

(No Model.)

3 Sheets—Sheet 1.

H. C. CAMP.
ELECTRIC RAILWAY SYSTEM.

No. 462,688.

Patented Nov. 10, 1891.

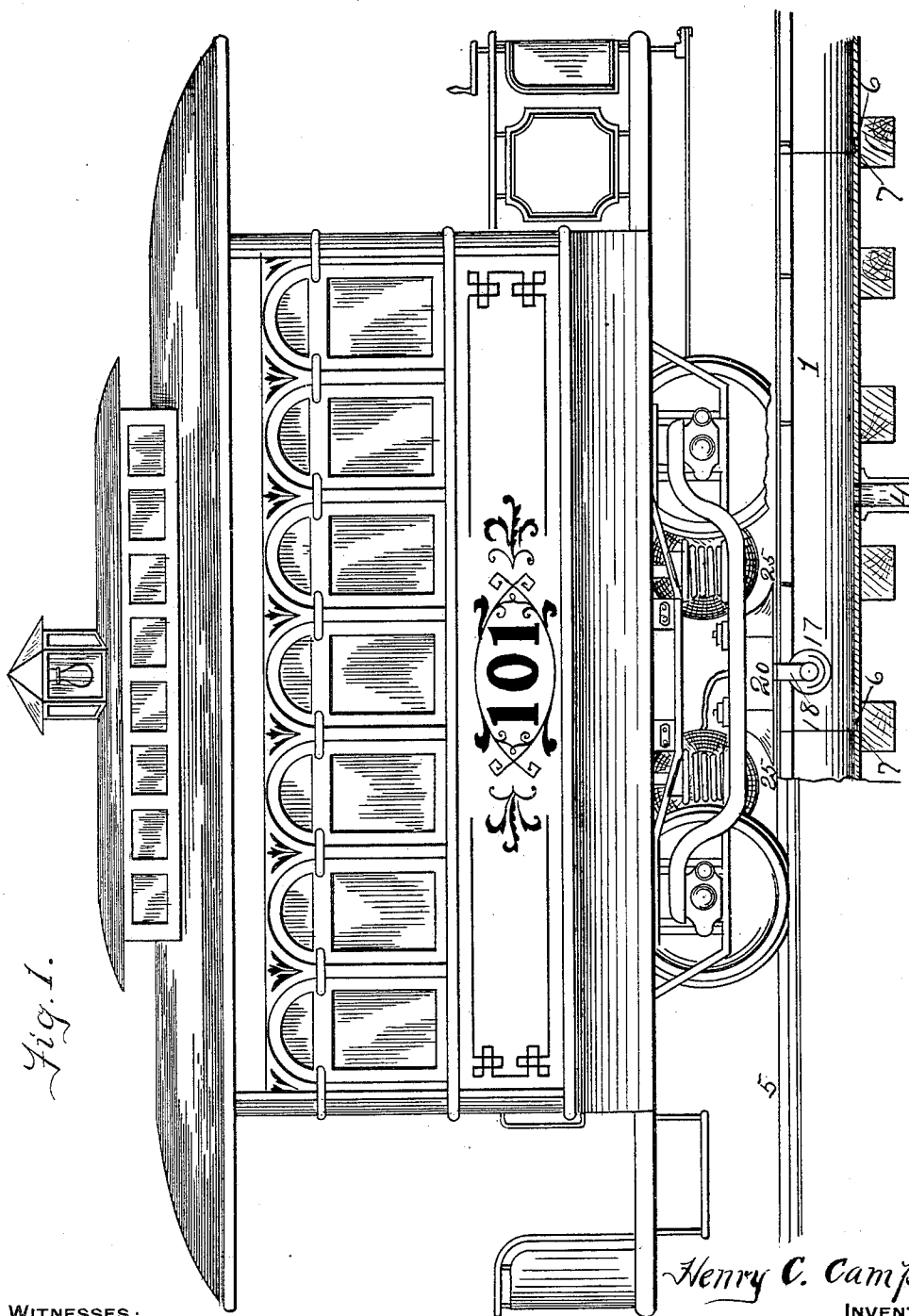


Fig. 1.

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Fig. 2.

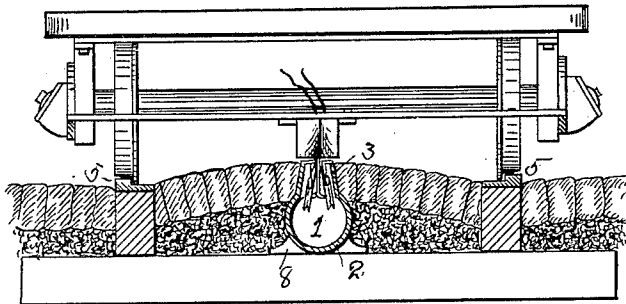
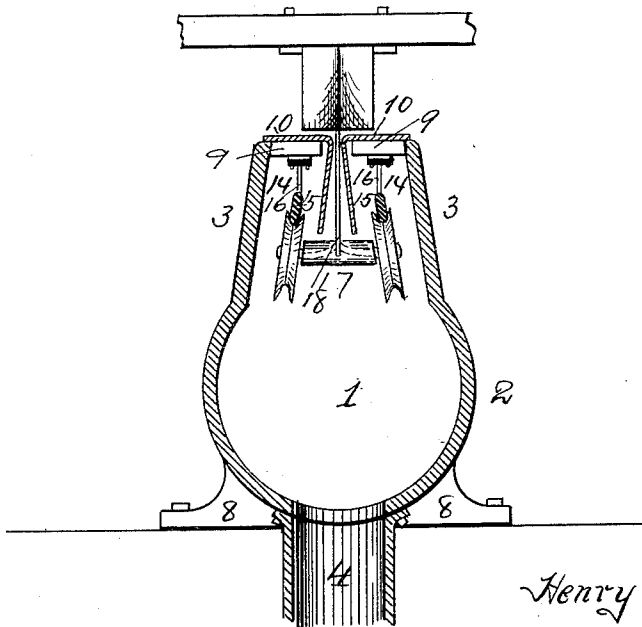


Fig. 3.



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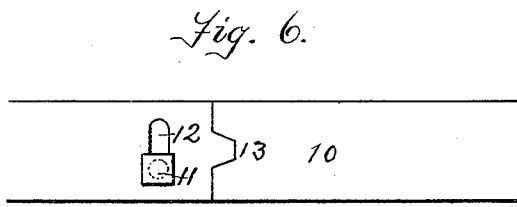
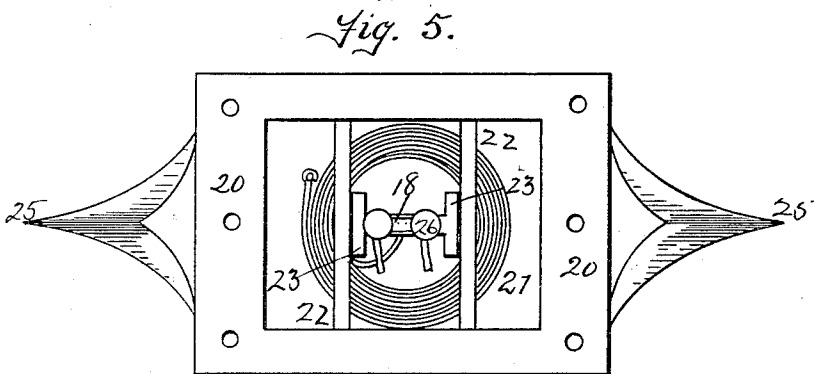
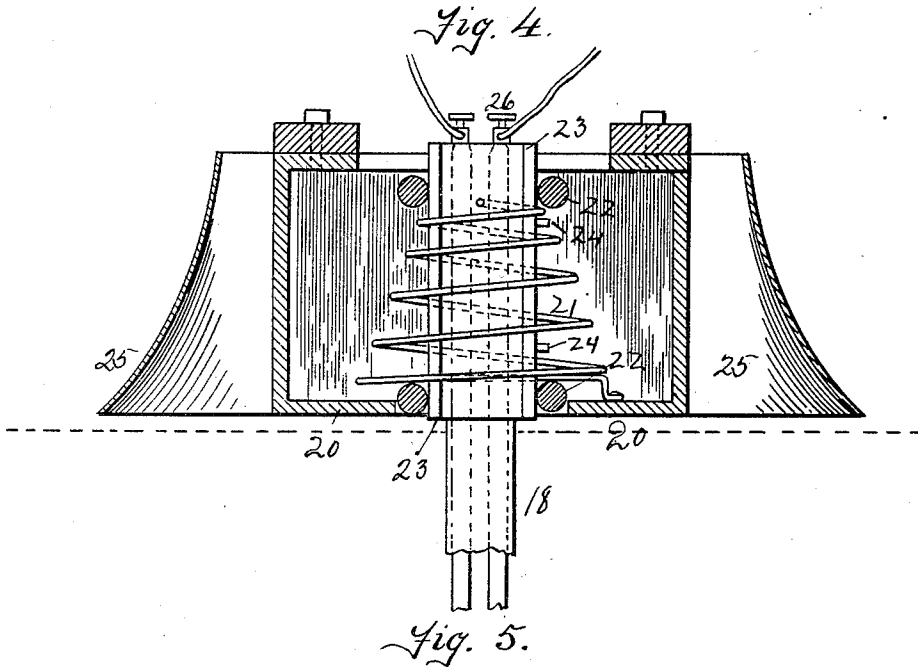
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UNITED STATES PATENT OFFICE.

HENRY C. CAMP, OF ST. PAUL, MINNESOTA.

ELECTRIC-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 462,688, dated November 10, 1891.

Application filed June 30, 1890. Serial No. 357,259. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. CAMP, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Electric-Railway Systems; 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 the figures of reference marked thereon, which form a part of this specification.

This invention relates to the construction of electric railways, and is of that particular class in which the electrical current-conductors are located underground in a suitable conduit or subway having means of access to the conductors therein for the purpose of gathering the current and completing the circuit with a motor carried by and operating the car.

The invention consists, generally, in the special construction of the conduit whereby the same may remain or be easily kept free from any foreign substances liable to impair the proper working of the conductors, and whereby the latter may be rendered easily accessible for purposes of construction and repair, and in the construction and arrangement of the traveling conductor and its adjacent parts and connections, whereby its constant and equal contact with the fixed conductors may be maintained regardless of any lateral or other motion of the vehicles due to inequalities in the track, unevenness of load, or other causes.

The invention will be more fully described with reference to the accompanying drawings, in which—

Figure 1 represents a longitudinal section of the conduit, showing the traveling conductor and its point of attachment to the car in elevation. Fig. 2 is a cross-section of the road-bed and conduit, showing a portion of the car and the means of attachment of the traveling conductor; Fig. 3, a similar view on an enlarged scale; Fig. 4, a longitudinal section of the trolley-support, showing the flexible attachment of the latter; Fig. 5, a plan view of the same, and Fig. 6 a detail of a por-

tion of the top of the conduit and the removable cap-plates of the same.

The conduit 1 may be located at any convenient point with reference to the rails, but is preferably secured upon the ties intermediate between the rails. The conduit is formed in sections of any desired length, and its form is generally pear-shaped, having a lower portion 2 embracing the greater part of a perfect circle when viewed in cross-section, and having sides 3 3 arising from the termination of the circular part at a slight inward inclination to the vertical. The lower curved part affords an open space adapted to receive any foreign substances which may find their way into the conduit, and from which they may readily flow or be swept by means of a revolving brush attached to the car or otherwise. At suitable points, as at the lowest points in the general grade of the track, outlets, as 4, may be formed, whence such substances may be conveyed away by connection with the sewer or otherwise.

The height of the conduit is preferably such as to be on a level with or a little above the level of the tread of the rails 5 5, as shown, and the different sections are united to form a close joint by means of a tongue 6, formed upon the extremity of one section, which fits a corresponding groove or rabbet 7 in the adjacent end of the next section. Each section may be formed by casting or otherwise in a single piece, having exterior lugs 8 at the base forming feet, by means of which it may be bolted, spiked, or otherwise secured to the cross-ties, or the sections and supports may be formed separately, the latter constituting a part of a bracket or chair in which the body of the conduit rests.

The material may be wood, metal, pottery, or the like; but cast-iron is considered to be the most advantageous material for the purpose, as affording the greatest degree of strength in proportion to first cost.

At the upper edges of the inclined side walls 3 3 of the conduit are formed inwardly-projecting lugs 9 9 at short distances apart and extending so far inwardly as to leave a space of about an inch and a half between the lines of the inner ends of opposite lugs, and to these lugs are secured the cap-plates 10 10, forming

the top and defining the slot of the conduit. These cap-plates are of angular form in cross-section, and the angle between the two parts is such that when one side of the plate is in place, with its inner face resting upon the top of the lugs 9, its other side will extend downwardly into the conduit at a slight inclination to the vertical toward its respective side of the conduit. Both cap-plates being in such position, a slot is formed communicating with the interior of the conduit, whose smallest width is at its upper and outer part, and the space between the inwardly-extending wings of the cap-plates is substantially of inverted-V shape in cross-section. The cap-plates are secured to the lugs 9 9 by means of bolts or similar fastening devices, and for the purpose of varying the width of the slot at will, as occasion may require, the said bolts 11 pass through cross-slots 12 in the horizontal wing of the plate, so that by loosening the bolt the position of any plate or plates may be readily varied. The meeting ends of adjacent plates are preferably also united by means of a vertical tongue-and-groove joint 13, as shown in Fig. 6, in order that the end of neither plate may extend into the slot farther than the other. The downwardly-extending wings of the cap-plates, which should not extend so far as to cut the circle of the lower part of the conduit, together with the side walls of the upper part of the conduit, form a pair of chambers 14 14, accessible normally only from below, and in these chambers are located the permanent current-conductors 15. The object of making the cap-plates so as to be readily removable will now be apparent, since their removal affords access to the whole interior of the conduit, enabling the easy adjustment and repair of the same or the conductors therein. The conductors are hung by insulated supports 16 from the lugs which support the cap-plates or from the sides of the conduit, preferably the former, and at such a point as to lie above the plane of the lower edge of the depending wings of the cap-plates. They are thus prevented from obstruction or interference by foreign substances of every kind, while the tendency of the inverted-V-shaped slot is to direct to the bottom of the conduit any substance entering the narrow mouth of the same.

Connection is made between the permanent conductors and the motor upon the car by means of any suitable form of traveling conductor, preferably a double trolley 17, having one contact for gathering the live current and a second for forming the connection with the return-wire. The two contacts are connected with the motor by wires insulated from each other and passing through an arm or sheath 18, forming the trolley-arm and adapted to run in the conduit-slot. The thickness of this arm 18 need not exceed one-quarter of an inch, its width being as great as desired, and the portion of the wires pass-

ing therethrough may be flattened for this purpose. Hence the width of the slot need not exceed three-eighths of an inch, and the liability of obstruction of the conduit is reduced to a minimum.

The trolley-arm is attached to the car in such a manner as not to be interfered with by reason of the lateral motion of the car in the following manner: To some convenient portion of the truck, preferably at a central point and upon cross-bars extending from one side bar of the truck to the other, is secured a box-shaped bracket or support 20, as shown in detail in Figs. 4 and 5. Through a cross-slot in the otherwise closed bottom of the same extends the trolley-arm 18, which may be enlarged at this point to any desired size. The arm is flexibly supported therein by means of a spiral spring 21, surrounding the same, which is made to exert a lifting force thereupon by resting upon the base of the support and having its upper end attached to the arm 18, and the arm is further prevented from any forward and backward movement by means of guides 22, preferably in the form of rollers to reduce friction, against which bear the front and rear edges of the arm. These bearing-faces may be widened by side lips or flanges 23 to afford a broader bearing-surface upon the guides. The vertical movement of the arm is limited to a certain extent by means of stops 24, and in order to allow the utmost freedom in the lateral movement of the car without disturbing the arm the spring 21 is made of conical form having its broadest part at the base. The slot in the base of the support is of sufficient width so that no amount of lateral movement of the car short of derailment can throw the sides of the support against the arm. The support 20 is so hung as to barely clear the plates forming the sides of the slot for the purpose of affording a support for the arm at as low a point as possible, and upon the front and rear ends of the same are secured or formed plow-shaped extremities 25 to assist in throwing obstructions from the mouth of the slot.

The entire trolley-support may be readily removed from the car by the removal of the bolts, by means of which it is secured to the cross-bars upon the truck, and to this end the conductors should be separable at the upper end of the trolley-arm. Binding-posts 26 may be fixed thereon for this purpose, by which arrangement the connections may be easily made or broken. The height of the trolley-support should not exceed the height of the car-axes from the ground, in order that when disconnected the car may be removed from above the same.

Switches and crossings may be provided for in any desired or well-known manner. For this purpose the continuity of the path of the conductors may be broken for a short distance, either by placing in a recess in any part of

the conduit or outside of the same. The momentum of the car will suffice to carry the trolley across the intervening distance and without disturbing the movement of the car.

5 For purposes of insulation the interior of the conduit and the cap-plates, as well as any other portion where it may seem desirable or necessary, may be covered with a heavy coat of coal-tar or substance having similar non-
10 conducting properties.

I claim as my invention—

1. The combination, in a conduit for the conductors of electric railways, of the side walls of the conduit at a greater distance
15 apart than the proposed width of the slot, inwardly-extending lugs formed at the upper edge of said side walls, angular cap-plates having one wing adjustably secured to said lugs and forming chambers upon each side
20 of the upper interior of the conduit, and current-conductors suspended from said lugs in such manner as to lie above the plane of the lower edges of said depending wings, substantially as and for the purpose herein specified.

25 2. In an electric railway, the combination of the slotted subway or conduit, and current-conductors supported therein, contacts carried by an arm adapted to travel in said slot, a spring attached to the upper part of said
30 arm, a bracket carried by the truck of the car and supporting said spring, and guides carried by said bracket in front and rear of

said arm, substantially as and for the purpose herein specified.

3. In an electric-railway car, the combination, with the contact-arm, of a bracket carried by the car-truck for sustaining said arm, a spring for lifting said contact-arm to hold its contact-wheels or brushes against suitable
40 conductors, the said bracket having a slot in which said arm is free to play from side to side, and guides permitting up-and-down but preventing forward and backward movement of the arm, substantially as specified.

4. In an electric-railway car, the combination, with the contact-arm, of a bracket carried by the car-truck for sustaining said arm, guides carried by said bracket, in which said arm is adapted to play up and down and from
50 side to side, but prevented from backward and forward movement, and a spiral spring for lifting said arm to hold its contact-points against suitable conductors, the said spring being of conical form, whereby its lower part affords no hinderance to the free movement of
55 the arm, substantially as and for the purpose herein specified.

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

HENRY C. CAMP.

Witnesses:

J. B. JETT,

F. W. LANE.