(No Model.)

M. WHELESS.

ELECTRIC STREET RAILWAY SYSTEM.

No. 441,210. Patented Nov. 25, 1890.

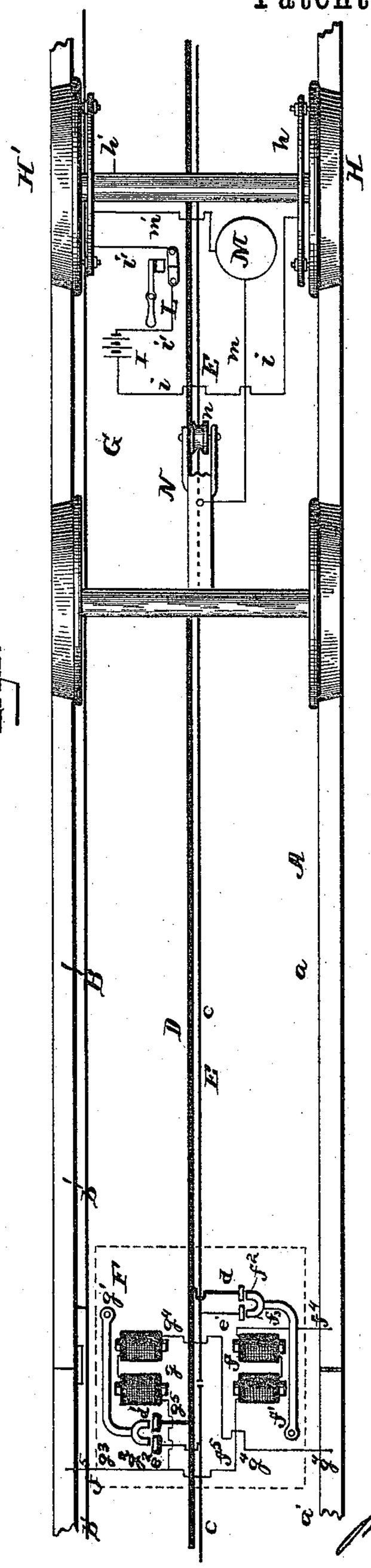

Fig. 1.

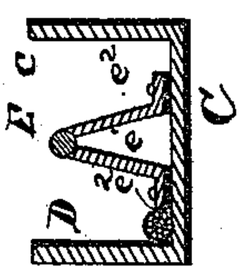

Fig. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

MALONE WHELESS, OF NASHVILLE, TENNESSEE, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE WHELESS ELECTRIC RAILWAY COMPANY, OF ALEXANDRIA, VIRGINIA.

ELECTRIC STREET-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 441,210, dated November 25, 1890.

Application filed March 15, 1890. Serial No. 343,984. (No model.)

To all whom it may concern:

Be it known that I, MALONE WHELESS, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Electric Street-Railway Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of my invention is an electric street-railway-conduit system.

The principal object obtained under this invention is the use of an open conduit in which is secured on insulated bearings a bare conductor not continuous through the conduit, but broken at convenient places, as shown in the accompanying drawings. These sections of the conductor under my invention can have no current from the generator in them until the car comes on a section, and then the conductor in the conduit can be vitalized or devitalized at the will of the person handling the car. It is known that in practice open conduits for electric street-railways carrying a continuous conductor have proved inefficient from the fact that where a long bare conductor is exposed to water and mud, which will naturally accumulate in a conduit, the exposed surface presented is so large that the consequent escape of the current is so great from the conductor that the motor fails to get a sufficient quantity of current to perform its function in the propulsion of the car. It has been demonstrated by a practical working-car under my supervision that if the conductor is segregated in lengths, say, of ninety (90) feet, the conductor may then be buried in water or mud and the working of the car is not perceptably depreciated. In this instance a current of five hundred (500) volts with a capacity of one hundred and twenty (120) ampères at the generator, and the car calling for an average of twenty-five (25) ampères, the loss in the current was found to be exactly proportional to the difference between the resistance of the motor and the resistance of the water under which the conductor was submerged. In other words, the current takes the metallic route to the generator in preference to a route through the ground.

In my present invention the above principle is made use of in the propulsion of electric street-railways.

It is easily understood that where a continuous line is used in a closed conduit the conductor must first be bare, so that the trolley from the car can lead the current to the motor, and this fact of a continuous bare wire in the systems heretofore in use will allow an escape of the current exactly proportional to the bare surface of the conductor exposed to the mud and water in the conduit. The escape of the current necessarily decreases with the exposed surface of the conductor, and where a bare conductor of not too great a length is used the working of the car is satisfactory in all respects, and the escape of current, even where the conduit is filled with up water, does not seriously impair the efficiency of the car.

Under conduit systems now in use a continuous conductor is kept charged with current from the generator, and all cars on the line are dependent for their supply from this main and exposed conductor. Under my system I dispense with a continuous conductor and use instead thereof a conductor made of separate sections. With these separate sections I use an insulated cable, which lies in the conduit and carries the current from the generator. From this cable the current is led into any desired section by the use of electro-magnets vitalized at will from the car. These magnets in the traps, as shown in the drawings, perform the function of coupling a conductor-section with the main line when the car is on that section, and a distinctive feature of my system is the fact that but one section is used by the car, although two or more cars can work on the same section. It is noticed, therefore, that the segregated conductor used in my system is not charged with the current except for a very short distance, the current from the generator being in the insulated cable lying in the conduit and led from

the insulated cable to the conductor in the conduit when needed.

In the annexed drawings, Figure 1 is a plan view of the system, a trap with the trap-magnets being shown in dotted lines at the left and a car with local and motor circuits at the right. Fig. 2 is a cross-section of an open conduit to be used with the system.

The letters A and B indicate two lines of railroad-track rails, the sections *a a'*, &c., of the former being insulated, and the sections *b b'*, &c., of the latter being electrically connected together, forming one continuous line. If desired, the line B may be connected at intervals with a return-wire. Passing along between these lines A and B is an open conduit C. This conduit is made with its mouth *c* at least as wide as, if not wider than, its inner part. Within this conduit is placed the power line D, which is covered or insulated; also, in the conduit is placed the trolley-line E. This is an uncovered wire made in sections *c c'*, &c., disconnected or insulated from one another. These sections are placed upon a support *e'*, which is properly insulated, as shown, at e^2 e^2.

At suitable distances apart are arranged the traps F. Each trap may be used for two sections, the one before and after it, as exemplified in the present case; or a trap may be used for any desired number of sections. In a trap F is placed the magnets *f g*, having the armatures *f' g'*, each having the insulated heads with the forks f^2 f^3 g^2 g^3. The magnets *f* are connected by a wire f^4 with section *a* and by a wire f^5 with the line B. The magnets *g* are connected by a wire g^4 with the section *a'* and by a wire g^5 to the line B, or, for convenience, with the wire f^5. The power-line D is made with contact-points *d d'*, and the sections *e* of the trolley-line have contacts *e' e²*. These contacts are arranged in pairs *d e'* and *d' e²* in juxtaposition with the forks f^2 f^3 and g^2 g^3, as shown.

Upon the car G the pair of wheels H H' is to be insulated, and upon each is secured the circular contact-plates *h h'*. Upon the car is placed a battery I, from which a wire *i* extends to one contact-plate *h* and another wire *i'* to the other contact-plate *h'*, there being in one wire—say *i'*—a switch L. Upon the the car there is the usual motor M, having one wire *m*, extending to the contact-plate *h'*, and another wire *m'*, connected to the trolley N. This trolley projects under the car and carries a wheel *n*, which straddles the trolley-wire E.

In use, as soon as the switch L is shut the local circuit is closed and the current passes from the battery I through the wire *i*, plate *h*, wheel H, section *a*, wire f^4, magnets *f'*, wire f^5, line B, wheel H', plate *h'*, and wire *i'* to battery. As soon as this local current is turned on, the magnets *f* are vitalized and draw down the armature *f'*. As this is done, the forks f^2 f^3 rest in the contacts *d* and *e'*, which turn on the power-current through these contacts and the forked head into the section *c* of the trolley-wire E, through the trolley N, wire *m'*, motor M, wire *m'*, plate *h'*, wheel H', line B, and to the return-wire or ground.

Having described my invention, what I claim is—

The combination of a continuous power-line, a trolley-line composed of sections insulated from one another, a car having thereon a motor-circuit in electrical connection with the trolley-line, a local circuit, part of which containing the source of electricity is on the car, and a switch between the local and the trolley-line and power-line, whereby when the local is closed a section of the trolley-line is connected to the power-line, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

MALONE WHELESS.

Witnesses:
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