(No Model.) 2 Sheets—Sheet 1.

G. E. HESSE.

CONVERTER SYSTEM FOR ELECTRIC RAILWAYS.

No. 511,524. Patented Dec. 26, 1893.

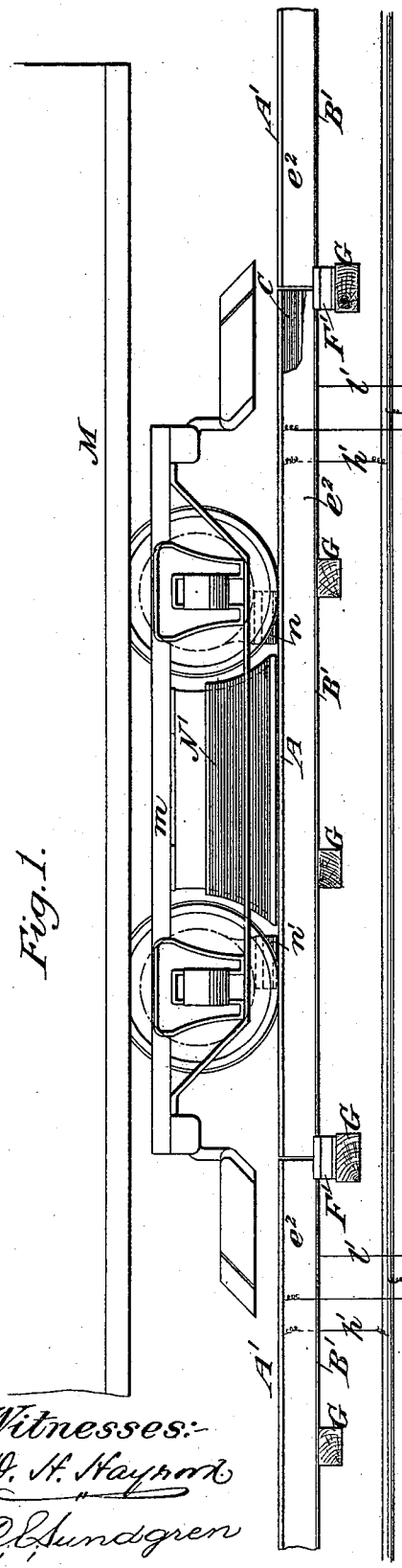

Fig. 1.

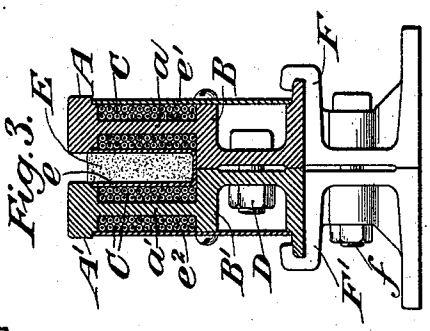

Fig. 3.

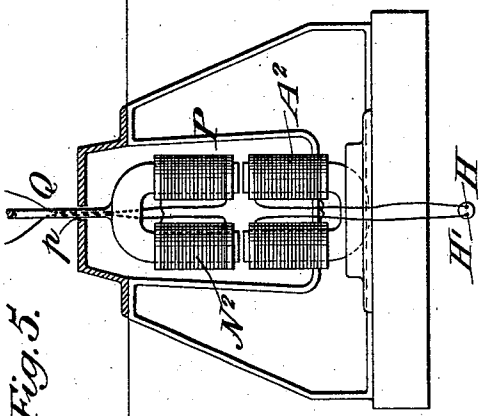

Fig. 5.

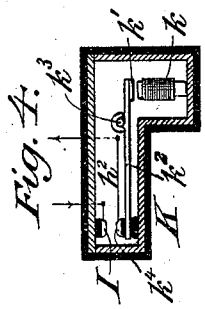

Fig. 4.

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(No Model.) 2 Sheets—Sheet 2.

G. E. HESSE.

CONVERTER SYSTEM FOR ELECTRIC RAILWAYS.

No. 511,524. Patented Dec. 26, 1893.

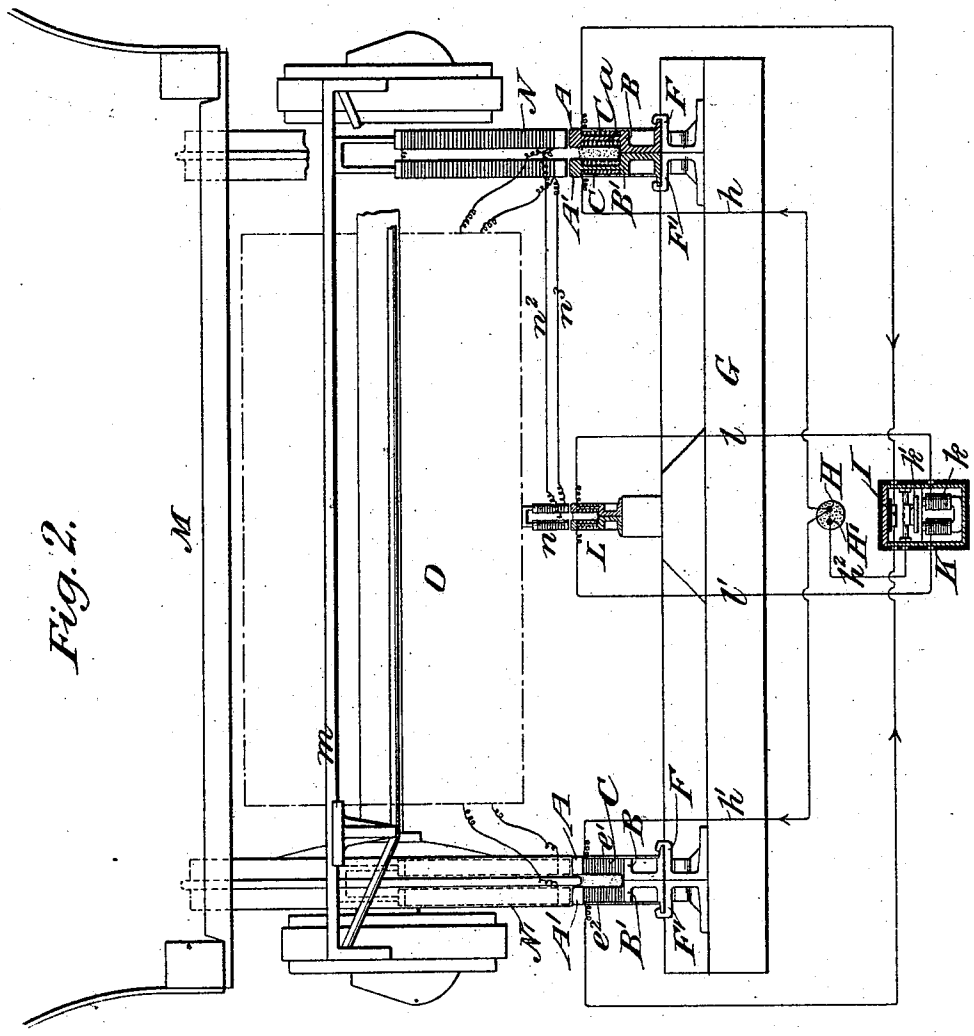

Fig. 2.

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UNITED STATES PATENT OFFICE.

GUSTAF E. HESSE, OF BROOKLYN, NEW YORK, ASSIGNOR OF FIVE-EIGHTHS TO WILLIAM W. SHARE AND VALDEMAR F. LÄSSOE, OF SAME PLACE.

CONVERTER SYSTEM FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 511,524, dated December 26, 1893.

Application filed November 21, 1892. Serial No. 452,647. (No model.)

To all whom it may concern:

Be it known that I, GUSTAF E. HESSE, a resident of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Electro-Magnetic Railways, of which the following is a specification.

My invention relates to an improvement in electro-magnetic railways in which an electric motor carried by a vehicle is actuated by a current of electricity induced by one or more electro-magnets located permanently along the track which the vehicle is intended to traverse.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a view in side elevation of a portion of a track and a car thereon. Fig. 2 is a transverse vertical section through the track, showing the car partly in end elevation and partly in section. Fig. 3 is an enlarged transverse vertical section through one of the rails. Fig. 4 is a view in longitudinal vertical section of one of the switch boxes; and Fig. 5 is a view in transverse vertical section through a track of modified form.

In practice, I provide the vehicle—in the present instance a car—with an electric motor and with one or more horse-shoe magnets for supplying a current to the motor. Along the track and in as close proximity to the horse-shoe magnet as feasible, I locate a series of primary magnets to which an alternating or interrupted electric current is supplied from a main conductor extending along the track. In connection with the series of primary magnets, I provide a series of switches for the purpose of automatically cutting off the current from the successive primary magnets as the car passes from one to another and leaving them out of action until the car is about to again pass them. The primary magnets may be located in different positions along the track, either above or under the surface on which the rails are laid; or they may themselves be utilized as rails on which a car may travel. In the preferred form which I have chosen, I have shown the primary magnets as formed of rails; while in the modification shown in Fig. 5, I have represented the primary magnets as located in a conduit extending centrally along between the rails.

When the rails are utilized to form the primary magnets, I find it desirable to construct them in the form shown in Fig. 3 in which two half sections have their heads A and A′ connected with their base portions B and B′ by webs a, a'. The web portions a, a' are each wound with insulated wire C and the base portions B and B′ are held firmly together by draw bolts D. The adjacent sides of the coils on the two webs are separated by a U-shaped partition piece e which may be filled with some suitable cement E up to a point a short distance below the faces of the heads A and A′, leaving a groove between the heads A and A′ for the flange on the middle portion of the face of the car wheel. The outer sides of the coils on the webs a, a' may be inclosed by side plates e' and e^2 extending from points underneath the outer edges of the heads A and A′ down to the foot of the base portions B, B′. The rails, as thus constructed, may be supported at the adjacent ends of two successive rail sections by chairs consisting of two half sections F and F′ which at their upper portions lip over the foot of the base of the rail and which may be drawn tightly together to clamp the ends of the rails therein by means of draw bolts f. The chairs and the rails intermediate of the chairs may rest upon suitable sleepers G of either wood or iron, as may be found desirable.

Positive and negative main conductors H and H′ completely insulated from each other and from surrounding objects, extend along the track and are connected by insulated branch conductors h and h' with the coils C on the rails, the opposite poles of said coils C being connected with a contact piece I in the switch box K. The switch box K is completely insulated from surrounding objects and is provided with an electro-magnet k, the armature k' of which is secured to one arm of a lever k^2, pivotally mounted as at k^3, the opposite arm of said lever being provided with a contact piece k^4 in electric communication through a branch conductor h^2 with the main conductor H′. The lever k^2 is so weighted that, when the electro-magnet k is

not energized, the contact piece k^4 will rest out of contact with the contact piece I, but when the said magnet k is energized it will draw the armature k' to it and will thereby swing the lever k^2 to bring the contact piece k^4 into contact with the piece I and will thereby close communication between the main conductors H and H' through the primary magnets or opposite rails of the car track.

The electro-magnet k is connected by insulated conductors l and l' with an auxiliary magnet L located along the track, in the present instance along the surface of the track intermediate of the rails. The magnets L may be constructed in a manner quite similar to the primary magnets which form the rails and may correspond thereto but may be very much smaller as their function is simply to furnish an induced current to the electro-magnet k for operating the switch or circuit maker and breaker in the box K.

It is intended that there shall be a switch mechanism, such as hereinabove described, for each successive primary magnet—excepting for the primary magnets at the ends of the track.

The car body is represented by M and may be of any well known or approved form or construction. It is shown in the present instance as mounted upon a four wheel truck which also may be of any well known or approved construction and provided with a suitable frame work m for supporting the horse-shoe magnets N and N' on each side of the truck and intermediate of the front and back wheels and for supporting a suitable motor within the housing indicated at O, Fig. 2. The horse-shoe magnets N and N' have their coils connected with the motor on the car which motor may be of any well known or approved form, either alternating current or continuous current. In case the latter is employed, it will of course be necessary to introduce a synchronously working alternate current motor to change the alternating current to a continuous current in the usual way.

At the opposite ends of the car truck there are located two auxiliary magnets, one at each end, denoted respectively by n and n'. The coils upon one of these, as for example n, are connected with a short exterior coil around one of the main horse-shoe magnets, as for example N, and the other with an exterior coil about the other of the horse-shoe magnets N'. The branch conductors which connect the horse-shoe magnet n with the magnet N are denoted by n^2 and n^3 respectively.

In operation, an alternating or interrupted continuous electric current having been established from a suitable generator through the main conductors H, H', and the current transmitted to the primary magnet or magnets (in the present instance the rail sections) at the beginning of the route along which the car is intended to travel, the horse-shoe magnet or magnets on the car will receive an induced current from the primary magnets and the motor, receiving its power from the current in the horse-shoe magnet or magnets, may advance the car toward the next successive primary magnet or magnets. As the auxiliary horse-shoe magnet (n for example) at the front of the car moves over the end of the auxiliary magnet of the succeeding section, it will induce a current which is transmitted to the electro-magnet in the switch box of that section and thereby close the circuit through the main conductors and the primary magnet of the second section so that the horse-shoe magnet in the car will still receive its induced current as it passes over the second section. The auxiliary horse-shoe magnets will be energized so long as the main horse-shoe magnet is energized, and hence will serve to close contact in each succeeding primary magnet section in advance of the entrance of the main horse-shoe magnet over that section. As the car passes from the second primary magnet section onto the third and each succeeding section to the end of the route, the electro-magnet in the switch box of a preceding section will become de-energized as soon as the auxiliary horse-shoe magnet at the rear of the car has passed that section, and the circuit through that primary magnet will be broken by the action of the lever k^2.

In Fig. 5, I have shown the primary magnets A^2 located along a conduit P, the horse-shoe magnet N^2 carried by the car being suspended within the conduit by a hanger Q extending through a slot p in the top of the conduit.

What I claim is—

1. In combination, a vehicle, a motor carried thereby, an electro-magnet supported to move along with the motor and having its coils electrically connected with the motor, a primary magnet forming one of the supporting rails located along the path of the moving electro magnet and means for sending an alternating or interrupted electric current through the coils of the primary magnet, substantially as set forth.

2. In combination, an electro magnet and a motor under the control of the electro-magnet, the electro-magnet and motor being mounted to travel along a predetermined path, a series of primary magnets each forming one of the supporting rails located along the said path in proximity to the path of the moving electro-magnet and means for sending an alternating or interrupted current of electricity through the coils of the said primary magnets, substantially as set forth.

3. In combination, an electro-magnet and a motor under the control of the electro-magnet, the electro-magnet and motor being mounted to travel along a predetermined path, an auxiliary electromagnet carried by the motor a series of primary magnets located along the said path in proximity to the path of the moving electro-magnet, a main electric conductor extending along the path, a branch circuit from the main conductor

through each of several successive primary magnets and auxiliary electromagnets located along the path to cooperate with the auxiliary magnet carried by the motor for automatically making and breaking the successive branch circuits as the electro-magnet and motor move from one primary magnet to another, substantially as set forth.

4. In combination, a series of primary magnets located along a track, a main electric conductor extending along the track, branch circuits from the main conductor through the primary magnets, an auxiliary series of magnets located along the track, a circuit maker and breaker for each of several of the primary magnets, the circuit maker and breaker being electrically connected with one of the auxiliary magnets, a motor carried by the vehicle and under the control of the electro-magnet, and an auxiliary electro-magnet carried by the vehicle electrically connected with said electro-magnet for controlling the circuit makers and breakers along the track, substantially as set forth.

5. A rail for an electromagnetic railway having branches wound with an insulated electric conductor for utilizing the rail as a primary magnet, substantially as set forth.

6. A combined rail and primary magnet for an electro-magnetic railway, comprising separate longitudinal rail sections, each provided with enlarged head and base portions, means for drawing the base portions into close contact and insulated electric conductors coiled around the web portions of the sections intermediate of the heads and bases, substantially as set forth.

7. A combined rail and primary magnet for electro-magnetic railways, comprising longitudinal half sections each provided with insulated wire coils intermediate of the heads and bases of the sections, and guard plates fixed upon the outer and inner sides of the rail sections to protect the coils, substantially as set forth.

8. In combination, a vehicle, a motor carried thereby, an electromagnet supported to move along with the motor and having its coils electrically connected with the motor, a series of primary magnets located along the path of the moving electromagnet, means for energizing the primary magnets, circuit closers for controlling the current which energizes the primary magnets auxiliary magnets for operating said circuit closers and an electromagnet carried by the vehicle in advance of the motor driving magnet thereon for inducing a current in a succeeding auxiliary magnet and thereby closing circuit with the succeeding primary magnet before the motor driving magnet carried by the vehicle reaches the said succeeding primary magnet, substantially as set forth.

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