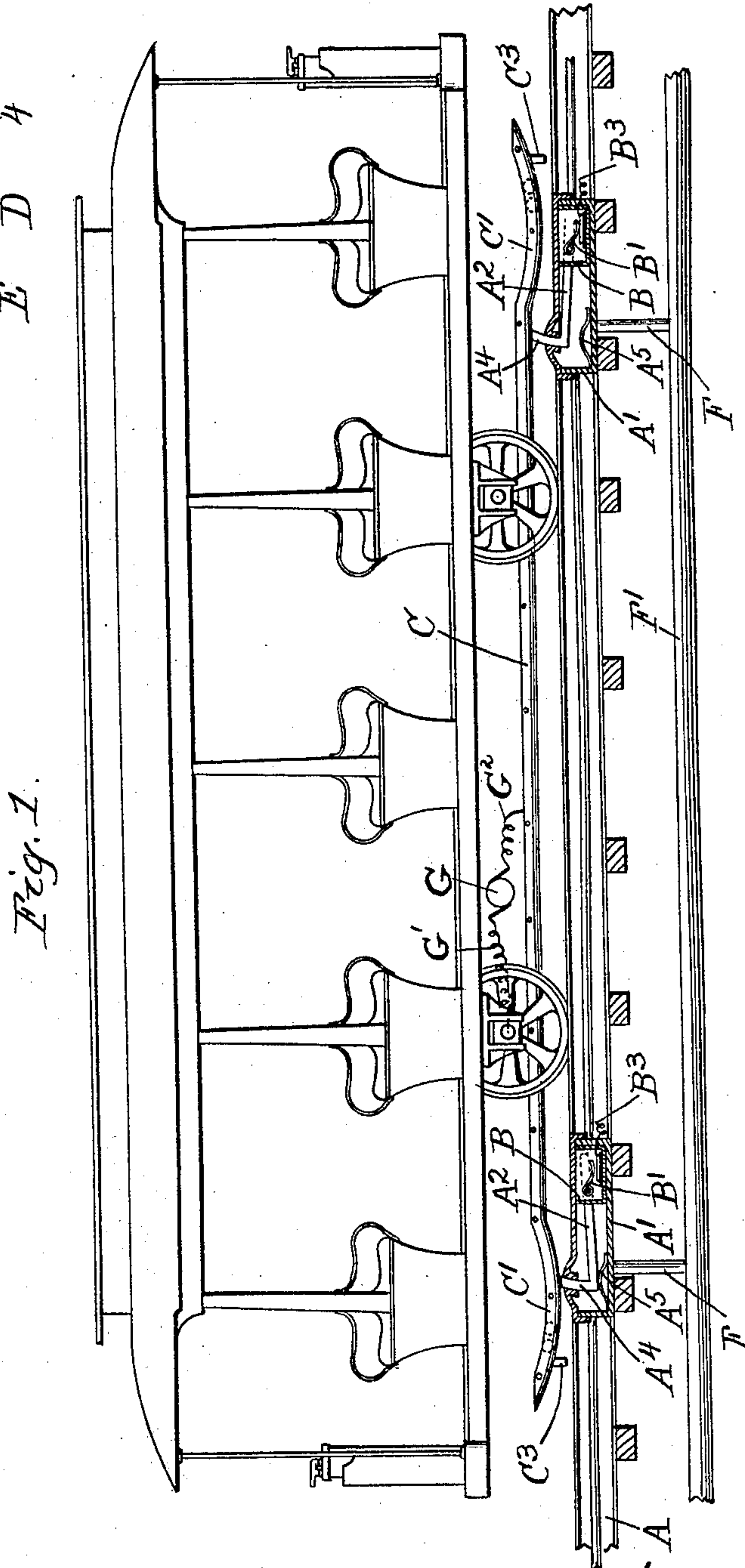
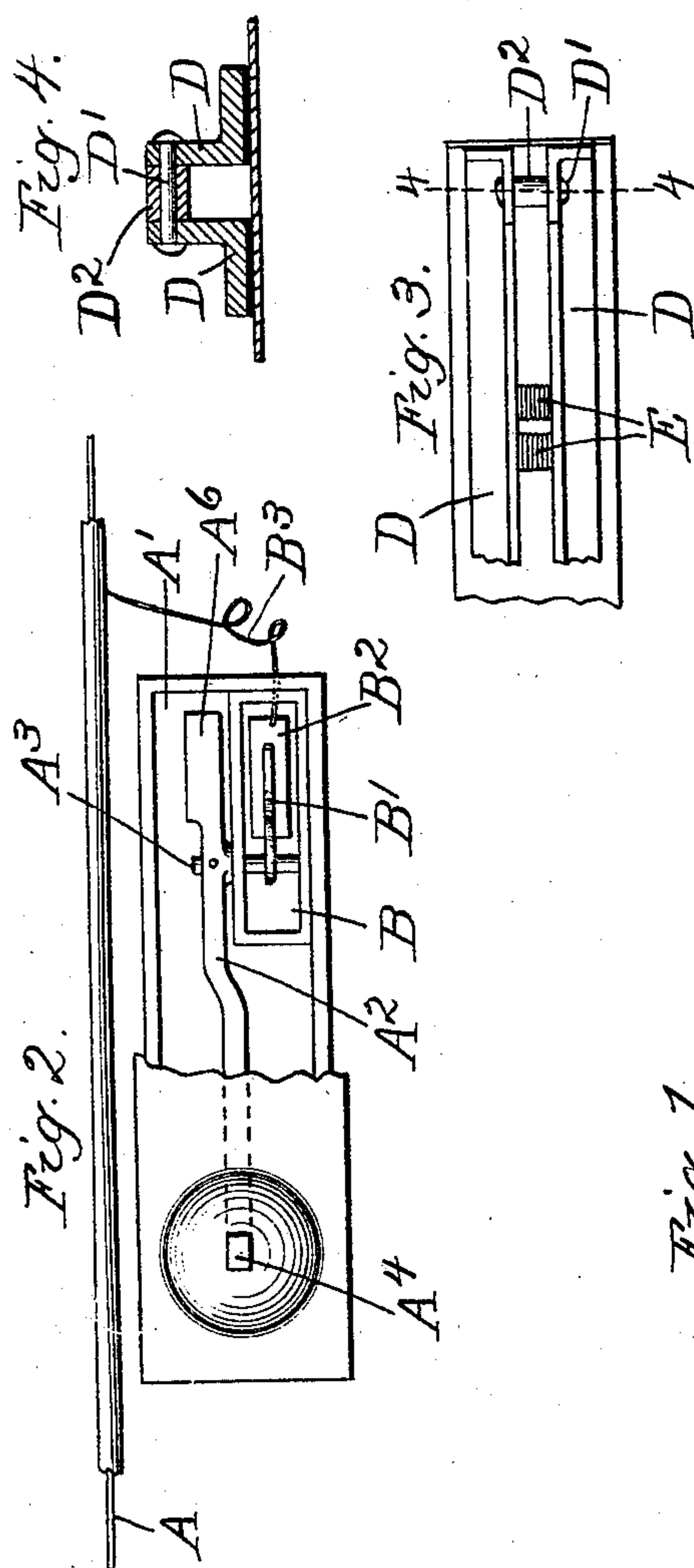


(No Model.)

W. R. ELLIOTT.  
ELECTRIC RAILROAD.

No. 557,657.

Patented Apr. 7, 1896.



Witnesses.

E. T. Wray.

Donald M. Carter

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by Francis W. Park,  
Atty.



# UNITED STATES PATENT OFFICE.

WILLIAM R. ELLIOTT, OF CHICAGO, ILLINOIS, ASSIGNOR OF TWO-FIFTHS  
TO ISAAC C. ROBBINS AND CHARLES A. EMMONS, OF SAME PLACE.

## ELECTRIC RAILROAD.

SPECIFICATION forming part of Letters Patent No. 557,657, dated April 7, 1896.

Application filed June 27, 1895. Serial No. 554,212. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM R. ELLIOTT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Electric Railroads; of which the following is a specification.

My invention relates to electric-railway systems, and has for its object to provide a new and improved system by which electric railways may be operated from conductors placed beneath the surface of the road-bed.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of a car, showing the road-bed in sections. Fig. 2 is a plan view of the box containing the circuit-making apparatus with part of the cover broken away. Fig. 3 is a plan view of a portion of the magnet used to operate the circuit-making device. Fig. 4 is a cross-section on line 4 4, Fig. 3.

Like letters refer to like parts throughout the several figures.

I have only illustrated so much of my device as is necessary to understand the same and have omitted the details of construction of the car and motor, as they are no part of my invention.

Referring more particularly to Figs. 1 and 2, an insulated conductor A is located beneath the surface of the road-bed and may be placed within a conduit or run in any other suitable manner. A series of boxes A' A' are located preferably at the side of this conductor, the distance between the boxes being less than the length of the car to be used upon the road. These boxes are preferably sunk beneath the surface of the road-bed so that only their upper part is exposed to view. Within each of these boxes A' A' is a lever A<sup>2</sup> provided with a short shaft or pivot A<sup>3</sup>, about which it is adapted to rock. These levers are preferably made in part or wholly of magnetic material. The ends of each of said levers are bent upwardly so as to form the arm A<sup>4</sup>. The cover of the box A' is provided with an opening through which this arm A<sup>4</sup> projects. The cover at this point is slightly raised or bulged, as shown. The lever A<sup>2</sup> normally rests upon the spring A<sup>5</sup>, said spring being of such size

that the end of the lever projects slightly beyond the cover of the box. A second box B is located within the box A', and the pivot A<sup>3</sup> extends therethrough, as shown, the sides of the box acting as bearings in which it is adapted to work. A contact-spring B' is connected to said pivot and is opposed to the contact-plate B<sup>2</sup>. This contact-plate is completely insulated from the box B and is connected by the conductor B<sup>3</sup> with the main conductor A. When the lever A<sup>2</sup> is in its normal position, the spring B' is out of contact with the contact-plate B<sup>2</sup>, but may be brought into contact with such plate by the movement of said lever. The lever A<sup>2</sup> is preferably provided at its end with a counterweight A<sup>6</sup> to facilitate its movement. The boxes A' A' are preferably placed in a straight line. The car is provided with a magnet C, which preferably extends substantially the whole length of the car, and which is in such a position that it passes over the boxes A' A' as the car is moved along the track. The ends of said magnet are bent downwardly at C' C', so that they just miss the bulged portion of the lid of the boxes A' A'. Each end of said magnet is also provided with a downwardly-projecting part C<sup>3</sup>, of rubber or the like, and which is adapted to come in contact with the bulged portion of the boxes A' A' and with the end of the arm A<sup>4</sup> of lever A<sup>2</sup> as the car moves along. The object of these parts C<sup>3</sup> is to brush away any dirt that may have accumulated upon the arm A<sup>4</sup> or the bulged portion of the box-lid.

The magnet C may be of any desirable construction and may be either a permanent magnet or an electromagnet. I have shown in the drawings one way in which this magnet may be constructed, but of course I do not wish to be limited to such construction. As herein shown, said magnet consists of two angle-irons D D, which are connected together at intervals by the bolts D' D'. These angle-irons are separated by means of washers D<sup>2</sup>, preferably of some non-magnetic substance. If it is desired to make this magnet an electromagnet, I may place the coils E E between the angle-irons, as shown in Fig. 3. As many of these coils may be used as is necessary to bring the magnet to the required strength,



and they may be placed at any desirable part of the magnet. As shown in the drawings, I have indicated the magnet as having two sets of coils, one at each end. These coils may be energized in any suitable manner, either by a source of electricity on the car or by being connected with the underground conductor in a manner similar to that of the motor. It is of course evident that this magnet may be made in any other desirable manner without departing from the spirit of my invention.

The boxes A' and B may be coated inside and out with asphaltum or other suitable material. These boxes are preferably made water-tight, but I prefer to connect them by pipes F with the sewer F', so that if by any chance water should obtain access thereto it would be immediately carried away by such pipes. I have indicated the motor G in a diagrammatic form in order to simplify the drawings. This motor is connected by wire G' with the axle of the car or in any other convenient way by which it may be grounded. Said motor is also connected by wire G<sup>2</sup> with the magnet C.

I have described these several parts in detail; but it is evident that they may be greatly modified in form, construction, and arrangement without departing from the spirit of my invention, and I therefore do not wish to be limited to the exact construction shown.

The use and operation of my invention are as follows:

The distance between the boxes A' A' should be less than the length of the magnet C, so that at least one of said boxes may at all times be beneath the magnet. As the car moves along, the downwardly-projecting part C<sup>3</sup> on the magnet C passes over the top of the boxes A' A' and brushes away any dirt or other material that may have accumulated there, thus leaving the end of the arm A<sup>4</sup> free from any material which might prevent its being attracted by the magnet. As the curved or bent portion of the end of the magnet moves along it comes in contact with the arm A<sup>4</sup>. As the car moves along the magnet C slides along the end of the arm A<sup>4</sup>, and when the downwardly-bent portion of the magnet has passed the box containing the lever A<sup>2</sup> the lever is moved upwardly by the attraction of the magnet for the end of the arm A<sup>4</sup> and the spring B' is brought into contact with the plate B<sup>2</sup>. The circuit is then completed through the motor and will be traced as follows: from conductor A through conductor B<sup>3</sup>, contact-plate B<sup>2</sup>, spring B', pivot A<sup>3</sup>, lever A<sup>2</sup>, magnet C, wire G<sup>2</sup>, motor G, wire G', and thence through the car-wheel and rail to the ground. As the car moves along the end of the arm A<sup>4</sup> is kept in contact with the magnet and slides along the bottom of such magnet until it reaches the rear end. The downwardly-bent portion at the rear end forces said lever back into the box, and just before the magnet breaks contact with the arm A<sup>4</sup> said arm comes in contact with the beveled

surface of the part C<sup>3</sup> and is kept within the box so as to allow the part C<sup>3</sup> to easily pass over it. The front part of the magnet will be in contact with the lever in the next box before the lever A<sup>2</sup> is moved so as to break contact between the spring B' and the plate B<sup>2</sup>.

I claim—

1. A railway system comprising a car with a motor thereon, an underground conductor, a movable part of magnetic material associated with said conductor and normally out of contact therewith, and a magnet on the car adapted to attract said movable part and move it so as to electrically connect the motor and the underground conductor, said magnet so constructed that the distance said movable part is moved varies with the different positions of the car.

2. A railway system comprising a car with a motor thereon, an underground conductor, a number of pivoted levers associated with said conductor but out of contact therewith, a magnet on said car bent downwardly at its front end, so as to come in proximity to said lever and adapted to attract it and move it as the car is moved along so as to electrically connect said lever with the said conductor and said motor.

3. A railway system comprising a car with a motor thereon, an underground conductor, a series of boxes associated with said conductor each provided with an insulated contact-plate, a second series of boxes within which said first series of boxes is placed, said second series or outer boxes being each provided with a bent lever one end of which projects through the cover of the box, a spring in each of said inner boxes connected with said levers and in proximity to said contact-plate, and a magnet on the car electrically connected with said motor and adapted to lift the exposed ends of said levers and electrically connect the conductor with the magnet.

4. A railway system comprising an underground conductor, a movable contact device associated with said conductor, a car having a magnet thereon, the ends of which are bent downwardly so as to be in a lower plane than the main body of the magnet, and so situated that its downwardly-bent ends pass said movable contact device at a distance sufficiently short to allow it to be attracted substantially as described.

5. A magnet adapted to be used on an electric car for actuating a contact-making device, consisting of a straight central portion having downwardly-curved ends on a lower plane than the central portion, substantially as described.

6. A railway system comprising an underground conductor, a car having a motor thereon, a magnet connected with said car and electrically connected with said motor, a series of boxes adapted to successively pass beneath the said magnet as the car moves along and so situated that at least one will be at all times beneath the magnet, a bulge on the lid



of each box, a hole through such bulged portion, a pivoted lever within said box, provided with an arm that projects through said hole, a downwardly-projecting part on the ends of  
5 said magnet adapted to pass over the projecting end of said lever-arm, and clean it before the magnet acts upon it, and a contact device associated with said lever and adapted to be

operated by the movement of said lever so as to electrically connect the lever with said 10 underground conductor substantially as described.

WILLIAM R. ELLIOTT.

Witnesses:

DONALD M. CARTER,  
FRANCIS M. IRELAND.