(No Model.)

M. H. SMITH.

ELECTRIC RAILWAY.

No. 457,382. Patented Aug. 11, 1891.

Fig. 1.

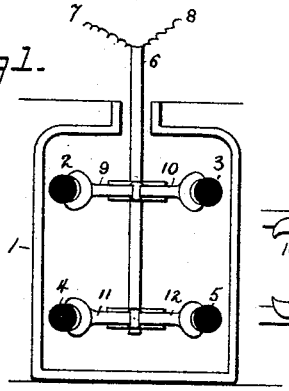


Fig. 3.

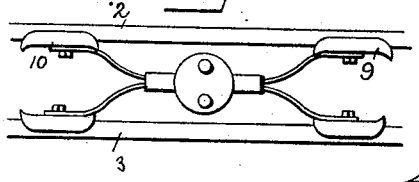


Fig. 5.

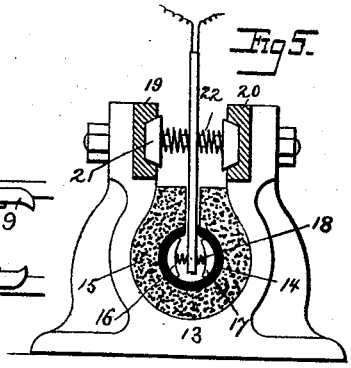


Fig. 2.

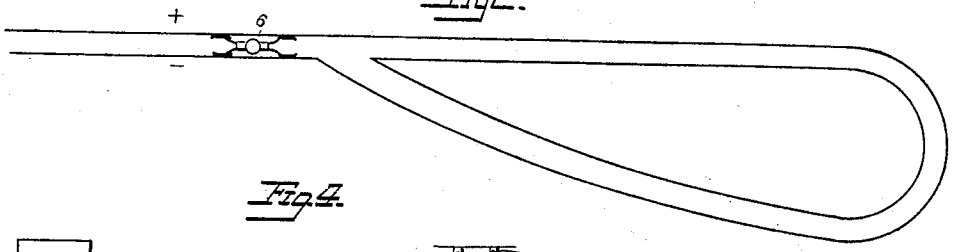


Fig. 4.

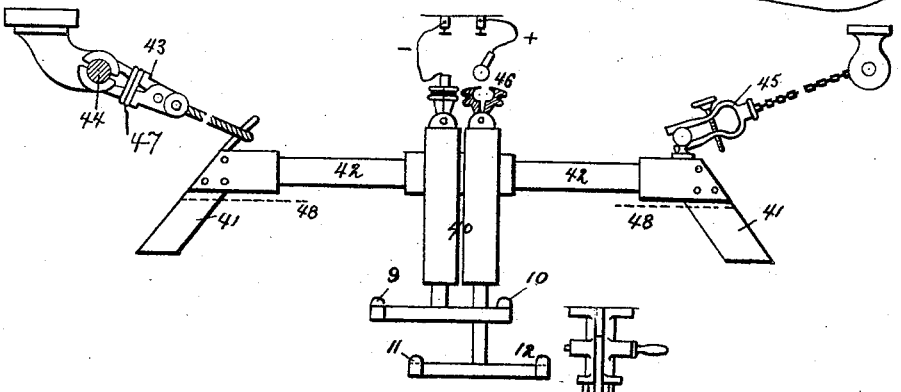


Fig. 6.

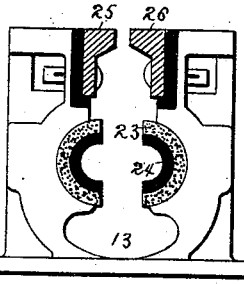
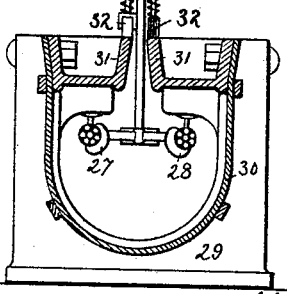


Fig. 7.



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UNITED STATES PATENT OFFICE.

MICHAEL HOLROYD SMITH, OF HALIFAX, ENGLAND.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 457,382, dated August 11, 1891.

Application filed December 16, 1887. Serial No. 258,100. (No model.) Patented in England October 24, 1883, No. 5,065; June 19, 1884, No. 9,163, and October 14, 1885, No. 12,230, and in Germany April 7, 1886, No. 39,079.

To all whom it may concern:

Be it known that I, MICHAEL HOLROYD SMITH, a subject of the Queen of Great Britain, residing at Halifax, in the county of York, England, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification.

My invention relates to electric railways, and more especially to that class in which the conductors carrying the electric current are arranged along the track, either supported overhead above the track or placed in conduits below the surface of the track, and in which the current is collected from said conductors by means of a traveling collector or trolley carrying contact devices bearing upon said conductors and connected to the car by automatically detachable connections; and my invention is embodied in the various forms of constructions and arrangements, substantially as more particularly pointed out hereinafter, some of which have been patented to me in British Letters Patent No. 5,065, of October 24, 1883; No. 9,163, June 19, 1884, and No. 12,230, of October 14, 1885, and in German Patent No. 39,079, dated the 7th day of April, 1886.

Referring to the accompanying drawings, forming part of this specification, Figure 1 is a transverse view of the conductors, showing the general arrangement thereof with relation to each other. Fig. 2 is a diagram illustrating a section of track. Fig. 3 is a plan view showing one form of trolley or collector in contact with the conductors. Fig. 4 is a side view of a trolley, showing the manner of connecting the same to the car. Figs. 5, 6, and 7 are transverse views showing various arrangements of conduits for supporting the electric conductors.

Heretofore in the construction of electric railways when two electric conductors have been used, one for the positive and the other for the negative current, they have been placed in the same horizontal plane, and the trolley or traveling collector has been provided with contacts insulated from each other and bearing, respectively, upon the opposite conductors. This arrangement, however, is open to some objections, especially when used in connection with turn-outs or loops in the road or track, as there is constant danger of the opposite conductors being brought in contact with each other and thereby produce a short circuit; and in order to avoid these difficulties I arrange the positive and negative conductors in different horizontal planes, preferably with one conductor directly over the other, and while it is not necessary to use more than a single positive and a single negative conductor, in some instances I have found it preferable to make use of two positive and two negative conductors, the positive and negative conductors being arranged in separate horizontal planes, as illustrated in Fig. 1, wherein 1 represents any form of conduit or inclosing case, whether for overhead or underground uses, in which 2 3 are the positive conductors arranged in one horizontal plane, and 4 5 are the negative conductors arranged in another horizontal plane, and 6 represents a trolley provided with collecting-shoes bearing upon each of these conductors and having terminals 7 8, one connected to the contacting shoe or shoes 9 10 on the positive conductors and the other connected to the contact shoe or shoes 11 12 on the negative conductors. While such an arrangement of circuits is useful in many instances, it is especially useful in connection with a loop-track, as shown in Fig. 2, as in this instance the traveling trolley 6 maintains its contact with the positive and negative conductors throughout all its course, and the reversal of the position of the shoes in going round the curve or loop does not reverse the current, nor does any arrangement have to be provided to overcome or prevent such reversal, as would be the case when two conductors were used with the positive and negative in the same horizontal plane.

Various arrangements of these conductors may be made, as will be evident to those skilled in the art; and while I do not wish to limit myself to any particular construction, I have shown, for instance, in Fig. 5, one form of conduit, in which 13 represents a chair or support, which may be of any material, but preferably of cast-iron, having an interior chamber in which is arranged a conductor, as 14, which may be used for the positive lead of the circuit, and which, if the chair is

of iron, should be insulated therefrom by insulating material 15, and which is shown in this instance as consisting of a hollow tube having a slot through which passes the connection of the trolley 6, carrying contact-pieces 16 17, (shown in this instance as connected with the trolley by spring connections 18,) and above this positive conductor in a different horizontal plane are arranged the conductors 19 20, which are shown in this instance as consisting of recessed bars of conducting material secured to the upper portion of the chair, and the shoes or contact-pieces 21 22 are connected with the trolley by spring connections, so that good electrical contact is always maintained between these conductors and the collectors. In Fig. 6 I have shown a similar arrangement, consisting of the chair or support 13, having supported therein two positive conductors 23 24, each of which is insulated from the chair, and above these positive conductors in another horizontal plane are arranged the negative conductors 25 26, which in this instance are formed so as to partially inclose the conduit, leaving a narrow slot or opening for the passage of the trolley or plow carrying the collectors or contact-pieces. In Fig. 7 I have shown another arrangement, in which one set of conductors 27 28, which may be the positive conductors, are supported from the roof of the conduit by suitable hangers, the conduit being formed of chairs or supports 29, connected together by casings of metal 30 or otherwise. The top of the conduit is partially closed by the angle-pieces 31, which are secured in the chairs in any suitable way, and these angle-pieces may form the other or negative conductor; and the trolley is shown as extending through the slit between these pieces and having contact-shoes contacting with the interior conductors, and is provided with any suitable contacting surfaces, as rollers or brushes 32, which may be spring-mounted, as shown, and connected to the trolley outside of the conduit and arranged to bear upon the adjacent surfaces of the angle-pieces. From these illustrations the scope of my invention in this regard will be understood as not being limited to any particular arrangement of conductors, whether there be two or more, or arranged inside or outside of the conduit, the essential and distinguishing feature being that the positive conductor or conductors and the negative conductor or conductors are arranged in different horizontal planes and occupy substantially the same vertical plane, and the trolley is provided with any suitable and desirable contact-shoes or collectors to make contact with these conductors.

While, as before stated, any suitable trolley may be used, I have illustrated in Fig. 4 one desirable form, in which the central or body portion 40 is arranged to pass through the slit and extend into the conduit, and through this portion pass the insulated conductors, which are respectively connected to the pa rs of contact-shoes or collectors 9 10 and 11 12, which are arranged in different planes to make contact with the respective positive and negative conductors. This trolley is provided with plows 41, which are also adapted to enter the slit of the conduit, and are connected to the main body 40 by flexible connections 42. This trolley may be connected in any suitable manner to the car; but in order to prevent damage or breakage of the parts, if from any reason the passage of the trolley through the conduit becomes obstructed, I make the connections between the trolley and the car of such a character that when the strain upon these connections exceeds a certain predetermined pressure they will automatically disconnect the trolley from the car, and the electric connections are also made in a similar manner, so that both the mechanical connections between the trolley and the car and the electrical connections between the same will become automatically detached without breaking any of the parts under these circumstances.

While various means may be provided to form these automatically-detachable connections, I have shown a clamp 43, consisting of two jaws adapted to embrace a pin or other extension 44 upon the car or trolley, and these jaws are held together under strain by some elastic device, as a ring 47, or the jaws may be springy material, as shown at 45, and in all instances they will securely clamp the projecting pin with sufficient strength for all ordinary purposes; but when the strain thereon is sufficient to cause damage to the parts they will yield and permit the trolley to be automatically detached from the car. I also provide the terminals of the electric connections with the motor on the car with similarly-constructed yielding joints, as shown at 46, and while I may make use of a single joint carrying both conductors properly insulated from each other I may also use two separate slip joints or connections, one for each of the conductors, as shown. In some instances the return current may pass directly from the under surface of the plow to the conductors, as 25 26, at the surface of the conduit, as indicated by dotted lines 48.

From the above it will be seen that the details of the construction of the trolley or the connections between the trolley and the car are not the essence of my invention, as they may be varied greatly without departing from the spirit thereof, the essential feature being that such connections are provided both mechanically and electrically, that when an undue strain is put upon them from any cause they will automatically detach themselves and the trolley and collectors or brushes will remain in the conduit and the car proceed without danger of breakage of any of the parts.

Without limiting myself to the precise construction shown, what I claim is—

The combination, in an electric railway, of

two parallel positive conductors in one horizontal plane, two parallel negative conductors in another horizontal plane, and cars carrying collectors arranged to make contact with all the said conductors simultaneously, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MICHAEL HOLROYD SMITH.

Witnesses:
HENRY W. AUBÉ,
WM. A. REDDING.