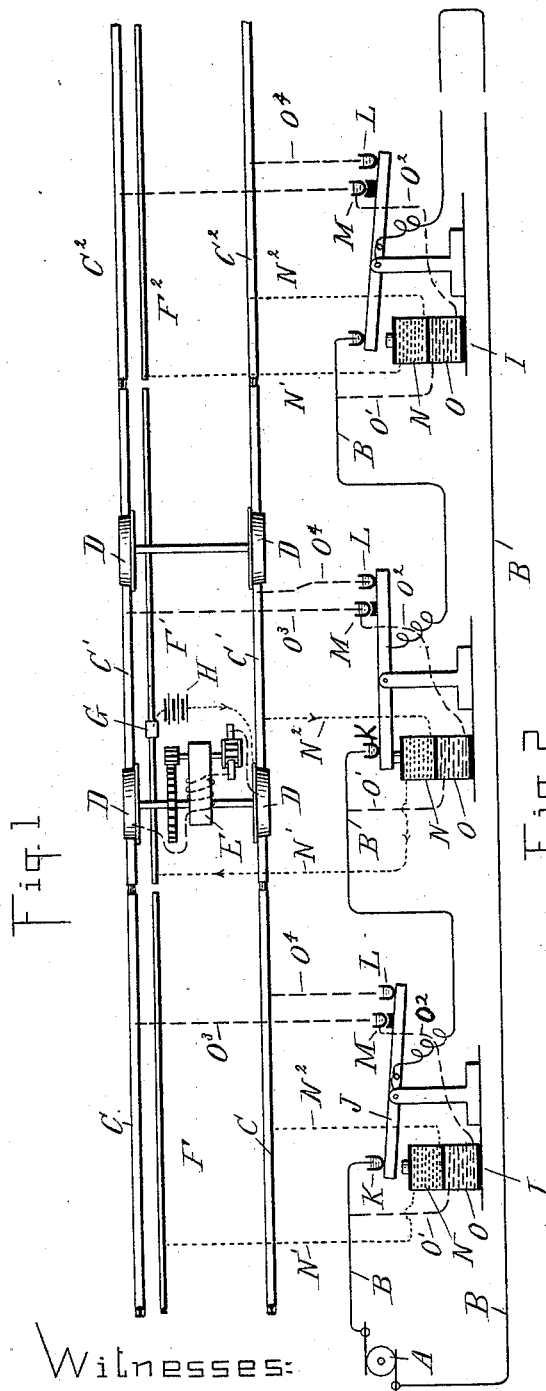


(No Model.)

T. H. HICKS.  
ELECTRICAL RAILWAY SYSTEM.

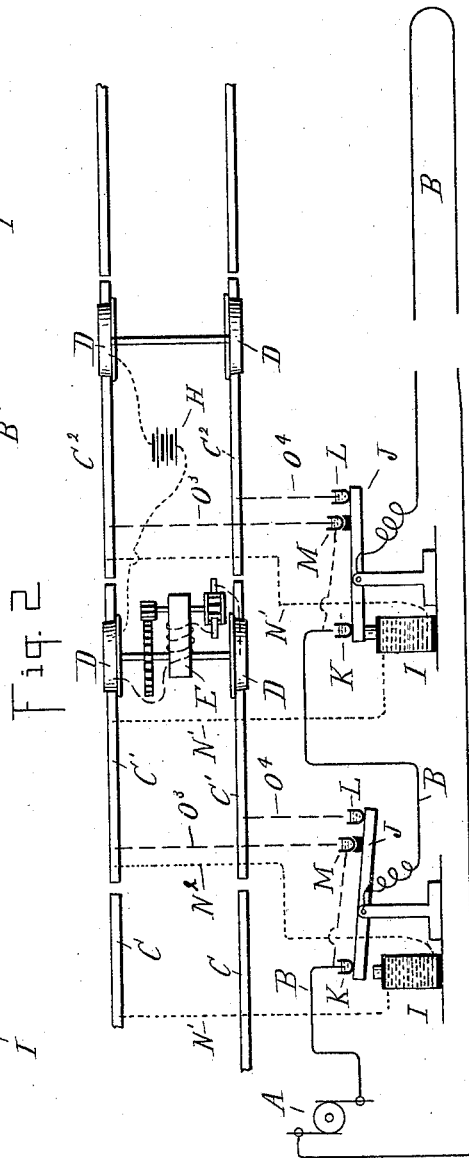
No. 419,673.

Patented Jan. 21, 1890.



Witnesses:

*P. M. Hulbert*  
*J. Paul Mayer*



Inventor:

Thomas H. Hicks  
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Atty.

# UNITED STATES PATENT OFFICE.

THOMAS H. HICKS, OF DETROIT, MICHIGAN, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE ELECTRICAL INVENTION COMPANY, OF MICHIGAN.

## ELECTRICAL RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 419,673, dated January 21, 1890.

Application filed March 6, 1889. Serial No. 302,048. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS H. HICKS, a citizen of Great Britain, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Electrical Railway Systems, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain improvements in that class of electric railways wherein the motor-car runs on rails electrically disconnected, and carries a battery that energizes a magnet by which a circuit is completed between the main line and the motor on the car; and the invention consists in the peculiar construction, arrangement, and combination of parts hereinafter more particularly described, and then definitely pointed out in the claims.

In the accompanying drawings, Figure 1 is a diagram plan of my improved system, and Fig. 2 is a modification thereof.

A is the generator at the station.

25 B are the main conductors leading from it and arranged in parallel relation to the rails, and preferably inclosed in an underground conduit.

30 C C' C' and C'' C'', &c., are electrically-disconnected rail-sections forming the track.

D are the wheels of a car adapted to travel on said track.

E is the motor adapted to propel the vehicle.

35 F, F', and F'' are electrically-disconnected sections of a conductor-rail parallel to the track-rails.

G is a contact carried by the car and traveling in electrical contact with the conductor-rail, and H is a battery carried in the car.

40 Each electrically-independent section of track is provided with an electro-magnet I, having a movable armature J, which carries at one end the movable contact K and at the other end the movable contacts L and M, the latter being insulated. The electro-magnet is provided with two coils N O. One of the terminals of the coil N is electrically connected by the conductor N' with a section of

the conductor-rail, and the other terminal is 50 connected by the conductor N<sup>2</sup> with a corresponding section of one of the track-rails. The other coil O has one of its terminals connected by the conductor O' with the main conductor B, and its other terminal by the conductor 55 O<sup>3</sup> with the insulated contact M. The movable contact M forms a make-and-break connection with one section of track-rail through the conductor O<sup>3</sup>, and the movable contact L forms a make-and-break connection with the 60 corresponding section of the other track-rail through the conductor O<sup>4</sup>, and the movable contact K forms a make-and-break connection in the main line B.

The motor on the car is electrically connected with both rails of the track by means 65 of the wheels or through brushes, and the battery has one of its terminals connected to the conductor-rail through the contact G, and at its other terminal to one rail of the 70 track through a wheel of the car.

In practice the parts, being constructed as shown and described, are intended to operate as follows: The battery being electrically 75 connected to the conductor and to one of the track-rails of the section of track on which the car happens to travel, a local circuit is established through the connections N', the coil N, and the connection N'', and the electro-magnet attracts its armature. This 80 breaks the contact K and makes the contacts M L, as shown in Fig. 1, on the portion of track on which the car travels. The main-line circuit, which is normally connected, as shown in the other portion of Fig. 1, is there- 85 by broken, but a short circuit is established through the connection O', the coil O, connection O<sup>3</sup>, contact M, connection O<sup>3</sup>, thence from the rail through the motor to the other rail, thence through the connection O<sup>4</sup>, contact L to armature, and from there into the 90 main line connected thereto. It will be observed that the main circuit is automatically switched onto that portion of track on which the car travels, and as soon as the car leaves 95 that section this circuit is automatically changed, and thus the current is thrown off the whole track with the exception of that

portion on which the car travels. If that section is comparatively short, no danger is liable to arise.

As the motor-circuit comprises a portion of the coil of the electro-magnet, it is obvious that the armature after having been attracted by the action of the battery-current remains in contact with the magnet until both the coils N O are simultaneously cut out as the contacts on the car pass the break between two sections of track. Thus to throw off the current from the section of rail on which the car travels both the battery and the motor circuit must be opened in the car, but it will be seen that if this is done (suitable levers being provided therefor in the car) the current is instantly picked up again when the circuit is again closed.

The battery in the car may be either a primary or a secondary battery. The latter may be kept charged by means of a derived current from the motor-current or from a little dynamo driven by the motor.

My invention may be readily carried out without the conductor or third rail used in Fig. 1. Such an arrangement is shown in Fig. 2, the difference being that in this case the motor-circuit does not include the electro-magnet, and the terminals N' and N'' of the coil N are connected to adjoining sections of rails.

The rail-sections are made equal to the distance of the rail-contacts of the car, and the battery terminals are connected to a front and rear wheel, respectively. The battery-current is thus established through the electro-magnet and is broken at the instant the car passes from one section of track to the other.

What I claim as my invention is—

1. In an electrical railway system, a main

line, a source of electricity therefor, a car, a source of electricity thereon, a motor adapted to propel the car, a two-rail track electrically divided into sections, an electro-magnet and armature for each section, a wire for each rail of each section, a contact for each wire normally out of contact with the same, but electrically connected with the main line and adapted to be automatically brought into contact with said rail-wires and direct the current through the motor by way of the rail-section on which the car is traveling by the electrical generator on the car closing a local circuit, substantially as described.

2. In an improved electric-railway system embodying a car, a motor adapted to propel the same, a two-rail track electrically divided in sections, a main line provided with normally open switches at each section of track adapted to direct the current through the motor by way of the rail-sections when the car travels thereon, and switch mechanism comprising an electro-magnet, a movable armature having make-and-break contacts between the main and shunt circuits, two coils on the electro-magnet, one included in the motor-circuit and the other having one terminal connected to a rail-section and the other to a corresponding section of a conductor or third rail, and a battery on the car provided with suitable contacts to close the circuit through the last-named coil when the car travels over the respective section of track, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses, this 15th day of February, 1889.

THOMAS H. HICKS.

Witnesses:

J. PAUL MAYER,  
ALFRED B. EATON.