

(No Model.)

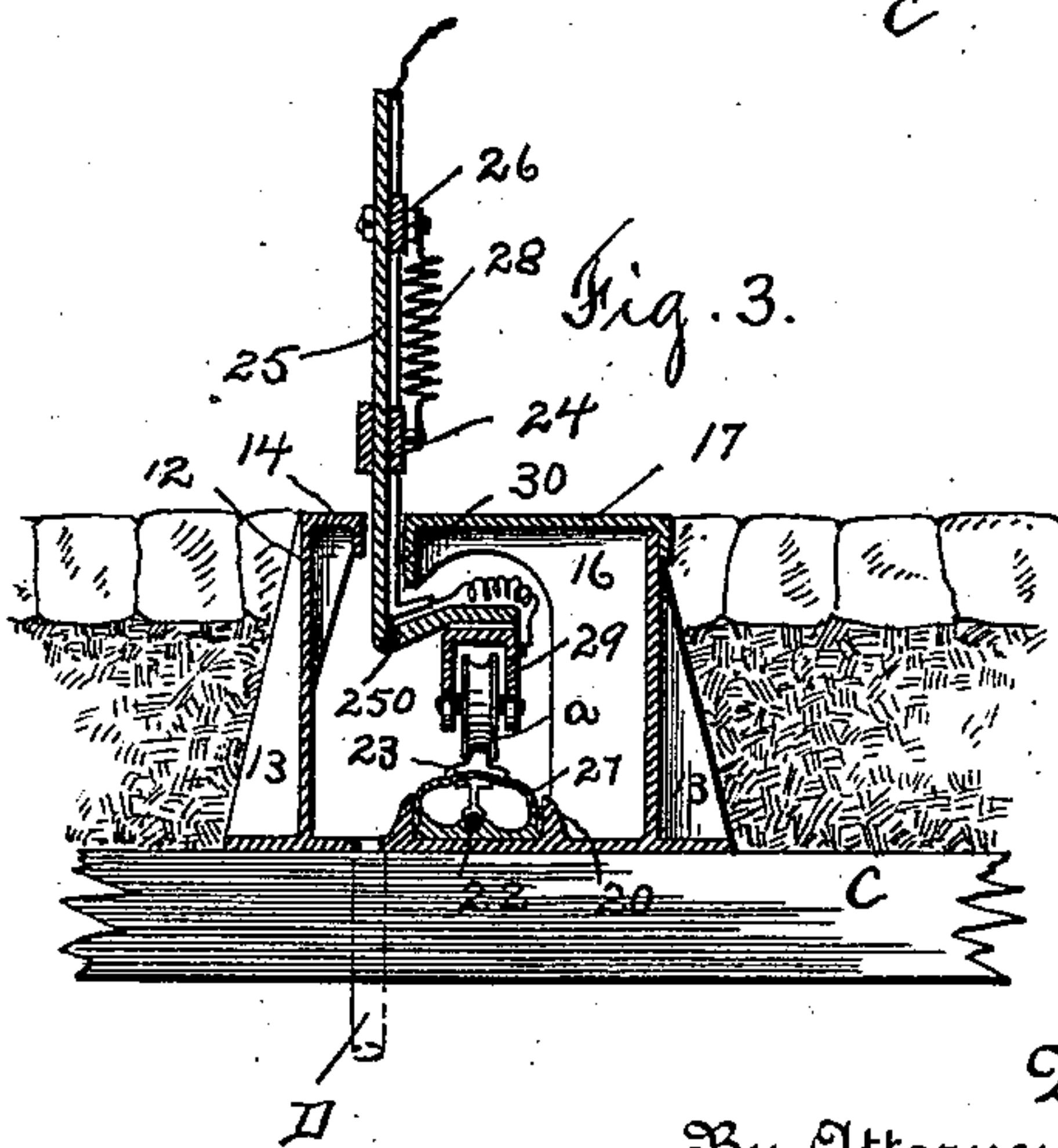
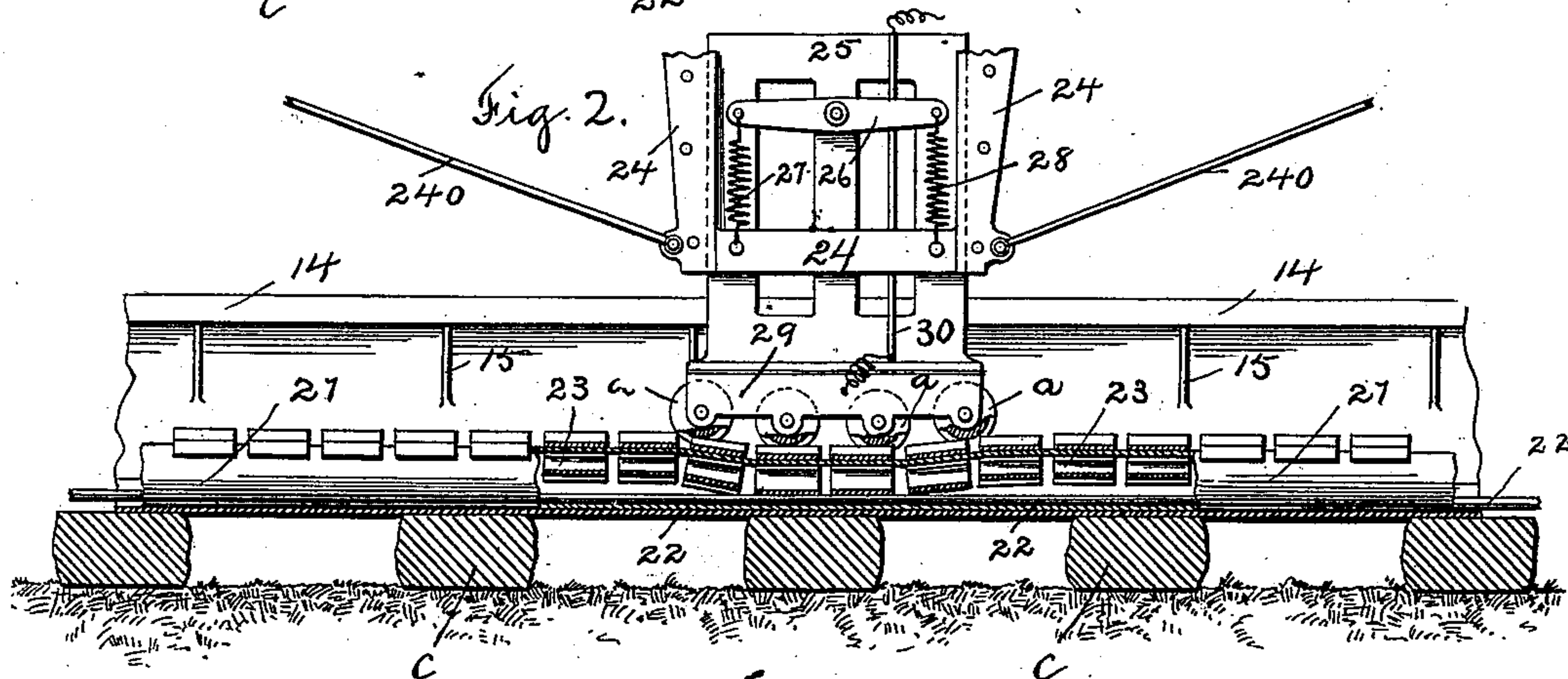
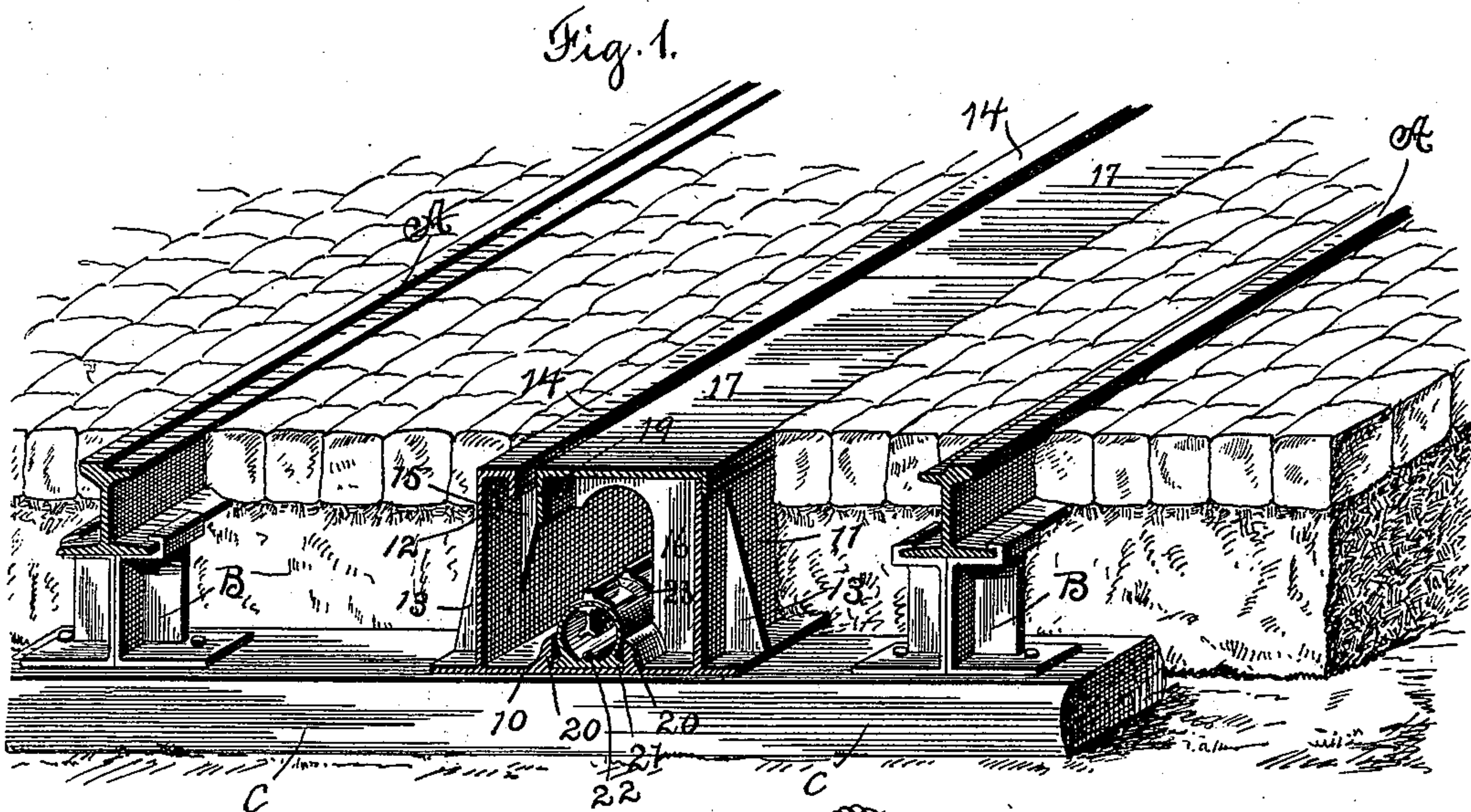
2 Sheets—Sheet 1.

W. E. STEARNS.

# CLOSED CONDUIT FOR ELECTRIC RAILWAYS.

No. 528,494.

Patented Oct. 30, 1894.



Witnesses  
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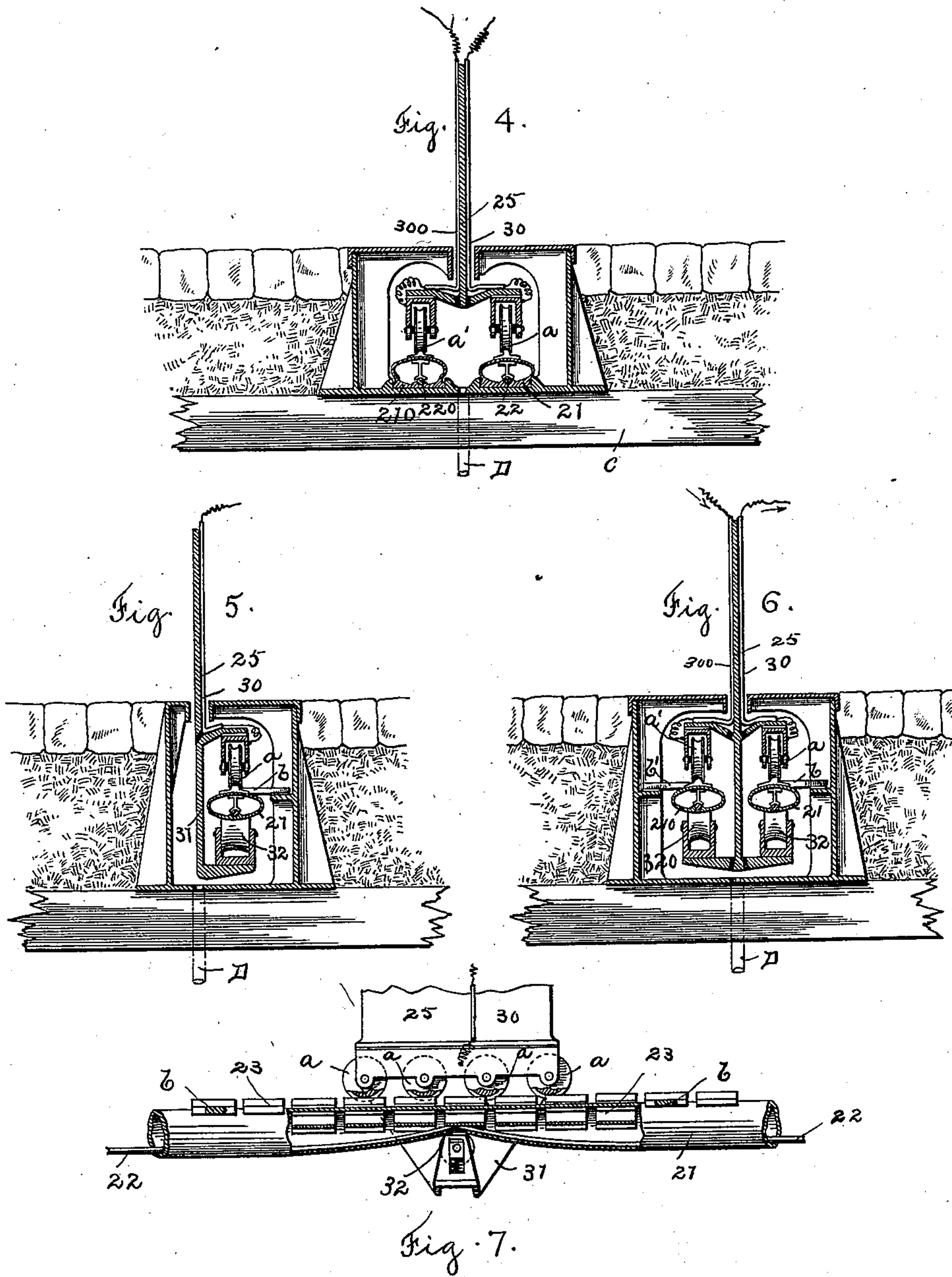
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2 Sheets—Sheet 2.

W. E. STEARNS.  
CLOSED CONDUIT FOR ELECTRIC RAILWAYS.

No. 528,494.

Patented Oct. 30, 1894.



Witnesses  
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# UNITED STATES PATENT OFFICE.

WILLIAM E. STEARNS, OF BERLIN, CONNECTICUT, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-THIRD TO DAVID L. BRADT, JOHN P. COGLIN, AND FRANK O. PLUMMER, OF WORCESTER, MASSACHUSETTS.

## CLOSED CONDUIT FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 528,494, dated October 30, 1894.

Application filed April 7, 1894. Serial No. 506,767.. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM E. STEARNS, a citizen of the United States, residing at Berlin, in the county of Hartford and State of Connecticut, have invented a new and useful Improvement in Conduit-Electric-Railway Systems, of which the following is a specification.

My invention relates to that class of electric railways, in which electric wires or conductors are located in conduits, and are connected to the cars by any suitable form of trolley.

In the construction of this class of railways, great difficulty has been encountered on account of leakage from electric conductors, and on account of various short circuits, which have arisen through the presence of moisture and other unfavorable conditions incident to the location of the conductors.

The object of my invention is to provide an electric railway system in which the electric wire or conductor is entirely inclosed in an insulating envelope, the envelope being provided with means for intermittently making contact; and to these ends, my invention consists in the parts and combinations of parts as hereinafter described, and more particularly pointed out in the claims at the end of this specification.

In the accompanying two sheets of drawings, Figure 1 is an isometric view of a section of the tracks and under ground conduit constructed according to my invention. Fig. 2 is a longitudinal, sectional view of the same, showing one form of trolley which I may employ. Fig. 3 is a transverse sectional view, and Figs. 4, 5, 6 and 7 illustrate modified forms of construction.

Referring to the drawings and in detail, A designates the tracks or rails, and as shown in the drawings, the rails may be of the ordinary grooved form, and may be located flush with the pavement or surface of the road.

The rails A are supported by suitable chairs or supports B, which rest upon and are fastened to the ordinary sleepers C.

The form of conduit which I employ in my improved electric railway system, is preferably comparatively shallow, and may simply

rest upon or be supported by the ordinary sleepers, but a deeper conduit can be used, if preferred.

As shown most clearly in Fig. 1, the conduit is constructed of a base or plate 10 having side plates 11 and 12 cast integrally therewith or secured thereto, the side-plates being strengthened or stiffened by means of the ordinary flanges or webs 13.

The side-plate 12 is bent or extended over, and is provided with a lip or downwardly extending portion 14, which forms one side of the groove or slot for receiving the trolley, the lip 14 being stiffened and supported by suitable small webs or flanges 15.

Extending up from the base-plate 10, and connected to the side-plate 11, I provide suitable webs or flanges 16, which extend up, and are arched over to support suitable top plates or covers 17, which preferably are formed in short sections, and form the removable cover plates for the conduit.

Resting in the bottom of the conduit, and secured in place by the lugs or ridges 20 formed with the base plate 10, I secure an electric conductor, which is constructed of an insulating envelope 21 having an electric wire or conductor 22 located therein, the envelope 21 being provided with contact strips or pieces 23 for making an intermittent connection with the conductor 22, as more fully described and set forth in my application, Serial No. 505,621, filed March 29, 1894.

With a conduit thus constructed, any desired or approved form of trolley or slider may be employed.

The form of trolley which I preferably employ is shown most clearly in Figs. 2 and 3. In these figures, 24 designates a suitable guide plate or bracket, which may be secured to any convenient part of the car, and which is braced or stiffened by means of the brace rods 240. Mounted in and guided by slots in the guide way 24, I provide a trolley plate or bracket 25. A yoke or equalizer 26 is pivoted to the trolley plate 25, as shown, and suitable springs 27 and 28 are connected to the equalizer and to the guide plate, for normally forcing down the trolley plate 25. In order to prevent the water and moisture which



may collect upon the trolley plate 25, from running down and following the same so as to interfere with the electric connections, the trolley plate 25 is offset or bent down, and provided with suitable drainage orifices as 250, as shown most clearly in Fig. 3. A yoke or bracket 29 is secured to and supported by the trolley plate 25, but is properly insulated therefrom, as shown most clearly in Fig. 3. Mounted or journaled in the bracket 29, I provide a series of trolley wheels *a*, the exterior or end trolley wheels being located slightly above the center trolley wheels, in order to provide an easy movement as the trolleys run over the compressible electric conductor.

In order to prevent the trolley wheels from being thrown off the contact strips of the conductor by any slight lateral or swaying motion of the trolley, the trolley wheels are preferably fitted loosely into the bracket 29, and may have a short transverse motion upon their arbors, as shown most clearly in Fig. 3.

As shown in the drawings, the wire for taking the current from the conductor passes through a suitable pipe 30, which is supported by the trolley plate, and is connected at its end to the insulated bracket or bearing piece 29.

The conduit of my improved railway system may be drained in any of the ordinary or preferred manners and as shown in Fig. 3, I may provide drainage pipes *D*, as shown by dotted lines, which may be connected with the sewer in the ordinary manner.

The operation of my improved system is thought to be obvious, and need not be explained at length.

The trolley, which is secured to the car, presses down, or compresses a section of my improved conductor, and one or more of the contact strips 23 are brought into contact with the electric wire or conductor 22.

As soon as the car has passed, the conductor again assumes its normal position, and the electric conductor or wire is maintained in an insulated condition until the trolley again passes over it.

In Fig. 4, I have illustrated the construction which I preferably employ when a two-wire or return circuit system is desired. In this construction, instead of utilizing the tracks or ground for completing the circuit of my electric railway system, I provide a return wire or conductor, which is of a similar construction to that heretofore described. In Fig. 4, the current passes from the electric wire or conductor 22, inclosed in an envelope 21, as heretofore described, through the contact pieces, the trolley wheels *a*, and through an insulated wire, which is inclosed in a pipe 30, the circuit being completed through the car, and through an insulated wire which is brought down through a pipe 300, and is connected to the trolley wheels *a'*, which co-operates with a second or return conductor formed by the electric wire or conductor 220 mounted in the compressible envelope 210.

In the single wire system and in the double wire system, that I have thus far described, my improved compressible conductor has been shown as secured in the bottom of the conduit, and the trolleys have been arranged to press down the contact strips, carried by the compressible envelope, into contact with the electric wire or conductor, which is inclosed therein.

In some cases, it may be desirable to maintain the contact strips in a straight line, and to intermittently move the electric conductor into contact with the contact strips, and I have illustrated such constructions in Figs. 5 to 7 inclusive. In Fig. 5, I have illustrated a single wire system showing this modified form of construction.

In the drawings, 21 designates the compressible envelope for the electric conductor, which is constructed as heretofore described, and is hung from the side of the conduit by means of suitable support *b* secured to a flange in the side of the conduit, the supports *b* being maintained in a properly insulated condition.

The trolley wheels *a* and their connections are substantially the same construction as that heretofore described, except that the trolley wheels are set in line, and need not again be described at length.

The trolley plate 25 is extended, however, to near the bottom of the conduit, as shown at 31, and is provided with a bracket in which are pivoted one or more idler rollers or compressing wheels, which are journaled in spring-pressed boxes, as shown most clearly in Fig. 7, and are adapted to engage the under side of the compressible conductor, to raise the electric wire or conductor into contact with one or more of the contact strips, which are maintained in the same horizontal line. I consider this construction especially desirable, as the trolley wheels will not be obliged to travel over an uneven surface, as in the construction heretofore described. It is also to be noted, that in this construction, the base or bottom of the conduit is vacant, and may be brushed or scraped out by any of the ordinary implements which are used for this purpose.

In Fig. 6, I have illustrated a similar construction applied to a two wire system. Referring to this figure, I provide a return conductor 210, which is carried by insulated arms or supports *b'*, and co-operates with suitable trolley wheels *a'*, and with suitable idler rollers or compressing wheels 320, the circuit being completed from the conductor 22, through the trolley wheels *a*, an insulated wire inclosed in the tube 30, through the car, and through an insulated wire passing down through the tube 300, and connecting with the trolley wheels *a'*, which co-operate with the return conductor 210.

The feed or supply wires for an electric railway system constructed according to my invention may be located or connected in



any of the ordinary or approved ways, and need not be herein shown or described at length.

In this application, I do not claim an electric conductor consisting of an insulating tube or envelope, an electric wire or conductor inclosed in said tube, and means for conveying a current from said wire to the outside of said tube or envelope, as this subject matter is claimed in my application, Serial No. 505,621, filed March 29, 1894, before referred to.

I am aware that slight changes may be made in the construction of my improved railway system by those who are skilled in the art, and I do not wish to be limited therefore to the exact details which I have shown and described, but

What I do claim, and desire to secure by Letters Patent of the United States, is—

1. In an electric railway system, the combination of a compressible resilient insulating envelope, an electric conductor inclosed therein, and a traveling trolley plate having a downwardly extending perforated offset portion for shedding water, said plate carrying a series of trolley wheels co-operating with said conductor, substantially as described.

2. In an electric railway system, the combination of the compressible resilient insulating envelope 21 having an electric conductor 22 mounted therein, a traveling trolley plate 25 having a downwardly extending offset portion provided with the drainage orifices 250, and carrying an insulated bracket 29 having a series of trolley wheels mounted therein, substantially as described.

3. In an electric railway system, the com-

bination of a compressible insulating envelope, an electric conductor mounted therein, a series of contact strips carried by said envelope, a traveling trolley-plate, and a series of trolley-wheels, journaled on fixed arbors carried by said trolley-plate, the exterior or end trolley wheels being journaled slightly above the central trolley wheels, and arranged to co-operate with the contact strips, substantially as described.

4. In an electric railway system, the combination of a compressible, insulating envelope, an electric conductor mounted therein, a series of contact strips carried by said envelope, a traveling trolley plate having a downwardly extending offset portion for shedding water, and a series of trolley wheels journaled on fixed arbors carried by said trolley-plate, and mounted to have a free lateral movement upon their arbors, substantially as described.

5. In an electric railway system, the combination of a traveling bracket 24, a vertically movable trolley plate 25, supported in and guided by said bracket, the equalizing yoke 26 and the springs 27 and 28 for forcing said trolley plate down, and a series of trolley wheels mounted upon said trolley-plate to co-operate with a series of contact strips carried by a resilient compressible conductor, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM E. STEARNS.

Witnesses:

W. C. JONES,

W. P. REED.