(No Model.)

2 Sheets—Sheet 1.

# H. E. RIDER.

## ELECTRIC RAILWAY.

No. 525,864. Patented Sept. 11, 1894.

Fig. 1.

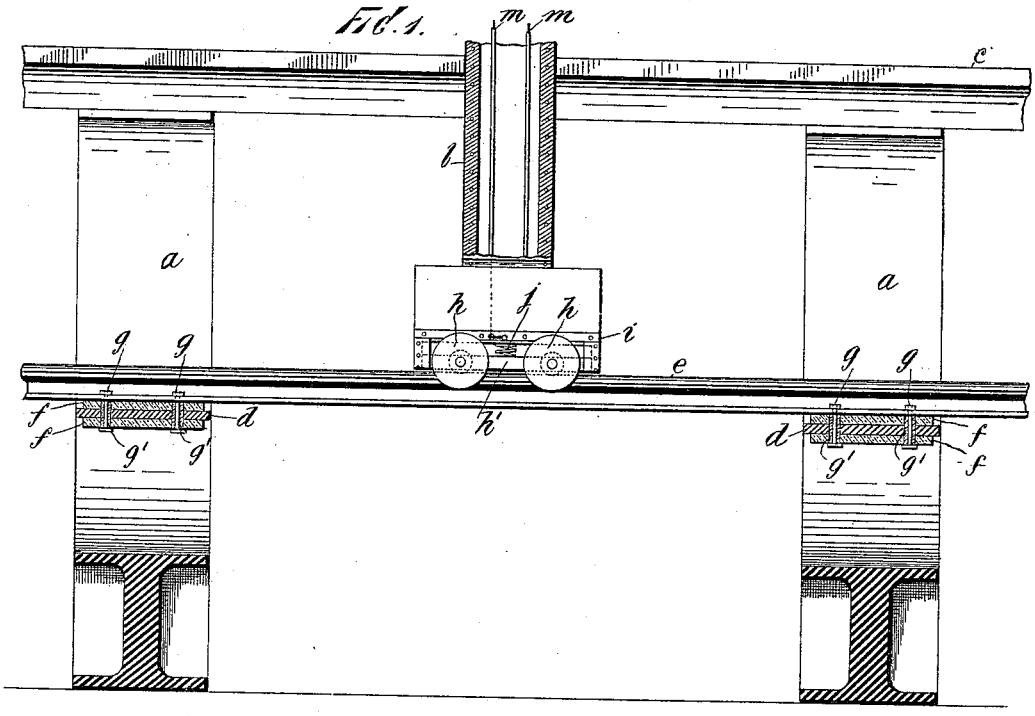
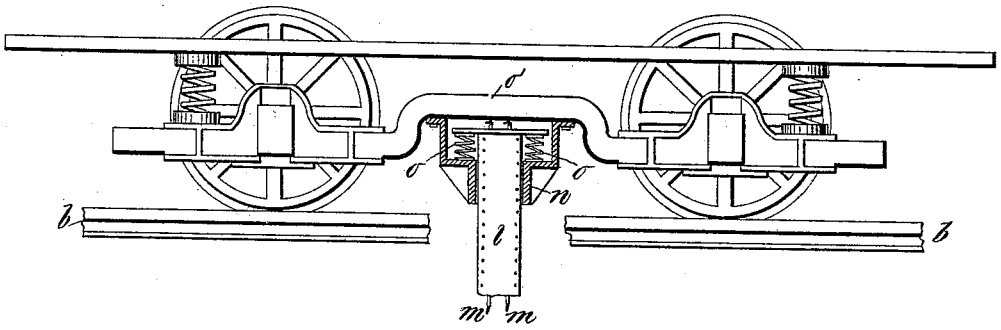



Fig. 2.




Witnessed:
John Buckler,
E. M. Taylor.

Inventor
Herbert E. Rider
By Redding & Kiddle
Attorneys.

(No Model.) 2 Sheets—Sheet 2.

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## ELECTRIC RAILWAY.

No. 525,864. Patented Sept. 11, 1894.

Fig. 3.

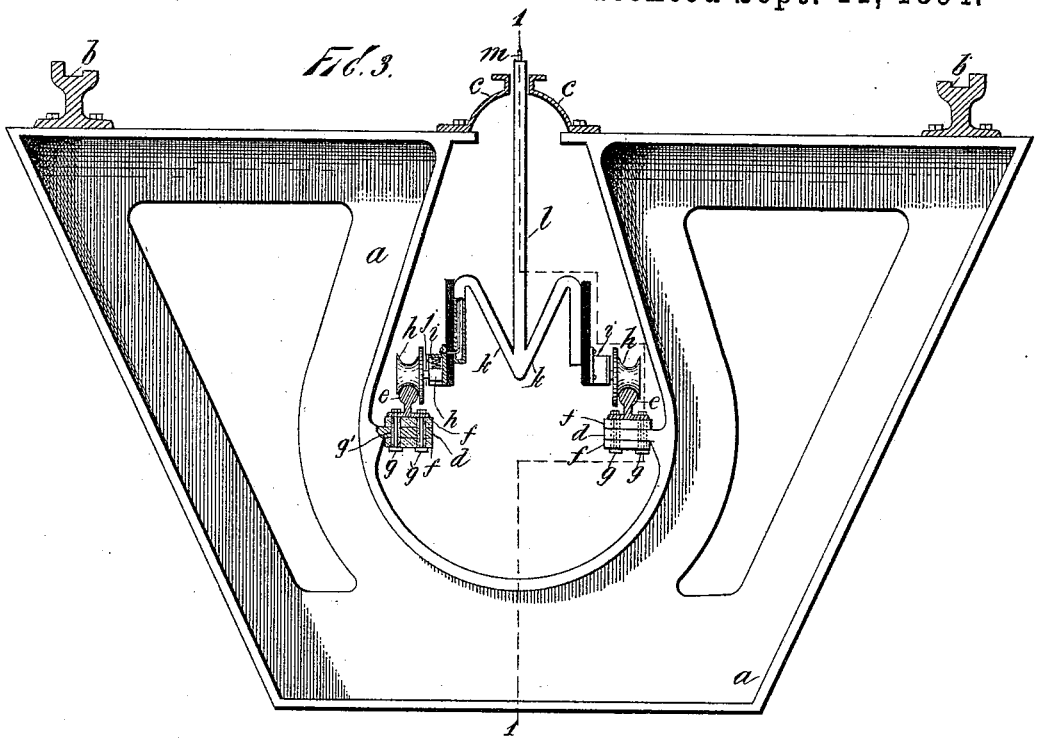



Fig. 4.

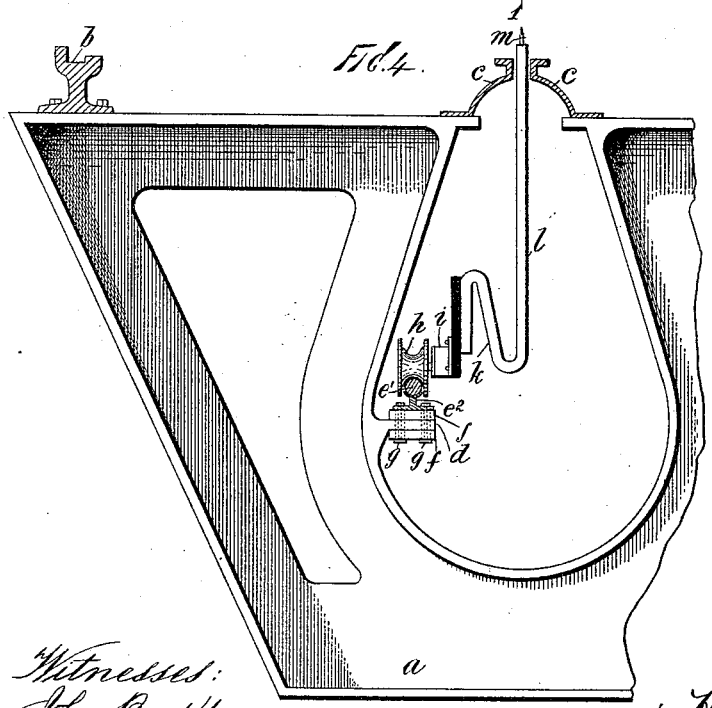



Fig. 5.

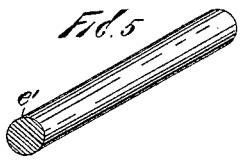



Fig. 6.

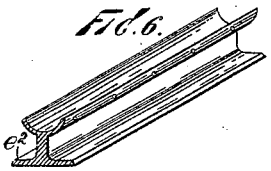
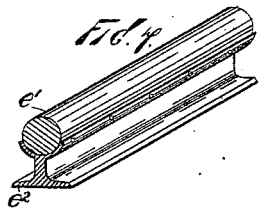



Fig. 7.




Witnesses:
John Buckler,
E. M. Taylor.

Inventor:
Herbert E. Rider
By Redding & Kiddle
Attorneys.

# UNITED STATES PATENT OFFICE.

HERBERT E. RIDER, OF NEW YORK, N. Y., ASSIGNOR TO ADOLPH FALCK, OF SAME PLACE.

## ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 525,864, dated September 11, 1894.

Application filed February 26, 1894. Serial No. 501,523. (No model.)

*To all whom it may concern:*

Be it known that I, HERBERT E. RIDER, a citizen of the United States, residing in the city and county of New York and State of New York, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification, reference being had to the accompanying drawings, forming part hereof.

This invention relates to electric railways, and more particularly to the main conductors or means for conducting the electric current along the line of the railway and to the means for conveying or collecting the electric current from the conductors along the line to the devices in the car actuated by the electric current.

One of the objects of this invention is to provide a main conductor of improved construction and so completely insulated that it may be successfully operated when placed in an underground conduit.

Another object is to provide a current collector so constructed as to project through the narrow slot of a conduit and to effectively collect the current from the main conductor or conductors.

The accompanying drawings illustrate embodiments of my invention. Figure 1 is a longitudinal vertical section taken on line 1—1 of Fig. 3 showing the frame of a conduit, and showing a conductor and the lower portion of a current collector. Fig. 2 is a side elevation on a reduced scale of a portion of a car showing in vertical section the upper part of the current collector. Fig. 3 is a transverse section showing the frame of a conduit, and showing two main conductors and the lower portion of the current collector partly in full and partly in section. Fig. 4 is a similar view with a portion of the conduit cross-piece broken away and shows a modified construction in which but one main conductor is employed. Fig. 5 is a perspective view showing the tread portion. Fig. 6 is a similar view showing the supporting portion, and Fig. 7 is a similar view showing the tread and supporting portions secured together, all illustrating a construction of conductor embodying my invention.

The underground conduit, the frame of which is shown in the drawings resembles in construction those now employed for cable railways and is provided with heavy cross-pieces *a a*, which support the track *b* and the slot forming plates *c c*, which may be of any suitable construction, and these cross-pieces *a a* are provided with a central opening under the slot and the conduit is formed of about the shape of the central opening. These cross-pieces *a a* are provided with shelf-like supports *d* which are preferably cast in one piece with the cross-pieces *a a*, and these shelves *d* are located some distance from the bottom of the conduit and at the side of the conduit, so as not to be near the vertical line beneath the slot. Upon these shelves *d* the main conductor or conductors *e* are supported.

In order to insure complete and perfect insulation, an insulating material is preferably employed which is absolutely impervious to moisture, and is not affected by any of the decomposing agents to which it would be subjected underground. For these insulators I employ glass, or other material, having a vitreous surface, or of a vitreous nature, and this insulating material is in the embodiment of my invention herein shown employed in the form of plates of glass *f f* interposed between the conductor *e* and the shelves *d* and other plates *f f* placed beneath the shelves *d*, and the conductor is held to the shelves by means of fastening devices preferably consisting of bolts *g g* which pass through flanges of the conductor *e* and through glass plates *f f* and shelf *d* and are placed within glass tubes *g' g'* where they pass through the shelf *d*, and these bolts are clamped against the lower glass plate *f* and the flange of the conductor *e* and firmly secure the conductor to the shelves *d*.

The conductor is supported at separate points along its length, and thus is in contact with its supports only at the separate points where it is supported. The supporting points may be placed at a considerable distance apart, and are shown in the drawings as provided on each one of the cross-pieces *a*, but it is of course evident that every alternate cross-piece may have no supporting shelf, or sev-

eral intervening cross-pieces may have no supporting shelf.

The main conductors *e* shown in Figs. 1 and 3 are each composed of a single piece of conducting metal having a lower flange or flanges which are penetrated by the holding devices *g*, and resemble in general appearance an ordinary railway rail except that their upper or tread portions are preferably shaped to cylindrical form.

In Fig. 4 the main conductor is shown as composed of two pieces $e'$ and $e^2$ and this construction is also separately shown in Figs. 5, 6 and 7. The tread piece $e'$ is composed of a metal having a high conductivity, such as copper, and is shown as an ordinary copper wire, while the supporting piece $e^2$ is composed of a stiff and hard material, such as iron or steel, and has bottom flanges to rest upon the supports and top flanges to embrace the tread-piece $e'$. These two pieces $e'$ and $e^2$ are secured together by screws or rivets or other fastening devices. The tread-piece insures the high degree of conductivity and non-corrosiveness desirable at the contact points, where the current collecting wheels run upon it, while the supporting piece $e^2$ braces, stiffens and strengthens the conductor, and also adds to the conducting capacity of the main conductor.

The top flanges or tread holding flanges of the supporting piece $e^2$ form a shallow groove for the tread-piece and permit a very large part of the surface of said tread-piece to be actually in contact with the current collecting devices. As shown in the drawings the current collecting devices are in contact with very nearly half the entire surface of the tread pieces. The tread holding flanges are comparatively thin, so as not to project to any objectionable distance on either side of the tread piece and the cross sectional area of the tread piece approximates quite closely the cross section of area of the supporting piece.

In Figs. 1 and 3 two main conductors are shown, one at each side of the conduit, while in Fig. 4 a single main conductor is shown, and the return current may be conveyed by the rails, or in any other suitable manner.

The current collecting wheels *h h* are shaped so as to fit upon and embrace a large surface of the conductor, being conformed to the curved shape of the tread portions of the conductor, and this contact will be maintained notwithstanding slight irregularities and variations of the angle of contact for the reason that the cross-section of the contact surfaces is circular, and will thus permit the current collecting wheels to maintain the same contact with a large range of variation in angular position. These current collecting wheels *h* are flanged so as to prevent the possibility of their jumping from or leaving the main conductor, and in the construction where a single conductor is employed, these flanges are on both sides of the wheels (see Fig. 4) while in a construction where two main conductors are employed, as in Figs. 1 and 3, the flanges need be at but one side of the wheels as shown. These current collecting wheels *h* as shown are carried by bearing blocks *h'* which slide in frames *i i*, and yielding devices such as the spring *j* are preferably interposed between the bearing blocks and the frames. It is of course obvious that the bearings for these current collecting wheels may be of any suitable construction; also that although two wheels are shown on each conductor, a single wheel or several wheels may be employed.

The frames *i i* are carried on upturned branches *k k* of the arm *l* which arm is carried by the car and extends downward through the slot and into the conduit, and blocks of insulating material are interposed between said frames *i* and the said branches *k*. Where but one conductor is employed, as in Fig. 4, the arm is provided with but one of these branches *k*. The upturned branches *k k* and the arm *l* are hollow and the branches and arm carry within them the conducting wires. Thus the two conducting wires *m m* pass downward within the arm *l* and one of them passes upward through one branch *k* and is electrically connected to the frame *i*, or other part of the bearings of the current collecting wheels *h*, while the other wire *m* passes up through the other branch *k*, and is similarly electrically connected with the other current collecting wheels *h*. These wires are insulated, and being carried within and protected by the arm *l* and branches *k*, are not exposed to moisture, or anything which would cause leakage of the current. It will also be noted that as a result of the upturned direction of the branches *k* of the arm *l* water or moisture will drop from the arm to the bottom of the conduit without touching the current collecting rollers, and so also that any water or moisture that falls upon the upturned branches *k* will be drained off at the middle of the conduit, in other words that the current collector is so shaped that it sheds all moisture or water at the middle portion to the bottom of the conduit with scarcely a possibility of conveying a particle of moisture to any part of the current collecting wheels or conductor.

The arm *l* is fitted at its upper end to slide within the socket *n*, and this socket *n* is suitably secured to any part of the car or car-frame as to the bolster or beam *o'*. Yielding devices or springs *o o* are secured to the socket piece *n* and to flanges from the arm *l*, as shown, or are otherwise suitably interposed or connected so that there is a yielding connection between the arm and the car truck or frame. By this means the arms will be pressed downward with a yielding pressure which can be arranged so as to be of suitable degree, and this downward pressure will hold the current collecting wheels in contact with the main conductors.

The current collecting wires *m* pass upward through the arm *l*, and are conveyed to suit-

able electro-motors or other devices wherein the current is to be employed. Such devices are not shown in the drawings as they form no part of the present invention.

In an electric railway embodying my invention no difficulty will be encountered in crossing other lines, whether the lines crossed are operated with cables or underground electric conductors, as the continuity of the main conductor may be broken at any point, and the two adjoining ends connected by a suitable insulated conductor, which can be made to pass under and around a cable, or any other part of the road crossed. It will be noted in this connection that the current collector may be constructed so as not to in any part extend as far beneath the surface as a cable, and therefore it will be above and clear of the cable at all crossings. So also there will be no difficulty in providing suitable switches and turn-outs, as it is only necessary to duplicate in the main conductor or conductors underground the switch mechanism above ground, and to construct the parts so that the switch of the main rails that carry the car will operate conjointly with the switch of the main conductor or conductors in the conduit. It will also be observed that the bottom of the conduit is entirely free from obstructions and may be readily cleaned by a suitable sweeper carried upon the current collector, or in any other suitable manner.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an electric railway, the combination of a slotted conduit, one or more conductors arranged therein, an arm carried upon a car and projecting downward through said slot and into said conduit and one or more upturned branches extending from said arm and current collectors carried by said upturned branches and insulated therefrom and arranged to move in contact with said conductor, and a conducting wire or wires passing through said arm and branch or branches and insulated therefrom and electrically connected to said current collecting device, said arm and branch or branches incasing said conducting wire or wires from a point above the slot of the conduit to where said wire or wires are connected to the current collecting devices, substantially as set forth.

2. In an electric railway, a conductor comprising a tread portion of a metal having high conductivity and a supporting portion consisting of a central web, supporting flanges extending on either side of said central web at the lower edge thereof and tread holding flanges extending on either side of said central web at the upper edge thereof, said tread holding flanges being upwardly curved so as to form a shallow groove within which the tread portion of the conductor is supported, whereby a large contact surface for the current collector upon the highly conductive portion of the conductor is provided, substantially as set forth.

This specification signed and witnessed this 24th day of February, A. D. 1894.

HERBERT E. RIDER.

In presence of—
HENRY D. WILLIAMS,
E. M. TAYLOR.