contact electric-railway system, comprising a feeder, track-rails, and sectional conductors in the roadway, with electromagnetic switches serving to make temporary connection in sequence between the feeder and the sectional conductors, the switches connected between the negative side of the system and ground by coils in multiple upon the different switches.

2. A surface-contact electric-railway system, comprising a feeder, track-rails, and sectional conductors in the roadway, with electromagnetic switches serving to make temporary connection in sequence between the feeder and the sectional conductors, the switches connected between the negative side of the system and ground by coils in multiple upon the different switches, each coil having an independent ground connection: in combination with a vehicle moving on the line of way, and making traveling contact with the sectional conductors, provided with motors in circuit between the traveling contacts, and a storage battery.

3. A surface-contact electric railway, comprising track-rails, sectional conductors, a feeder, and electromagnetic switches for making connection between the feeder and the sectional conductors in sequence; each of the switches furnishing current to a single contact or conductor in the roadway, and being provided with operating-coils in multiple with more than one of the sectional conductors upon the negative side of the system, each of the coils upon the switch being separately grounded.

In witness whereof I have hereunto set my hand this 11th day of November, 1896.

WILLIAM B. POTTER.

Witnesses:
B. B. HULL,
E. W. CADY.