

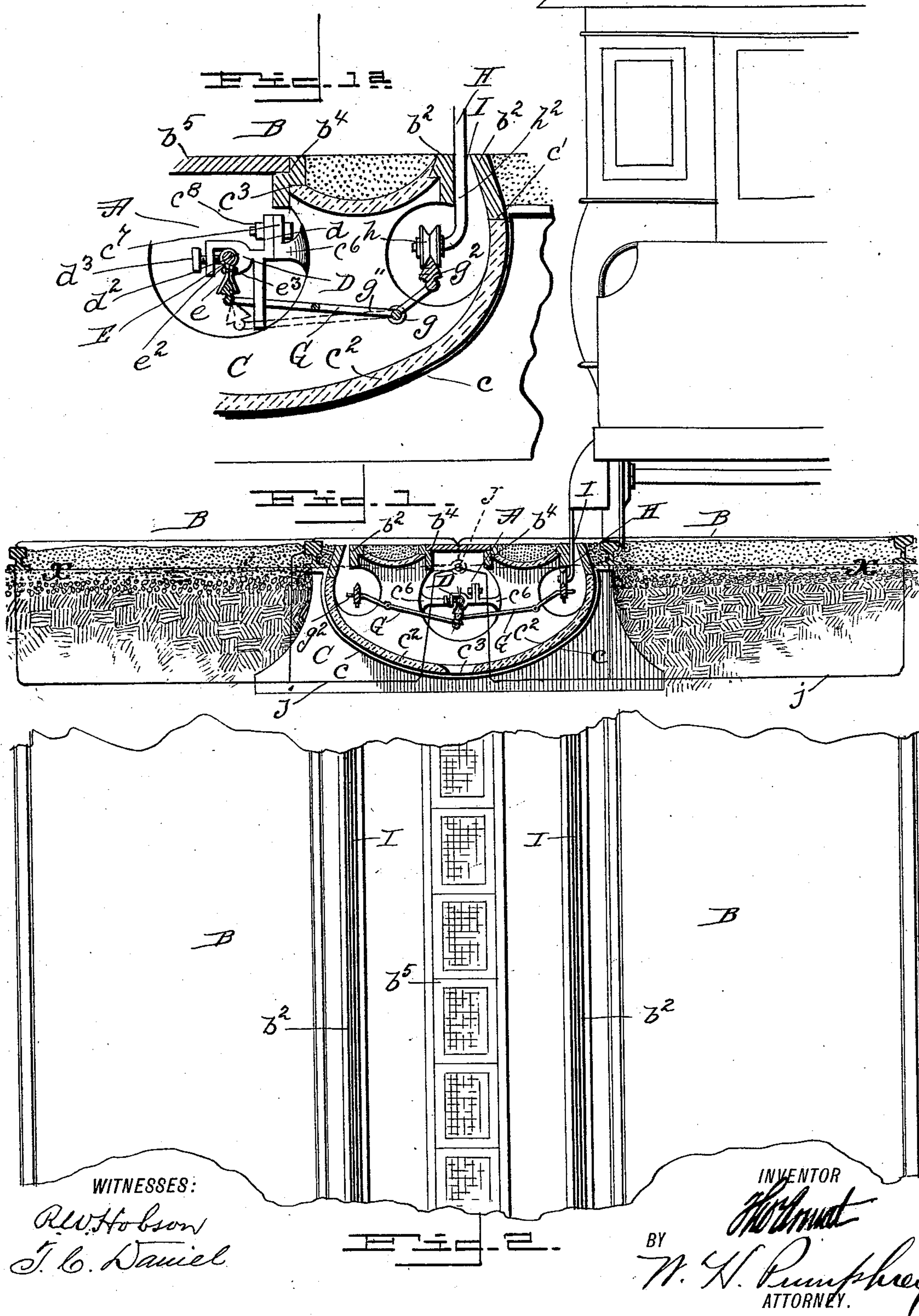
(No Model.)

3 Sheets—Sheet 1.

T. ARMAT.
CONDUIT ELECTRIC RAILWAY.

No. 521,562.

Patented June 19, 1894.



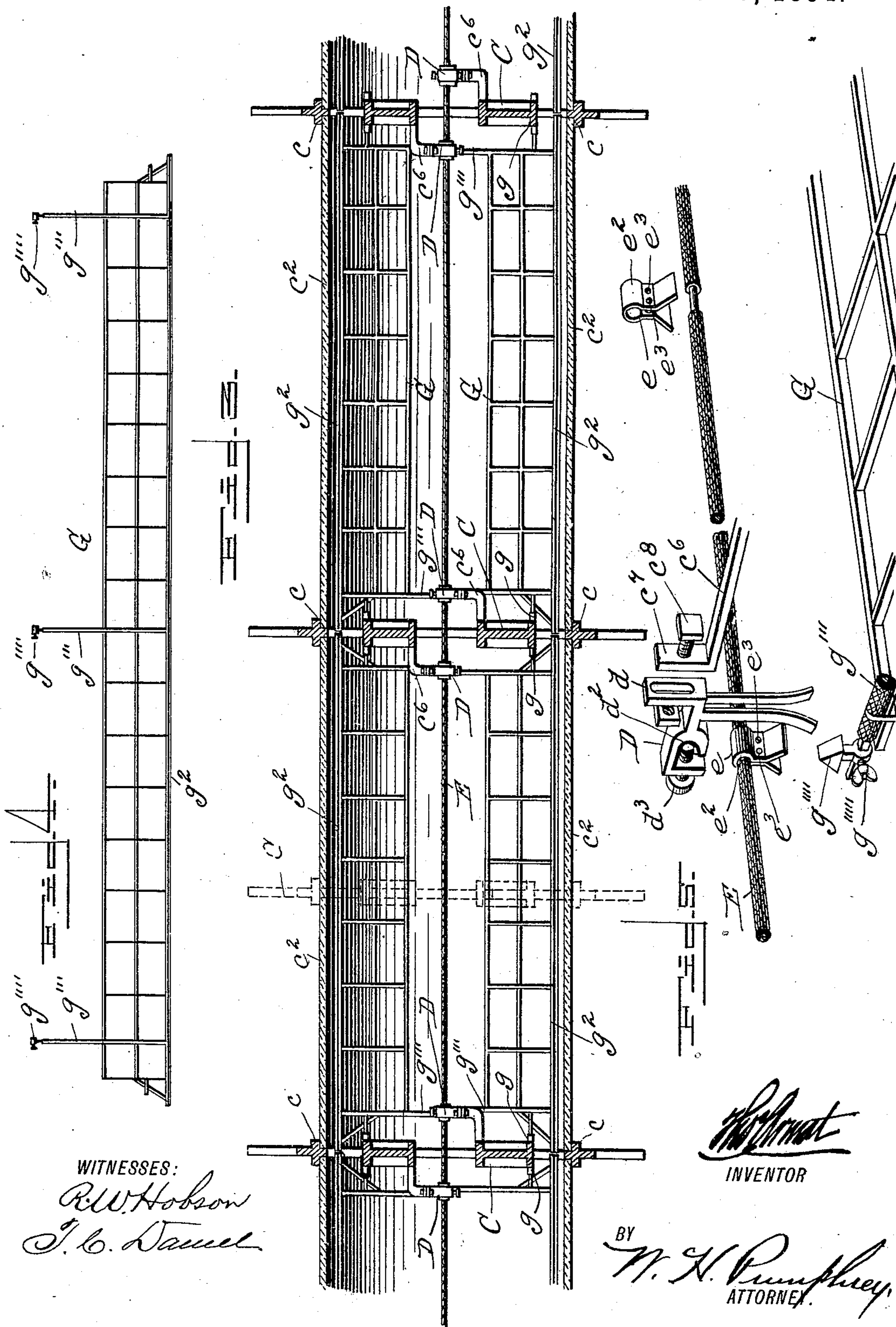
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WITNESSES:

R. W. Hobson
J. C. Daniel

INVENTOR

BY

N. H. Pumphrey
ATTORNEY.

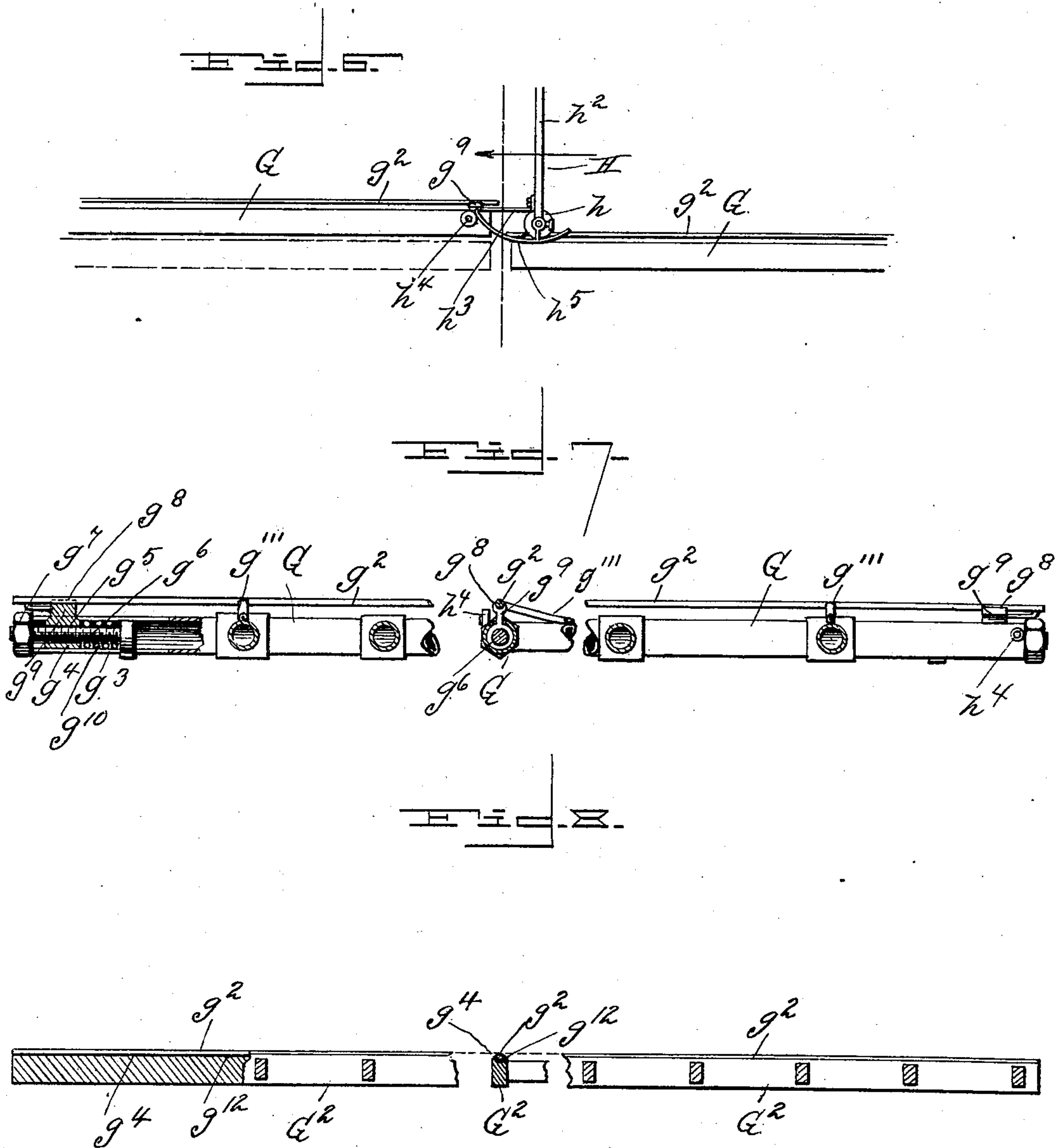
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T. Armat
INVENTOR

BY *W. H. Humphrey*
ATTORNEY.

UNITED STATES PATENT OFFICE.

THOMAS ARMAT, OF WASHINGTON, DISTRICT OF COLUMBIA.

CONDUIT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 521,562, dated June 19, 1894.

Application filed March 28, 1893. Serial No. 467,949. (No model.)

To all whom it may concern:

Be it known that I, THOMAS ARMAT, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Electric Railways; and I do hereby 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.

This invention relates to certain new and useful improvements in electric railways and particularly to that class known as conduit systems.

The object of the invention is to prevent loss of energy by leakage, short circuiting, induction or other causes which ordinarily result from improper or imperfect insulation, accumulations or defective contact devices.

A further object is to employ such peculiar and novel means in the construction of a conduit system by which the conducting leads may be thoroughly and effectually insulated with any suitable material and to any thickness desired.

A further object is to provide an improved form of contact device, by which the current may be conducted to the motors of the vehicles without direct engagement between the traveling contacts or current gatherers and the conducting leads.

A further object is to provide a novel form of conduit that shall be thoroughly ventilated and drained, thus insuring proper protection to the mechanism inclosed within the same, against atmospheric changes and at the same time, allowing for ready access to any portion of the interior thereof for the purpose of cleaning, repairing, replacing broken or fractured parts, &c.

With these objects in view, the invention comprises various novel details of construction, combinations and arrangements of parts to be hereinafter more fully set forth and claimed.

In describing the invention in detail, reference is had to the accompanying drawings forming part of this specification wherein like letters indicate corresponding parts in the several views, in which—

Figure 1:— is a transverse sectional view of

a road bed, showing a preferred construction embodying my improvements. Fig. 1^a:— is a similar view showing in detail, on an enlarged scale, the operation of the contact frames. 55 Fig. 2:— is a plan view of a portion of the road-bed. Fig. 3:— is a longitudinal sectional view of the conduit, taken on the line *x, x*, of Fig. 1. Fig. 4:— is a plan view of one section of the contact frame. Fig. 5:— is a detail 60 view in perspective, showing the general construction of the lead, the contact points thereon, the brackets supporting the lead and the contact frames. Fig. 6:— is a detail view of the current gatherer, showing the same in 65 position on the contact frame. Fig. 7:— is a view showing the manner of supporting the wires on the contact frame and Fig. 8:— is a similar view showing a modification of the same. 70

In the drawings: A— denotes a longitudinally extending subterranean conduit located between adjacent rails of the road-bed —B— and comprising a series of transversely arranged yokes or braces —C— which are provided with flanges —*c*— or other suitable means for supporting the shell or casing —*c*²—. 75 This shell may be of wood, concrete or metal and if desired provided with a suitable lining of insulating material also with drain openings —*c*³— in the bottom thereof. The yokes —C— are provided at the top and adjacent the extremities with shoulders or seats —*c*¹— 80 —*c*¹— for the reception of the slot rails —*b*²— —*b*²— and centrally with similar seats —*c*³— 85 —*c*³— to receive the supporting rails —*b*⁴— on which suitable doors or flags —*b*⁵— are removably secured. Thus, should it be necessary at any time to repair, lubricate or clean the mechanism within the conduit the doors 90 —*b*⁴— may be readily turned back or opened to expose the interior.

Projecting from opposite sides of each yoke are suitable bracket arms —*c*⁶— which terminate in apertured heads —*c*⁷— and to these 95 heads are adjustably secured by bolts —*c*⁸— the slotted extensions —*d*— of the clamps —D—. These clamps are provided with concave seats —*d*²— lined with insulating material into which are adapted to be secured 100 by the thumb screws —*d*³— the rounded heads —*e*²— of the contact pieces —*e*—. At equi-

distant points on the positive lead —E— the insulation is cut away exposing the metallic conductor and into the recesses thus formed the contact pieces —e— are securely clamped by the screws —e³—. These contact pieces —e— may be cast or formed from strap metal suitably bent up and consisting preferably of a rounded head portion —e²— which is adapted to inclamp the lead as above described, and being removably secured thereon by screws —e³— with the extremities diverging downwardly into the approximate form of an inverted —V—. Between these yokes and at each side of the lead —E— the contact frames —G— are pivotally mounted in suitable bearings —g—g—. These frames may be of any desired construction to support thereon the longitudinally disposed wires, or strips —g²— —g²— and the transverse branches —g'''—g''' thereof all of which are suitably insulated from the carrying frames, as shown in Fig. 5. These wires or strips —g²—g²— are preferably arranged as shown in Fig. 7— wherein the frame —G— is constructed of metal tubes of suitable size which facilitates the operation by giving to it the necessary strength and lightness required. The outer tubes extend some distance beyond each frame section and are slotted as at —g³—. Into the bores of these tubes small cylindrical tension blocks —g⁴— are inserted and centrally of the blocks, openings —g⁵— are formed, through which loosely pass threaded bolts —g⁶— having their inner ends headed and provided with adjusting nuts —g⁷— by which they may be moved longitudinally to decrease or increase the tension of the wire —g²—. Between these heads and the blocks spiral springs —g¹⁰— are interposed, whereby a constant pull will be at all times exerted to retain the wires taut. These wires are securely held in a terminal seat —g⁸— formed in a projecting portion —g⁹— of each block —g⁴— which passes through the slot of the tube, as shown. Again, should the above construction prove inefficient, the frame may be arranged as follows: The strips or wires —g²—g²— may be seated (as shown in Fig. 8—) in a groove —g⁴— formed in the outer rails of the frame —G²— which is provided with a lining of insulating material —g¹²—. By this peculiar construction the wires or strips will at all times be held in proper position, which entirely obviates the possibility of disarrangement or sagging and the consequent sparking and burning out of parts.

The transverse branches —g'''— are provided with terminal —V— shaped metallic points —g''''— which are adjustably secured thereon, by thumb screws —g'''''— and adapted to be elevated into engagement with and seated between the divergent extremities of the contact pieces —e— as the frames are depressed or rocked by the current gatherers —H— which movement completes the motor circuit.

The form of current gatherer herein em-

ployed forms no part of the present invention and will therefore not be described in detail, suffice it to say, as shown, the device, comprises an ordinary trolley wheel —h— mounted on an inwardly bent extremity of a depending arm —h²— which projects toward the center of the conduit and out of alignment with the slot —I—. The opposite end of this arm —h²— may be connected to the car in any well known manner, and preferably, under the constant pressure of a downwardly acting spring. Attached to this arm —h²— and arranged at right angles thereto is a bent up bar —h³— which is inclined to engage the anti-friction rollers —h⁴— of the swinging frame sections —G— in advance of the trolley and depress them. Thus, as the trolley engages the outer current conducting rail of a frame section, the latter will be rocked to swing the contact pieces —g''''— of the arms —g'''— into engagement with the contact points —e— of the positive lead —E— and as the trolley reaches the end of the section as shown in Fig. 6— the incline —h⁵— engaging the small roller —h⁴— of the next section will depress the outer rail thereof so that the trolley can bridge the distance between the extremities of the conductor wires without breaking the circuit. If desired, a return or negative lead —J— may be supported within the conduit and connected in any well known manner with the motors of the vehicles, as by taps —j— from the lead to the rails. (See Fig. 1.)

It will be understood that I do not limit myself to the exact form herein shown and described, as various changes may be made in the construction and arrangement without materially departing from the general idea involved.

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

1. In an electric-railway, the combination with an insulated supply conductor supported centrally of a conduit and provided at intervals with contact-points, of a series of frames arranged on opposite sides of the conductor and carrying on the outer edges and insulated therefrom metallic strips and transversely disposed continuations leading from said strips toward the conductor aforesaid, said frames being mounted within the conduit and with the pivotal centers in parallel alignment with said conductor whereby as the frames are rocked the terminals of said transverse continuations will be swung into engagement with the contact-points of the supply conductor, as specified.

2. In an electric railway, the combination with an insulated supply conductor adjustably supported within a conduit and provided at intervals with contact-points, of a series of frames arranged at each side and in parallel alignment with the conductor, said frames being independently journaled and carrying thereon, longitudinally arranged metallic

strips and transverse branches leading from said strips inwardly toward the supply conductor and terminating in engaging heads, and a current gatherer adapted for traveling over said longitudinally arranged strips thereby rocking the frames and bringing said heads of the transverse branches into engagement with the contact-points, as specified.

3. In an electric railway, the combination with an insulated supply conductor having a series of contact-points thereon, of frame-sections independently pivoted at each side of and carrying on the edges remote from the conductor metallic rods which are adapted when said frame sections are rocked to be brought into electrical connection with the contact-points of the conductor through suitably arranged branches, and a current-gatherer provided with a yielding incline adapted for engaging a projection of each succeeding frame-section, thereby bridging the space between the ends of said metallic rods without breaking the circuit, as specified.

4. In an electric railway, the combination with an insulated supply conductor of the contact points thereon, a traveling current gatherer and the intermediate contact devices comprising a series of swinging frames arranged on each side of the supply conductor and adapted to be engaged and operated by the current gatherer to complete the circuit, as specified.

5. In an electric railway, the combination with a slotted conduit, of the insulated working conductors within the conduit, the contact points on the supply conductor, an electric motor adapted to travel over the conduit, a current gatherer depending from the motor through the slot and into the conduit, and the intermediate and gravitating contact devices pivotally mounted within the conduit and on each side of the supply conductor, said devices having an independent movement about a horizontal axis and being adapted to complete the motor circuit when engaged by the current gatherer, as specified.

6. In an electric railway, the combination with an insulated supply conductor adjustably supported within a conduit and provided at intervals with metallic projections electrically connected with said supply conductor, of a series of swinging frame sections each carrying suitably arranged conductors, and a current gatherer adapted to engage said last mentioned conductors, rock the frame sections and thereby complete a motor circuit through said metallic projections of the supply conductor, as specified.

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

THOS. ARMAT.

Witnesses:

J. W. ALLEN,
WM. P. YOUNG.