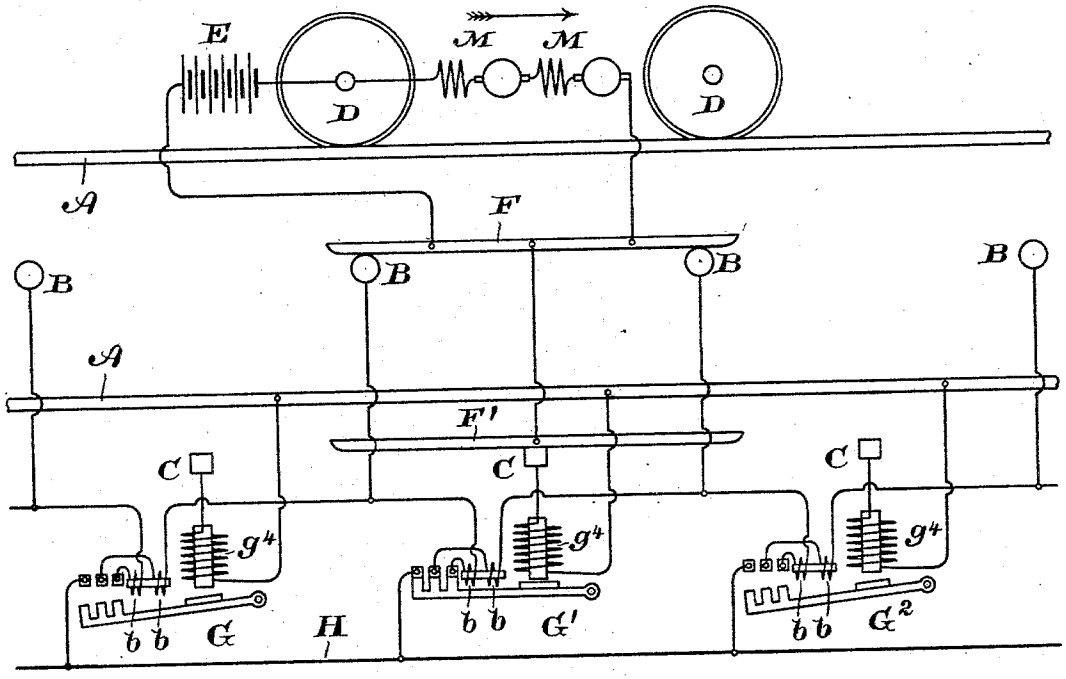
(No Model.)

W. B. POTTER.

CLOSED CONDUIT ELECTRIC RAILWAY.

No. 589,789. Patented Sept. 7, 1897.



WITNESSES.
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UNITED STATES PATENT OFFICE.

WILLIAM B. POTTER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

CLOSED-CONDUIT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 589,789, dated September 7, 1897.

Application filed November 28, 1896. Serial No. 613,744. (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, county of Schenectady, State of New York, have invented certain new and useful Improvements in Closed-Conduit Electric Railways, (Case No. 492,) of which the following is a specification.

The invention relates to electric-railway systems, sometimes called "closed-conduit systems" or "surface-contact systems," and characterized by the presence of sectional conductors or contacts normally disconnected from the source of supply and electromagnetically-operated switches which complete a circuit between the sectional contacts and a feeder or distributing-main in sequence for supplying current to the traveling motor or motors. For ordinary street-railway work sectional contacts are arranged on the surface of the street.

Of course the invention is applicable to elevated-railway service or systems where the sectional contacts are housed in a conduit or arranged in any other desired manner.

The invention relates more particularly to what are sometimes called "shunt systems"—that is, systems where the line-switches are picked up by magnets whose coils form part of a shunt-circuit around the motor, and hence receive the full-line potential. I have aimed particularly to devise a system such that the cars may run equally well in both directions, also to provide a sufficient overlap or time-allowance in order that the circuits may be maintained operative at high speed, and to simplify as much as possible the arrangement of the surface contacts and traveling collectors, as will be more particularly described hereinafter.

My invention is illustrated in the accompanying drawing, wherein is shown a diagram of an electric-railway system embodying my improvements.

In the figure, A A are the track-rails.

B B and C C are the sectional conductors or contacts. These may be points or rails, as is now well understood in the art, though I prefer the use of points. I shall hereinafter refer to the contacts B as "motor-contacts," because they form part of the circuit through the car-motors, and I shall refer to the contacts C C as "switch-contacts," since these are provided for completing the shunt-circuit through the switch-operating magnets.

F represents the shoe or collector, which makes sliding contact with the motor-contacts B and is connected to one terminal of the motors M M, the other motor-terminal being grounded upon the car wheels and axle D.

E is a storage battery carried by the car, which is connected in multiple with the motors between the shoe F and ground, and serves to pick up the switches when the line-current is not operative for this purpose. The magnet-coils g' are connected between switch-contacts C and the rail A and are of comparatively high resistance, since they form part of a circuit shunting the motor and hence receive the full-line potential. The line-switches G G' G^2 are closed by the magnets and opened by gravity or in any other desired manner. Blow-out coils b b are included in circuit between the motor-contacts B and the contacts at the line-switch. The motor-contacts B are connected with the line-switches in pairs, as shown in the diagram, so that when any given switch is closed two of the motor-contacts are thereby connected in multiple with the feeder or distributing-main H, and likewise, it will be observed, that each of the motor-contacts B is connected to contacts at two of the line-switches, so that it may be connected to the feeder through either or both of the line-switches, as will be understood from an examination of the diagram. As the car advances the motor-contacts are successively connected with the feeder slightly before they are reached by the traveling shoe F, and each motor-contact is connected first through one of the switches, then a second connection in multiple with the first is established through a line-switch next in advance, and, finally, the first-established connection is broken while the motor-contact still remains energized from the second switch, so that in the practical operation of the system each motor-contact is energized for a longer interval of time than the interval during which the switches, individually considered, are held closed. In this way I secure an efficient time-overlap without mak-

ing the collectors unduly long and at the same time allow the placing of the contacts as far apart as possible.

The motor-contacts I have shown arranged in a central row between the track-rails, while the switch-contacts C C are shown outside the rails, and the contacts C C are staggered with reference to the motor-contacts B B, since I find that much better results can be secured in this way than are possible if the switch-contacts and motor-contacts stand directly opposite one another. A second collector-shoe F′ rides upon the switch-contacts C C and is electrically connected with the shoe F. With the parts arranged as shown in the diagram the switch G′ is closed, the shoe F bridges two of the motor-contacts B B, and current may pass through both of these contacts to the motors and ground through wheels D. The shunt-circuit around the motor leading from the collector F through the shoe F′, switch-contact C, and high-potential-magnet coil g^4 to ground holds the switch G′ closed. As the car advances in the direction of the arrow the shoe F′ shortly reaches the next switch-contact C in advance before it breaks contact with the one which it is shown resting upon and establishes a circuit through the magnet of switch G^2, closing this switch and connecting a new motor-contact with the feeder. If the motor-circuit is interrupted at any time or the line-current fails to operate in picking up the switches, the battery is used to close one or more of the switches and so start the system in normal operation. The circuit of the battery leads through the magnet-coils g^4 and is completed through the ground, as will be readily understood from the diagram. The blow-out-magnet coils *b b* prevent damage to the switches by extinguishing arcs in a well-known way, though there should be no serious arc at the switches in any event.

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

1. An electric-railway system provided with sectional normally-insulated contacts, a feeder, switches for connecting the sectional contacts in sequence with the feeder, and electromagnets operating the switches having a pick-up coil in shunt to the motor-circuit, each switch energizing a plurality of surface contacts carrying motor-current, and each motor-contact taking current from more than one of the switches.

2. In an electric railway the combination of a feeder, two rows of staggered sectional contacts, high-potential magnets grounded at one terminal and connected at the other terminal to one row of contacts, switches controlled by said magnets connecting the feeder directly with the other row of contacts and collectors on the car which, when the system is in operation, bridge adjacent contacts in each row alternately, and establish a circuit through the magnets in shunt to the motor-circuit.

3. In an electric railway the combination of a feeder, sectional motor-contacts, switches corresponding in number with the motor-contacts, electrical connections by which each motor-contact may be connected to line through two of the switches, each switch energizing at least two contacts, and electromagnets for operating the switches having a pick-up coil in shunt to the motor-circuit.

4. In an electric-railway system the combination of a feeder, motor-contacts forming part of the motor-circuit, switches each having contacts by which a plurality of said motor-contacts, adjacent to one another, are connected with the feeder in multiple, and electromagnets controlling the switches provided with a pick-up coil in shunt to the motor-circuit.

In witness whereof I have hereunto set my hand this 13th day of November, 1896.

WILLIAM B. POTTER.

Witnesses:
B. B. HULL,
C. L. HAYNES.