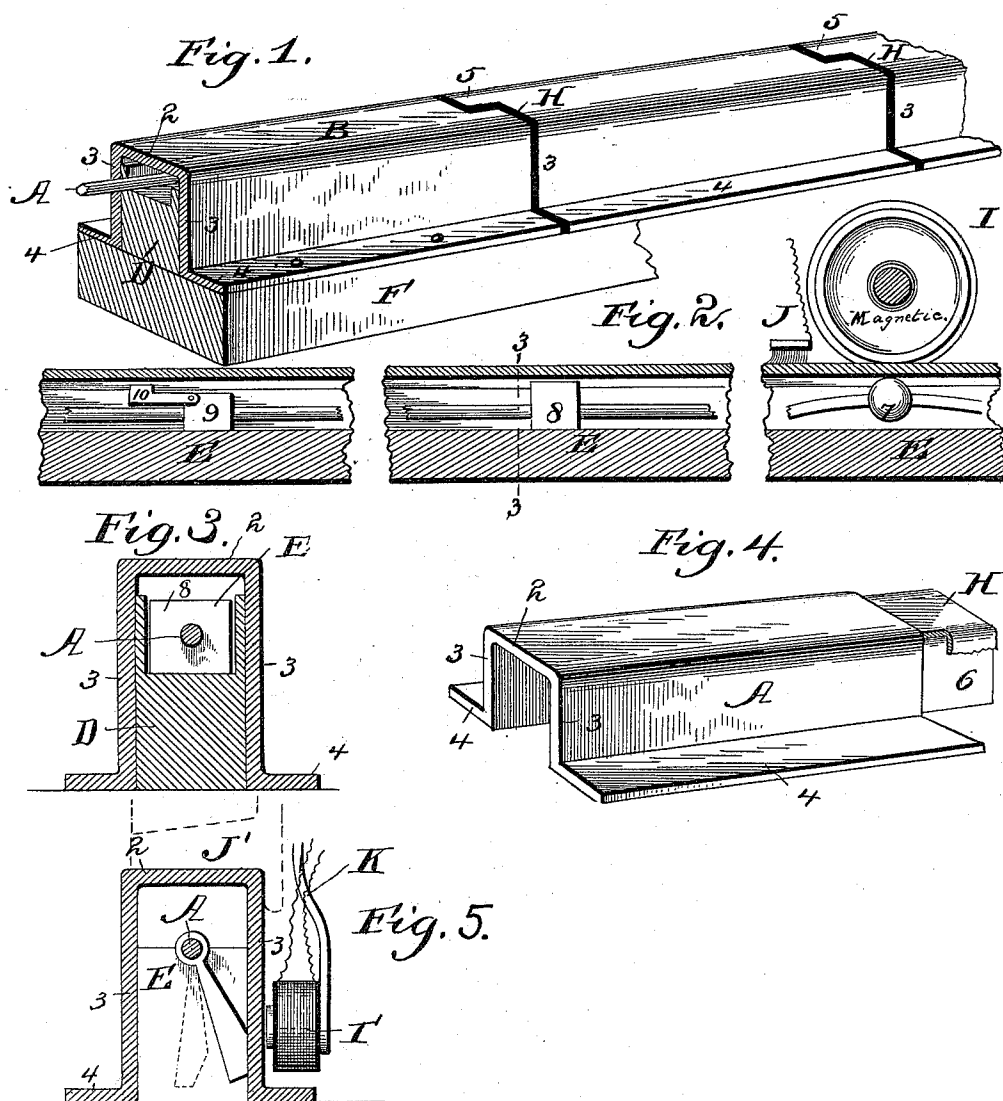


(No Model.)

A. NORMAN.
ELECTRIC RAILWAY.

No. 570,328.

Patented Oct. 27, 1896.



Witnesses:
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UNITED STATES PATENT OFFICE.

ADDISON NORMAN, OF TORONTO, CANADA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF A PART TO WILLIAM MCCABE, WILLIS JONES, AND WILLIAM B. TAYLOR, OF SAME PLACE.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 570,328, dated October 27, 1896.

Application filed June 22, 1895. Serial No. 553,769. (No model.)

To all whom it may concern:

Be it known that I, ADDISON NORMAN, a citizen of Canada, residing in the city of Toronto, county of York, Province of Ontario, and Dominion of Canada, have invented certain new and useful Improvements in Electric Railways, of which the following is a full, clear, and exact description.

The object of my invention is to simplify and otherwise improve electric railways, especially of the kind in which the conductor which supplies the motive current is arranged in a closed conduit arranged usually upon or below the surface of the ground.

In the accompanying drawings, wherein are illustrated several forms of my invention, Figure 1 is a perspective view of a short section of track upon which electrically-propelled cars are adapted to run and which track constitutes a closed conduit in which is mounted the main conductor for the electric current. Fig. 2 is a longitudinal vertical section of the track like that illustrated in Fig. 1, there being shown in this view several different forms of the connecting-pieces. Fig. 3 is a cross-section on the line 3 3 of Fig. 2. Fig. 4 is a perspective view of a somewhat different form of rail-section from that illustrated in Fig. 1. Fig. 5 is a transverse sectional view illustrating a different form of the invention from that illustrated in the other views.

In the drawings, A indicates the conductor, which is supplied with electric current that supplies the motors in use upon the system. It is properly insulated and mounted within a closed conduit, which latter is preferably laid upon the surface of the ground or buried therein to a greater or less extent. The conduit in which is mounted the conductor A serves also as one of the rails upon which run the cars. These rails B are of an inverted-U shape, the cavity inclosed by the top wall or tread 2 and the side walls 3 of the rails being partially filled by suitable non-conducting material, such as blocks of wood D, shaped so as to fit the cavity of the rails and to serve as an insulating-support for the conductor, which latter is always arranged adjacent to but out of contact with the rails. The rails

are preferably supported upon longitudinally-arranged stringers F, and are secured thereto by spikes or bolts which pass through the horizontal flanges 4 of the rails.

The abutting ends of the rails may be rabbeted, as shown at 5 in Fig. 1, in order to reduce the objections incident to the weight of the car being transferred from one rail to the other, this being especially desirable in my system, as I prefer to construct the rail with comparatively short sections. A similar effect may be secured by the construction illustrated in Fig. 4, where the rail is shown as provided at one end with a portion 6 of reduced size, which is adapted to telescope into the opposing end of an adjacent rail. The construction shown in this figure has certain advantages, as the portion 6 closes the joint between the two rail-sections, thus insuring a tight conduit, even though the rail-sections be not brought close together, end to end, and when they are laid with sufficient space between their ends to allow for contraction and expansion.

The rails, when arranged to serve as conduits in which is arranged the conductor A, are also made to operate as the sectional conductors, which take the current from the main conductor and deliver it to the motor. It is hence desirable that the rail-sections should be insulated from each other, and at H, I have indicated an insulating material arranged between adjacent rail-sections. This insulating material may be of any suitable character and preferably is adapted not only to prevent the electrical connection of the rail-sections, but also to prevent the entrance of moisture into the cavity within the rails.

The rail-conduit which I have described serves to perfectly insulate the working conductor A, as the rails B cover and protect the insulating material by which the conductor is directly supported and form a dry-air space surrounding the conductor.

Upon the conductor A, at suitable intervals, there are mounted or placed a series of connecting-pieces E, composed of soft iron or of other material which will be attracted when exposed to the influence of a sufficiently strong magnet. These connecting-pieces are

arranged in the conduit-cavity adjacent to, but out of contact with, the sectional conductors, and they are free to move into contact with the working conductor when acted upon by a magnet sufficiently powerful to move them, but they normally tend to move out of contact with such sectional conductors when they are not influenced by a magnet. These connecting-pieces may be of many different forms, and I have illustrated several of the preferred forms in the drawings. Thus at 7 in Fig. 2 the connecting-piece is shown as consisting of a ball perforated and strung upon the conductor A, to which it is secured in such manner as to always be maintained in electrical connection therewith. Whenever this ball is subject to the influence of a sufficiently powerful magnet, it is lifted, carrying with it the conductor, until it comes into engagement with the top wall 2 of the rail, when electrical connection is established between the main and sectional conductor, and the current may be taken to the motor in the usual way.

At 8 in Fig. 2 and in Fig. 3 the connecting-piece is shown as consisting of a cube of soft iron. It operates in the same manner as does the spherical-shaped connecting-piece just described.

At the left-hand portion of Fig. 2 is shown a form of connecting-piece which may be used in connection with a conductor which is rigid and cannot be easily moved toward the sectional conductor when the connecting-piece is contracted. It consists of a block 9, secured to the conductor A, and a lever 10, pivoted to this block. When the attracting-magnet is brought close to such a connecting device as is now being described, the lever 10 is attracted and makes contact with the sectional conductor without lifting the block 9 and the conductor to which it is secured.

Different forms of magnets, either permanent magnets or electromagnets, may be employed for the purpose of moving the connecting-pieces to establish connection between the main and sectional conductors. Thus in Fig. 2 one of the car-wheels I is represented as being magnetic, so that whenever it passes over the track the connecting-pieces are raised in succession. In Fig. 5 an electromagnet I' travels adjacent to the track and successively attracts the connecting-pieces. In this figure the connecting-piece is shown as consisting of a pendulum-like body which is hung upon the conductor A and is free to vibrate thereon and to make contact with one or the other of the side walls 3 of the rail or conduit. An electromagnet I' is shown as being supported by an arm or bracket K in such relation to the rail that as it is moved with the car along the rail it attracts one or the other of the pendulum-like conducting-pieces.

It will be understood that the connecting-pieces E are arranged closely together to insure that one of them shall not pass out of

the influence of the passing magnet before the one next to it comes under the influence of the magnet and is attracted thereby.

Any form of collector for the current which is adapted for the use to which it is put may be employed; and in Fig. 2 I have illustrated the collector as being a metallic brush J, while in Fig. 5 the wheel J' may serve to collect the current.

The rail opposite the one illustrated in Fig. 1 of the drawings may be employed for the return current, or other conductor for the return current may be used, if desired.

I have not attempted to illustrate or describe all of the embodiments of my invention, and therefore do not wish to be restricted in its useful applications to the particular forms of embodiment thereof which I have delineated and described for the purpose of illustrating the invention.

What I claim, and desire to secure by Letters Patent, is—

1. In an electric railway, the combination of a supporting-rail upon which the cars run, the rail being formed in sections which are insulated from each other, and with a central cavity, a main conductor mounted within the cavity of the said rail, insulating-supports for the conductor also arranged within the said cavity, and means for bringing the main conductor and the sections of the rail into electric engagement successively, substantially as set forth.

2. In an electric railway, the combination of a supporting-rail upon which the cars run, the rail being formed in sections which are insulated from each other, and with a central cavity, one end of each section being reduced in size and extended beyond the bearing-face for the car-wheels, whereby the rail-sections telescope one into the other, a main conductor mounted within the cavity of the rail, insulating-supports for the conductor, and means for bringing the conductor and the rail-sections successively into electric connection, substantially as set forth.

3. In an electric railway, the combination of a supporting-rail upon which the cars run, the rail being formed of sections of substantially inverted-U shape, in cross-section, a main conductor mounted within the cavity formed within the rail, insulating-supports for the conductor also mounted in the said cavity, and means for bringing the conductor and the rail-sections successively into electric connection, substantially as set forth.

4. In an electric railway, the combination of a main conductor, a closed conduit therefor formed of sections which are insulated from each other, the insulating-supports within the conduit for the conductor, and a series of pendulum-like connecting-pieces hung upon the conductor and free to vibrate thereon to make contact with the side of the conduit when attracted by a magnet, substantially as set forth.

5. In an electric railway, the combination

of a supporting-rail upon which the cars run,
the rail being formed of sections of substan-
tially inverted-**U** shape in cross-section,
whereby there is formed a cavity within the
5 rail, a main conductor mounted in the cavity
of the said rail, insulating-supports therefor,
and a series of pendulum-like connecting-
pieces hung upon the conductor and free to
vibrate thereon to make connection with the
10 side of the rail when attracted by a magnet.
6. In an electric railway, the combination

of a supporting-rail upon which the cars run,
the rail being formed of sections of substan-
tially inverted-**U** shape, in cross-section, a
main conductor mounted within the cavity 15
formed within the rail, and insulating-sup-
ports for the conductor also mounted in the
said cavity, substantially as set forth.

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Witnesses:

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