(No Model.)

T. A. EDISON.

CONVERTER SYSTEM FOR ELECTRIC RAILWAYS.

No. 468,949. Patented Feb. 16, 1892.

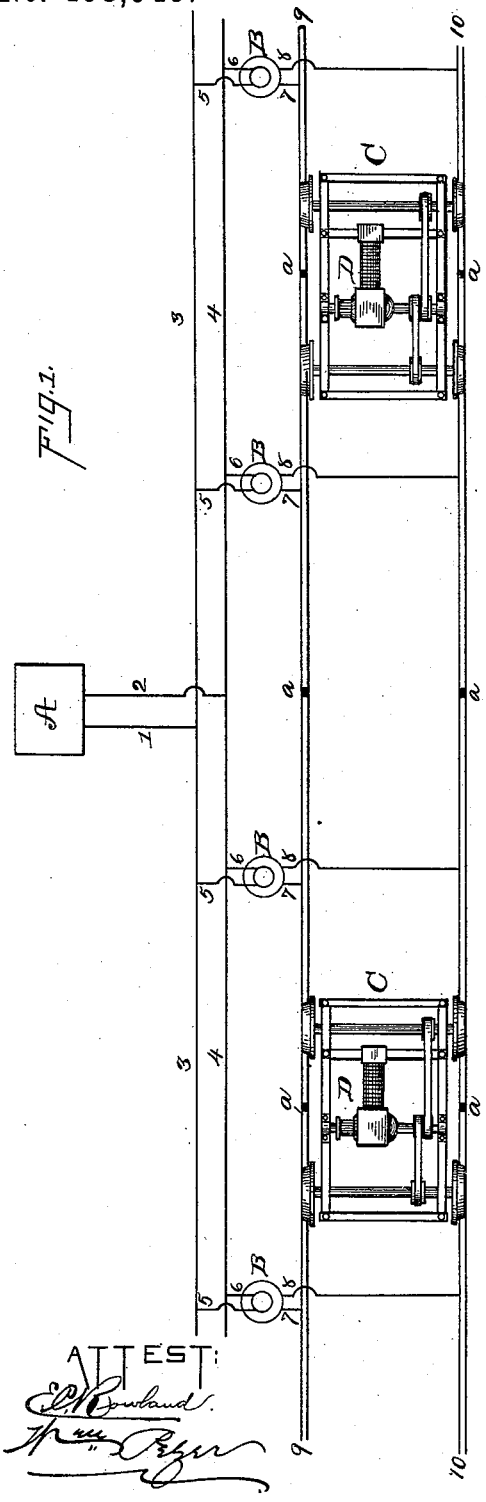

Fig. 1.

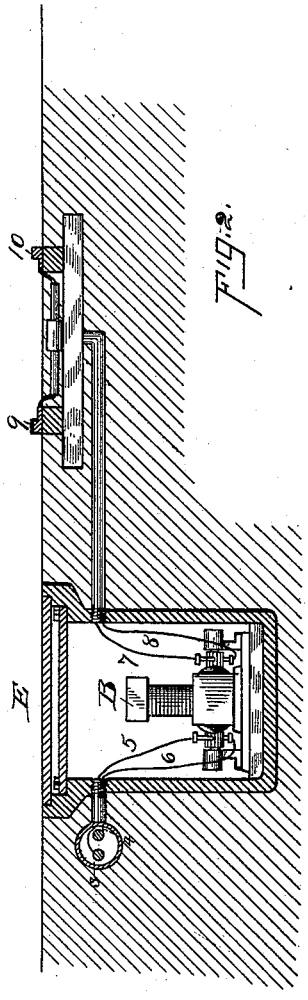

Fig. 2.

ATTEST:

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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

CONVERTER SYSTEM FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 468,949, dated February 16, 1892.

Application filed March 8, 1887. Serial No. 230,091. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Electric Railways, (Case No. 718,) of which the following is a specification.

Heretofore great difficulty has been experienced in properly insulating the contact-conductors of electric railways, such conductors being those with which traveling electrical contacts are maintained at the moving cars. This difficulty arises from the necessity of using high-tension currents in order to secure economy in working. The losses from leakage, due to imperfect insulation, have been especially great when the contact-conductors are at the surface of the ground, as when the traffic-rails upon which the cars travel are used as such conductors in whole or in part, or when one or more other rails between the traffic-rails are so used alone or in conjunction with the traffic-rails. For the street-railways of cities and towns this difficulty has caused the resort to the use of one or more contact-conductors elevated above the cars by supports or to slotted conduits sunken between the rails and carrying the contact-conductors therein; but both of these methods are highly objectionable.

The object I have in view is to overcome largely the loss from leakage upon the contact-conductors of electric railways.

The invention is applicable to electric railways whatever may be the arrangement or the construction of or the method of supporting the contact-conductors; but it has the especial advantage of permitting the use for the contact-conductors of surface conductors, such as the traffic-rails, or a central rail and the traffic-rails, or two central rails without the traffic-rails. I accomplish this end by using a current of the desired high tension on conductors running parallel with the railway and by connecting such conductors at short intervals with the contact-conductors of the railway through tension-reducers, so that upon such contact-conductors the current will have a very low tension—say, for illustration, from five to ten volts—while the tension of the current on the main supplying-circuit may be as great as desired.

I propose to employ any of the various forms of tension-reducers shown by my patents and applications for patents, such tension-reducers being preferably connected with the main circuit in multiple arc. I prefer to employ continuous currents upon the main supplying-conductors as well as upon the contact-conductors and to use combined generators and motors such as are shown in my patent, No. 287,516, for reducing the tension, or I may employ the devices of my patent, No. 278,418, for this purpose. The contact-conductors may be continuous from end to end of the railway; but I prefer to divide them into sections, with a tension-reducer connected with each section, so that the secondary circuit of each reducer will be open except when a car is traveling over the section with which it is connected. I may provide electrically or mechanically operated switches for connecting and disconnecting the sections of the contact-conductors as the car advances; but such switches and other matter of detail will be made the subject of another application for patent. The electric motor of each car will be in a separate cross or multiple-arc circuit from the contact-conductors. The main conductors may be run on poles or buried underground, and the tension-reducers may be located at any convenient points. Such reducers may be placed in water-tight man-holes constructed at intervals by the side of the railway. The generators may be connected directly with the main circuit or by means of feeders to better distribute the current.

In the accompanying drawings, forming a part hereof, Figure 1 is a view, principally in diagram, illustrating the principle of my invention; and Fig. 2, a sectional view showing the location of a tension-reducer in a man-hole with the connections thereto and therefrom.

A represents one or more generators of electricity, which may be continuous or alternating current dynamo-electric machines, as before explained. These generators may be located at a station at any point upon the line of the railway. Conductors 1 2 extend from A to the conductors 3 4 of the main circuit. To this main circuit may be supplied a current of high tension. Separate multiple-arc cir-

cuits 5 6 extend to tension-reducers B, from which extend conductors 7 8 to the contact-conductors 9 10. These contact-conductors are shown as the traffic-rails upon which the cars C, carrying electric motors D, travel. The tension-reducers produce upon the contact-conductors a current of low tension, the motors being properly proportioned for such a current. The contact-conductors are shown in Fig. 1 as divided into sections by insulation *a*, one tension-reducer being connected with each section, although the contact-conductors may be continuous, as before explained.

In Fig. 2 the tension-reducer B is a combined motor and generator adapted to be operated by and to produce continuous currents. It is located in the water-tight man-hole E and is connected with the main conductors and with the working conductors, as shown.

What I claim is—

1. In an electric railway, the combination, with a moving car and an electric motor carried by such car and proportioned for operation by low-tension currents, of contact-conductors with which such car makes a traveling contact, a main supplying-circuit extending along the line of the railway and having a current of high tension, and a number of tension-reducers located at intervals along the line of the railway and near thereto, such tension-reducers being connected in multiple arc with the said main supplying-circuit and being also connected in multiple arc with the said contact-conductors and producing a current of lower tension upon the latter, substantially as set forth.

2. In an electric railway, the combination, with two or more moving cars, each having an electric motor proportioned for operation by low-tension currents, of contact-conductors with which the car-motors are connected in multiple arc, a main supplying-circuit extending along the line of the railway and having a current of high tension, and a number of tension-reducers located at intervals along the line of the railway and near thereto, such tension-reducers being connected with the said main supplying-circuit, and being also connected with the said contact-conductors and producing a current of lower tension upon the latter, substantially as set forth.

3. In an electric railway, the combination, with a moving car and an electric motor carried by such car and proportioned for operation by low-tension currents, of contact-conductors located at the surface of the ground and with which such car makes a traveling contact, a main supplying-circuit extending along the line of the railway and having a current of high tension, and a number of tension-reducers located at intervals along the line of the railway and near thereto, such tension-reducers being connected in multiple arc with the said main supplying-circuit, and being also connected with the said contact-conductors and producing a current of lower tension upon the latter, substantially as set forth.

This specification signed and witnessed this 7th day of February, 1887.

THOS. A. EDISON.

Witnesses:
WM. PELZER,
E. C. ROWLAND.