

(No Model.)

3 Sheets—Sheet 1.

D. MASON.
CONDUIT ELECTRIC RAILWAY.

No. 530,543.

Patented Dec. 11, 1894.

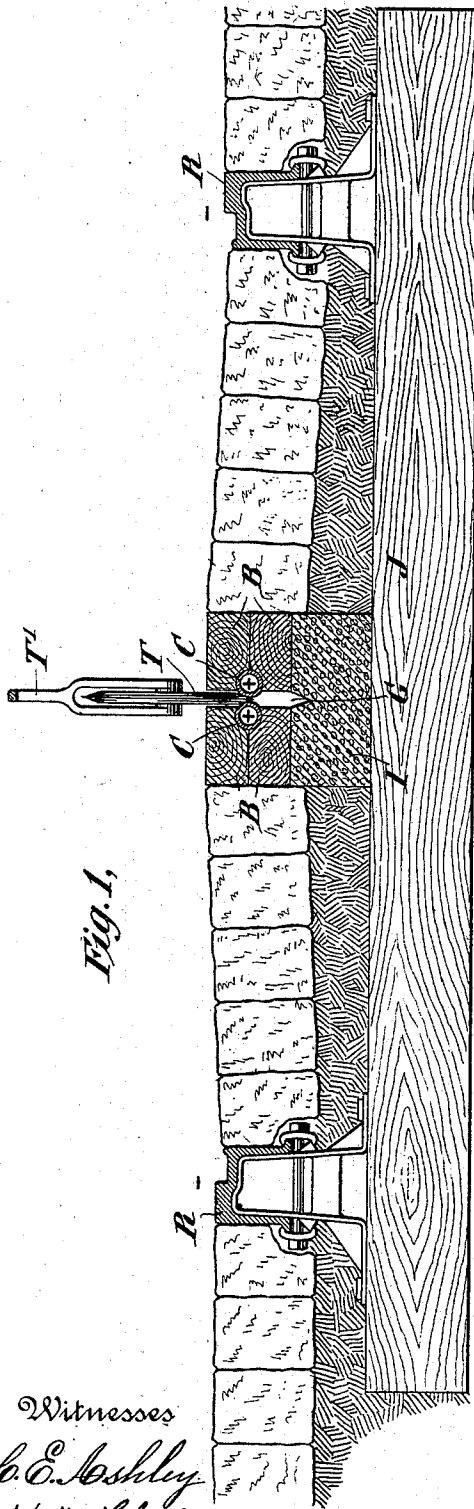


Fig. 1,

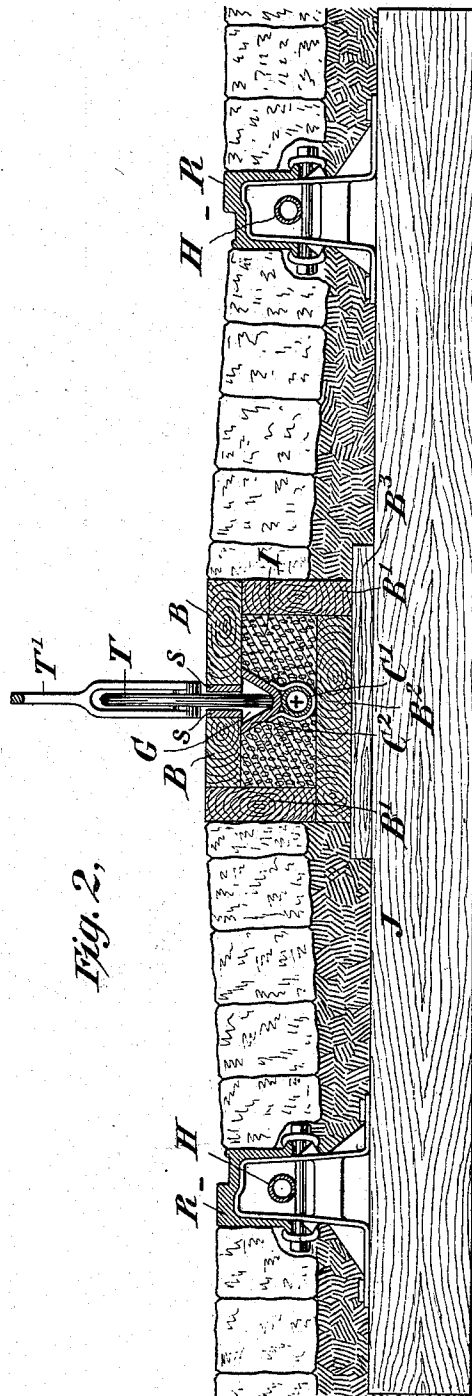


Fig. 2,

Witnesses
C. E. Ashley
H. W. Lloyd

By his Attorney

David Mason
Charles J. Kintner

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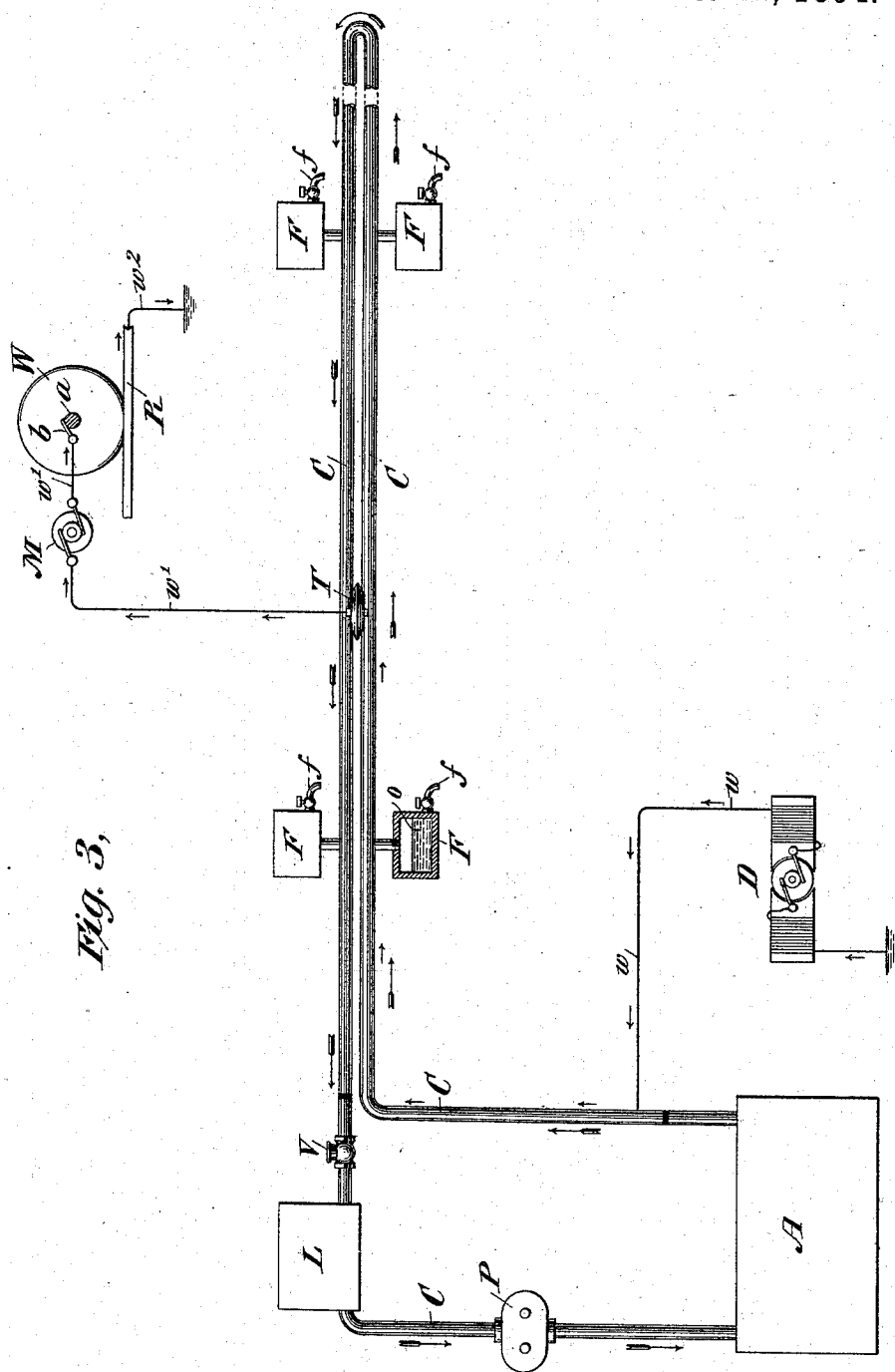


Fig. 3,

Witnesses
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J. W. Lloyd.

Inventor
David Mason
By his Attorney *Charles J. Kintner*

(No Model.)

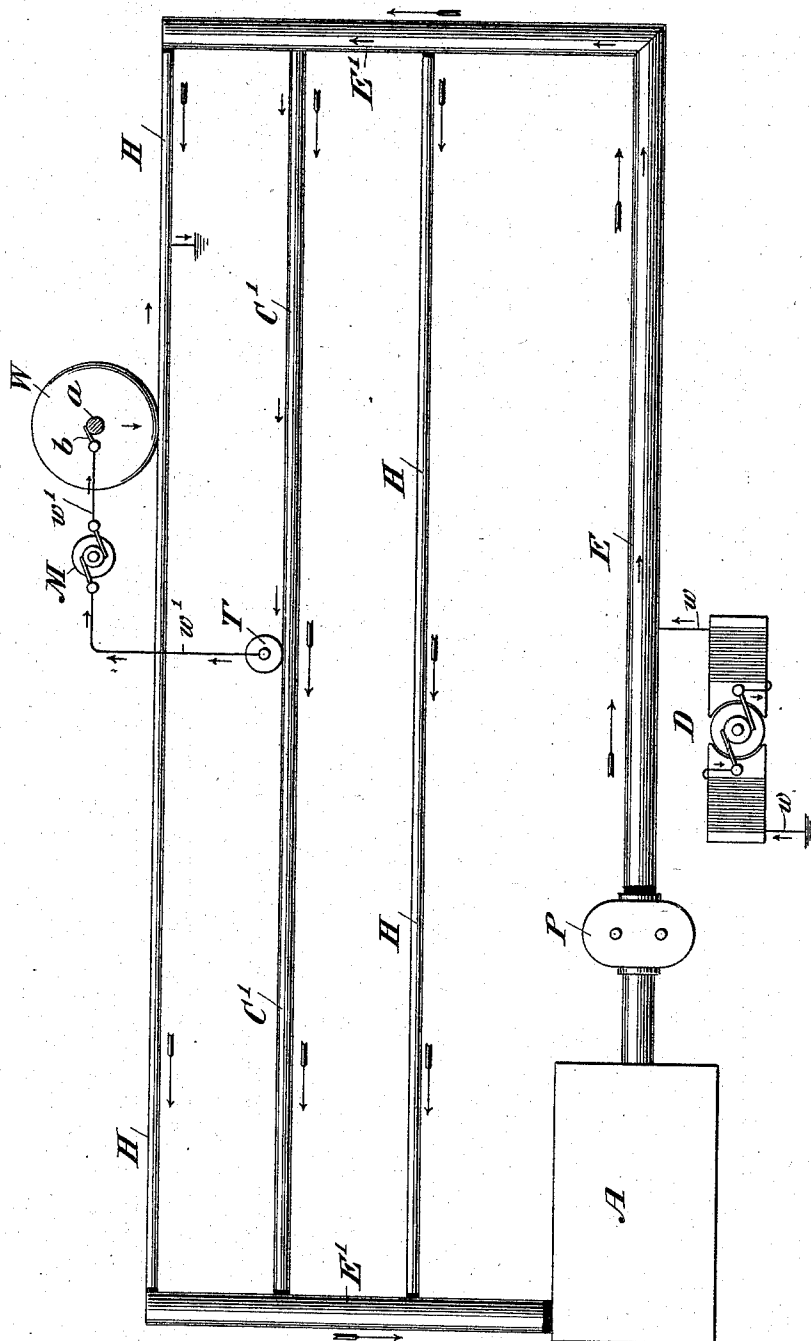
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Fig. 4.



Witnesses

C. E. Ashley
H. W. L. Byrd

Inventor

By his Attorney David Mason
Charles J. Kintner

UNITED STATES PATENT OFFICE.

DAVID MASON, OF SCHENECTADY, NEW YORK.

CONDUIT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 530,543, dated December 11, 1894.

Application filed June 8, 1893. Serial No. 476,917. (No model.)

To all whom it may concern:

Be it known that I, DAVID MASON, a citizen of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have made a new and useful Invention in Electric Railways, of which the following is a specification.

My invention relates particularly to improvements in electric railways of the conduit type in which the current mains or leads are located beneath the roadway, and its objects are, first, to afford better insulation for systems of this general nature than is ordinarily effected with existing structures of a kindred nature; second, to afford a simple and efficient means for removing snow and ice, not only from the vicinity of the trolley conductors but also from the tramway rails. I accomplish these results by the use of heat conveying tubes located in the road-bed near the conductors and the tramway rails, or in fact said tubes themselves may constitute the actual trolley conductors either in part or in whole and through these tubes I cause to flow continuously either heated liquids, gases, or the like, heated at a fixed point to such a temperature as will readily drive away all moisture in the vicinity of the conductors; or the heat conveying tubes may be located directly in a conduit in close proximity to the trolley conductor or conductors so as to afford sufficient heat to keep the same perfectly dry.

My invention will be fully understood by referring to the accompanying drawings which illustrate modified forms of the apparatus, and in which—

Figures 1 and 2 are cross sectional views taken through the road-bed representing two such specific forms. Fig. 3 is a part diagrammatic, part sectional view illustrating the manner of carrying out my invention, and Fig. 4 is a modified form of an equivalent system coming within the scope of my claims.

Referring now to the drawings in detail and first to Fig. 1, J represents the cross-ties, and R the rails of an ordinary tramway resting upon chairs secured to the cross-ties in the usual manner. The road-bed is ballasted and paved in the usual manner, and near its center are located two pairs of wooden timbers B B

which are creosoted or otherwise impregnated with insulating material. Between these pairs of timbers are held in grooves of the proper dimensions, two pipes or tubes C C located at a sufficient distance apart to receive the trolley wheel T supported by a trolley arm T' carried by the car or vehicle in the usual manner. The timbers B B rest upon a cement or other solid road-bed I which is provided with a groove G of sufficient capacity and pitch to carry off any water which might flood the slit. One of these pipes C is connected at the power house directly with a source of heat energy as a steam boiler and includes also a force pump, the other pipe being connected to the steam boiler at another point, and the two constituting a complete return circuit for the steam, hot water, oil, or other heating agent as will be more fully described in connection with the description of Figs. 3 and 4. The pipes C constitute also the current feeder or main for the trolley as is illustrated in Fig. 3.

In Fig. 2 I have shown a single pipe C' embedded in concrete beneath a grooved trolley channel C² of metal which is also supported in the concrete I, the pipe C' and the grooved channel C² being metallically united together as far as possible to give better heat conducting capacity. The concrete I is surrounded by creosoted or insulated timbers B' B' which rest upon blocks B³ carried by the cross-ties J. The return pipes H in this instance are located beneath the rails R R for the purpose of utilizing the heat in melting snow and ice which may accumulate upon the tracks in winter time.

s s are metallic guard bars secured to the top timbers B B for preventing any unnecessary wear thereof. The electrical and steam pipe connections in both Figs. 1 and 2 are substantially as shown in Figs. 3 and 4, which figures will now be described.

A represents a boiler or other heat generating source to one end of which the outgoing pipe C is connected, but electrically insulated therefrom as shown.

D is a dynamo electrically connected at one pole to the earth and at the other to either or both of the pipes C.

L is a condenser designed to condense the steam as it returns to the power house.

P is a pump for forcing the water which accumulates in the condenser L back into the boiler A.

F F are catch pits or chambers for receiving any condensed vapor *o* which accumulates along the line of the pipes, and *f f* are cocks for drawing the same therefrom.

T represents a trolley and *w'* the conductor running therefrom through the motor M, brush *b*, axle *a*, and wheel W to the rail R of the tramway which is connected by conductor *w*² to earth.

The condenser L, the pump P, the boiler A, and the dynamo D are all located at the power house as shown in Fig. 3, and either one or both of the pipes C may constitute the trolley conductor as shown in Figs. 3 and 4.

Instead of locating the condenser, the pump and boiler A at the power house the entire system may be divided into sections and provided with independent apparatus of like nature for each section located wherever deemed desirable throughout the system; as for instance at low places where the conduit is liable to be often submerged.

The operation of this apparatus is as follows: Steam having been generated in the boiler A is forced in the direction of the arrows through the pipe or tube C over the entire route ultimately finding its way back into the condenser L when the stop cock V is turned in the proper direction. Consequently the pipes C are heated to such temperature that the timbers B and concrete I are rendered absolutely dry and therefore free from permitting any current leakage. Should any moisture accumulate at various points along the route it may be drawn off at will from the catch pits F located in man-holes beside the conduit. I have found that with such a system even in the most violent winter weather it is possible not only to free the conduit from snow, ice, and water to render it absolutely electrically perfect, but also to free the rails from moisture and maintain the entire road-bed perfectly dry at all times.

In the modified form of apparatus shown in Fig. 4, P is a pump and A a boiler, while E is a main or supply pipe which conveys the heated liquid or gas to the multiple arc return system of pipes H H and C', the central pipe C' being electrically connected to the main supply pipes E and E', while the two side pipes H are located beneath the rails R as shown in Figs. 2 and 4, or the rails themselves may be tubular in form for the purpose of conveying the heated liquid or gas back to the boiler or heating chamber A. With this system it will of course be necessary, however, to carefully insulate the main or feeder pipe E from the return or rail pipes H H and boiler A as is clearly shown.

I do not limit myself to either of the special

forms of apparatus herein shown and described as I believe it is broadly new with me to heat both the road-bed and the conducting mains or leads which supply the current directly to the trolley wheel of an electrically propelled conveyance, and also that it is broadly new with me to utilize a heat conveying tube directly as a trolley conductor, and my claims are generic in these particulars.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In an electric railway system a tubular or hollow trolley conductor, in combination with means for heating and forcing liquids, vapors, or gases through it, substantially as described.

2. In an electric railway system a tubular or hollow current main, in combination with an electrical generator connected thereto and means for heating and forcing liquids, vapors, or gases through it.

3. In an electric railway system one or more tubular or hollow conductors located in a slitted conduit and operatively connected to a source of electrical energy, in combination with means for heating and forcing liquids, vapors, or gases through said tube or tubes, substantially as described.

4. In an electric railway system one or more pipes or tubes embedded in insulating material in a slitted conduit, an additional pipe or tube located beneath each tram rail, in combination with means for heating and forcing liquids, vapors or gases through the pipes, substantially as described.

5. In an electric railway system one or more hollow or tubular conductors connected to a source of electrical energy and extending over the entire route, in combination with means for heating liquids, vapors or gases and forcing the same through said pipe or pipes, substantially as described.

6. In an electric railway system one or more hollow or tubular trolley conductors held in a slitted conduit in close proximity to the surface of the road-bed, in combination with an electrical generator connected thereto and an apparatus for forcing heated liquids, vapors or gases through said hollow or tubular conductors, substantially as described.

7. In an electric railway system one or more hollow or tubular conductors held between one or more pairs of insulating supports in close proximity to the surface of the road-bed, an electrical generator connected thereto and a heating apparatus adapted to force heated liquids, vapors or gases there-through, substantially as described.

8. In an electric railway system a two-part tubular trolley conductor held in insulating supports near the surface of the road-bed, in combination with an electrical generator connected thereto and an apparatus for heating

liquids, vapors or gases, said apparatus being connected directly to said tubular conductor, substantially as described.

5 9. In an electric railway system a two-part tubular conductor held in a slitted conduit, in combination with a trolley adapted to bear upon both of said tubular conductors, and means for heating and forcing liquids, vapors

or gases through said tubes, substantially as described.

In testimony whereof I have hereunto subscribed my name this 7th day of June, 1893.

DAVID MASON.

Witnesses:

C. J. KINTNER,

M. M. ROBINSON.

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