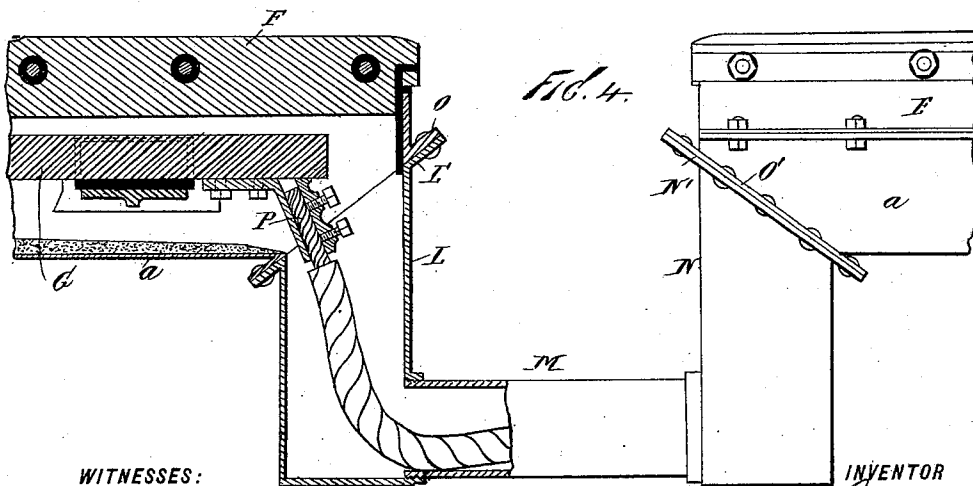
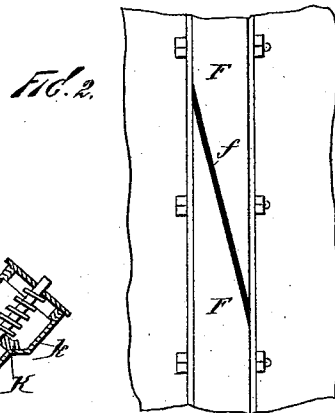
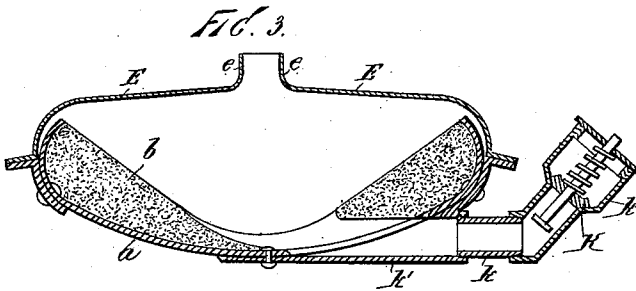
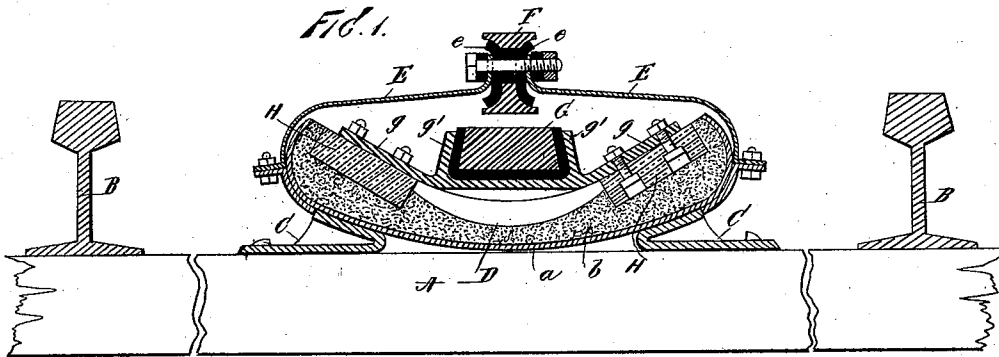


(No Model.)

W. GRUNOW, Jr.
ELECTRIC RAILWAY.

No. 565,453.

Patented Aug. 11, 1896.



WITNESSES:

John Buckler.
C. G. G. (Sd.)

INVENTOR

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By
Edgar Tate
ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM GRUNOW, JR., OF BRIDGEPORT, CONNECTICUT, ASSIGNOR OF
ONE-HALF TO ZALMON GOODSSELL, OF SAME PLACE.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 565,453, dated August 11, 1896.

Application filed August 27, 1895. Serial No. 560,662. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GRUNOW, Jr., a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Electrical Railways, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof, in which similar letters of reference indicate corresponding parts.

This invention relates to electrical railways, and the object thereof is to provide an improved closed conduit or receptacle for the conductor; and with this and other objects in view the invention consists in the construction, combination, and arrangement of parts hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which—

Figure 1 is a transverse vertical section of a railway-track provided with my improvement; Fig. 2, a top plan view of a contact-rail which I employ; Fig. 3, a transverse section of the conduit, showing my improved drainage and drying facilities; and Fig. 4, a side elevation of the means which I employ in connection with switches or cross-tracks for carrying the closed conduit around or beneath cross-rails or switch-rails, part of said view being in section.

In the accompanying drawings, A represents one of the cross-ties, and B the rails of the track, and midway between said rails is arranged my improved conduit, as clearly shown in Fig. 1. This conduit consists of a longitudinal trough *a*, which is preferably formed of any preferred metal, or which may be formed of wood, and which may also be lined and filled in throughout its length and inside thereof with asphaltum *b*, or other material which is a non-conductor of electricity and which will also not absorb moisture. The asphaltum is arranged, preferably, so as to form a longitudinal trough or gutter D in the bottom central portion thereof, the sides being inclined inwardly and downwardly, as clearly shown in Fig. 1.

My improved conduit rests upon the cross-ties, to which it is bolted or otherwise secured, as shown at C, and the trough or gutter may,

if desired, be covered with some non-conducting and non-absorbent material.

To the opposite sides or edges of the trough *a* are bolted longitudinal flexible elastic spring-plates E, which are curved or shaped in cross-section, substantially as shown in Figs. 1 and 2, and which are upturned or curved at their inner edges, as shown at *e*, and which support between their respective upturned or flanged edges a depressible rail F, which is thoroughly insulated from the metal plates and from the bolts passing through them, which hold them rigidly together.

The elastic and flexible plates E, which form a cover for the conduit, may be made of steel or any other metal, and may be so coated or treated as not to be affected by the weather or by water or moisture, and the bottom plate *a* of the conduit may also be similarly treated.

It will thus be seen that I provide a tubular or hollow conduit, all joints of which are made water-tight, and that the depressible rail F is thoroughly and completely insulated throughout its length. Inclosed in this conduit and lying about midway, free and clear of the inner walls of the conduit, is a conductor G, which is preferably of a size large enough to carry the full current without the use of feeders. The conductor G is supported at intervals by cross-bars or supports *g*, provided with upwardly-directed flanges *g'*, and from these cross-bars or supports the conductor is fully insulated. These cross-bars or supports rest upon and are bolted to insulating-blocks H, which may be formed of glass, hard rubber, porcelain, or similar material, and which are embedded in the asphaltum, and which may also be bolted or otherwise secured in position as may be most desirable. It will thus be seen that the conductor is free and surrounded by air, one of the best known conductors, and that it is fully insulated from its immediate supports and also from the conduit or the walls thereof.

The depressible rail F is formed in section, as shown in Fig. 2, the ends of the separate sections being cut out at an inclination or in a vertical plane at an angle, so that they overlap, as clearly shown in said figure, and said ends are separated by means of insulating material *f*. This sectional and insulated

depressible rail, however, is connected and supported in such a manner as to form one rigid rail throughout its length, and the object of forming the rail F in sections, as shown
 5 and described, is to provide means whereby only one or two sections at a time may be charged with the electric current and the section or sections so charged will be those directly under the motor or car.

10 In order to provide means for dissipating or removing what moisture may accumulate within the conduit by "sweating," evaporation, or otherwise, I may employ compressed air, which will be forced through the conduit
 15 by any desired means or in any preferred manner, and I also provide outlets, as shown in Fig. 3, which are placed at any desired intervals along the conduit and provided with automatic escape-valves K, which are arranged in upwardly-directed tubular heads
 20 k, which are in communication with the bottom of the conduit by means of tubular attachment k' and k². These valves will open to admit of the discharge of the air under
 25 pressure, but will also close and prevent any moisture from entering the conduit, and by means of this arrangement any moisture within.

30 The top of the depressible rail F is preferably higher than the sides of its supporting-flanges, and also preferably above the level of the tops of the rails B, but these elements are not absolutely essential to my invention, and the entire conduit may or may not be surrounded or filled in at the sides level with
 35 the top thereof.

I also provide means for carrying my improved conduit or conductor beneath railway-rails at crossing or switches, and this arrangement is shown in Fig. 4. For this purpose I employ a metallic box consisting of the pipes L, M, and N, the upper ends of the pipes L and N being cut away at an angle and provided with oblique annular flanges or rims
 45 l' and N', which are adapted to be securely bolted to similar flanges or rims O and O', formed on the adjacent ends of the conduit, and the separate ends of the conductor G are united by means of a heavily-insulated conductor P, which extends through said box or housing, and is connected with the main conductor G, as in Fig. 4. It will be understood,
 50 of course, that a single or bent pipe or housing may be substituted for the pipes L, N, and M, and it will also be understood that in railway switches or crossings any desired number of said boxes or housings may also be provided with escape-valves as hereinbefore described, and the connection thereof
 60 with the main conduit must be water-tight.

In operation the support for the trolley or other device by which contact is made with the rail F is secured to the bottom of a car or motor in such manner as to bear upon the
 65 rail F with a force sufficient to depress it to or in contact with the conductor G. The amount of this pressure is immaterial, and

may be regulated to suit the requirements of the case or the situation of the line, and may be anything from two or three hundred
 70 to a thousand or more pounds, and this pressure may be regulated by means of springs or otherwise, the only object being to depress the rail F so that it will make contact with the conductor G and to have said rail F
 75 supported, when not operated upon by a car or motor, so that no ordinary pressure or weight would depress it sufficiently to come in contact with said conductor.

My invention is not limited to the exact
 80 form, construction, and arrangement of parts shown and described, and I therefore reserve the right to make all such alterations therein as fairly come within the scope of the invention. I may also employ any desired material from which to form the conduit, and, as
 85 hereinbefore stated, the flexible and elastic plates E may be composed of any metal that is best adapted for the purpose, and may be treated in any desired manner in order to
 90 prevent corrosion or other injurious effects produced by moisture or otherwise.

Having fully described my invention, I claim and desire to secure by Letters Patent—

1. The combination in a closed conduit for
 95 electrical railways, the bottom of which is filled in with asphaltum, the upper surface of which is inclined to form a gutter, of an electrical conductor supported centrally in said conduit, and insulated therefrom and a
 100 flexible curved cover for said conduit, a depressible rail, disposed between said elastic cover and insulated therefrom, substantially as described.

2. The combination in a closed electric
 105 conduit, the lower portion of which is formed in the shape of a trough or gutter having the bottom thereof filled with asphaltum, of an electrical conductor supported centrally in said trough, and insulated from said conduit,
 110 an elastic cover for said conduit provided with flanges upon the inner edges thereof, a depressible contact-rail supported between said flanges and insulated therefrom, and the transverse bars or plates secured upon insulating-blocks to the asphaltum bed, and insulated from said conductor and supporting
 115 the same, substantially as shown and described.

3. The combination in a closed electrical
 120 conduit, the bottom of which is formed of a trough or gutter having a filling of asphaltum, of the transverse bars or plates, the ends of which rest upon insulating-blocks, through which said bars are secured to the said asphaltum filling or bed, an electrical conductor supported by said bars and insulated therefrom, a flexible elastic plate covering
 125 said conduit, and provided upon the inner edges thereof with upturned flanges, a depressible rail secured between said flanges and insulated therefrom, substantially as described.
 130

4. The combination in a closed electrical

conduit, the bottom of which is filled with asphaltum, of the transverse bars resting upon insulating-blocks secured in said asphaltum, a longitudinal conductor supported by said
5 transverse bars and insulated therefrom, a flexible elastic covering for said conduit provided with upturned flanges, a sectional contact-rail movably secured between said flanges and insulated therefrom, adapted to be forced
10 downwardly in close contact with said conductor, and the switch-boxes for switches or crossings, which are secured to or connected with the adjacent end of the conduit, and passing beneath the switch or cross-rails to
15 receive the conductor and afford connection between the adjacent ends of the conductor within the conduit, substantially as described.
5. The combination in a closed conduit for

electrical railways provided with a filling of asphaltum, of the transverse bars secured in
20 said asphaltum and insulated therefrom, a longitudinal conductor supported by said bars, and insulated therefrom, a flexible elastic covering for said conduit having upturned
25 flanges between which is movably supported a depressible sectional rail, the ends of which are beveled and overlap, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of the subscribing witnesses, this 13th
30 day of August, 1895.

WILLIAM GRUNOW, JR.

Witnesses:

L. M. MULLER,

S. L. HAWKSHURST.