

UNITED STATES PATENT OFFICE.

MALONE WHELESS, OF NASHVILLE, TENNESSEE.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 468,163, dated February 2, 1892.

Application filed December 1, 1891. Serial No. 413,721. (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 Railways; and I do 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, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 represents the system diagrammatically. Fig. 2 is an end view of the trolley, the axles being arched.

This invention relates to an improved system for electric railways designed more especially for underground work.

In the annexed drawings, the letters A A' indicate the two lines of a railroad-track. Running along between these rails is the bare working conductor B, made in sections *b*, insulated from one another at *b'*. From the generator G an insulated main power-line C runs along the track and has the ground D. From each section *b* of the working conductor B a feed-wire E runs to one end *e* of the armature *e'* of an ordinary telegraphic relay *e²*, such armature having a carbon contact *e³* at the other end. Adjacent to the contact *e³* is another carbon contact *e⁴*, from which another feed-wire E' runs to the insulated power-line C. Running parallel with the working conductor B—one on each side thereof—are two bare wires F and G, made in insulated sections *f* and *g*, coincident with sections *b* of the working conductor B. From the sections *f* of the wire F groundings *f'* run to one line of rails A'. From the sections *g* of the wire G a wire H runs to the magnet *e⁵* of the relay *e²*, and thence to a resistance-line C', which is connected to the generator G through a rheostat *c'*.

On the track is the car I, having the usual motor K connected in the usual way. Secured underneath the car I is the trolley L. This consists of the two transverse axles M M', carrying the wheels *l l' l² m m' m²*. These axles are provided with insulators *k k'*, so

that each axle is divided into three parts, and each wheel on an axle is thus insulated from the others. As shown, the middle wheels may be larger than the others. The two middle wheels *l'* and *m'* are electrically connected by the wire *l²*, and the wheels *l* and *m* and *l²* and *m²* by the wires *m³ m⁴*. From the wire *l²* a feed-wire *l'* runs to the motor K, and from the wheels *l* and *l²* or the ends of the axle M wires *l² m⁵* run to a switch N on the car. This trolley I when in place has its wheels *l'* and *m'* on the bare working conductor B, its wheels *l m* on the wire F, and its wheels *l² m²* on the wire G.

In a system thus constructed the magnets *e⁵* are vitalized by the current from the generator G passing through the rheostat *c'*, and the main current is taken from the main power-line C, as will be described. When the motor-circuit on the car is closed in the usual way and the switch N also closed, the action is as follows: The current from the wire C' passes through the wires H around the magnet *e⁵*, vitalizing it, through section *g* of the wire G, wheel *m²*, wire *m⁴*, wheel *l²*, wire *m⁵*, switch N, wire *l²*, wheel *l*, wire *m³*, wheel *m*, sections *f* of wire F, grounding *f'*, and rail A' to ground. As soon as the magnet *e⁵* is vitalized the armature *e'* is drawn down and the power-current streams from the power-line C through the feeders E' and E and armature *e'* to the section *b* of the working conductor B, and thence through the wheel *m'* and wires *l²* and *l'* to the motor. The trolley is made with two sets of wheels, so as to span the insulation of the wires on which it bears. This system produces a simple and efficient device. The circuits on the positive side being all wire effectually prevents grounding until the current has been used.

Having described my invention, what I claim is—

A prime conductor or power-line, a resistance-line, a working conductor, a positive wire, and a negative wire, all three in sections insulated from one another, the sections of the negative wire grounded, the sections of the positive wire connected to the resistance-line by feeders in which are electro-magnets, and the sections of the working conductor connected with the power-line by feeder-wires,

parts of which are the armatures of the said
electro-magnets, in combination with a car
furnished with a trolley in electrical contact
with the working conductor, positive and
5 negative wires, and also provided with a mo-
tor, and a switch-line connected with such
trolley, as set forth.

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

MALONE WHELESS.

Witnesses:

THOS. S. HOPKINS,
M. C. LAW.