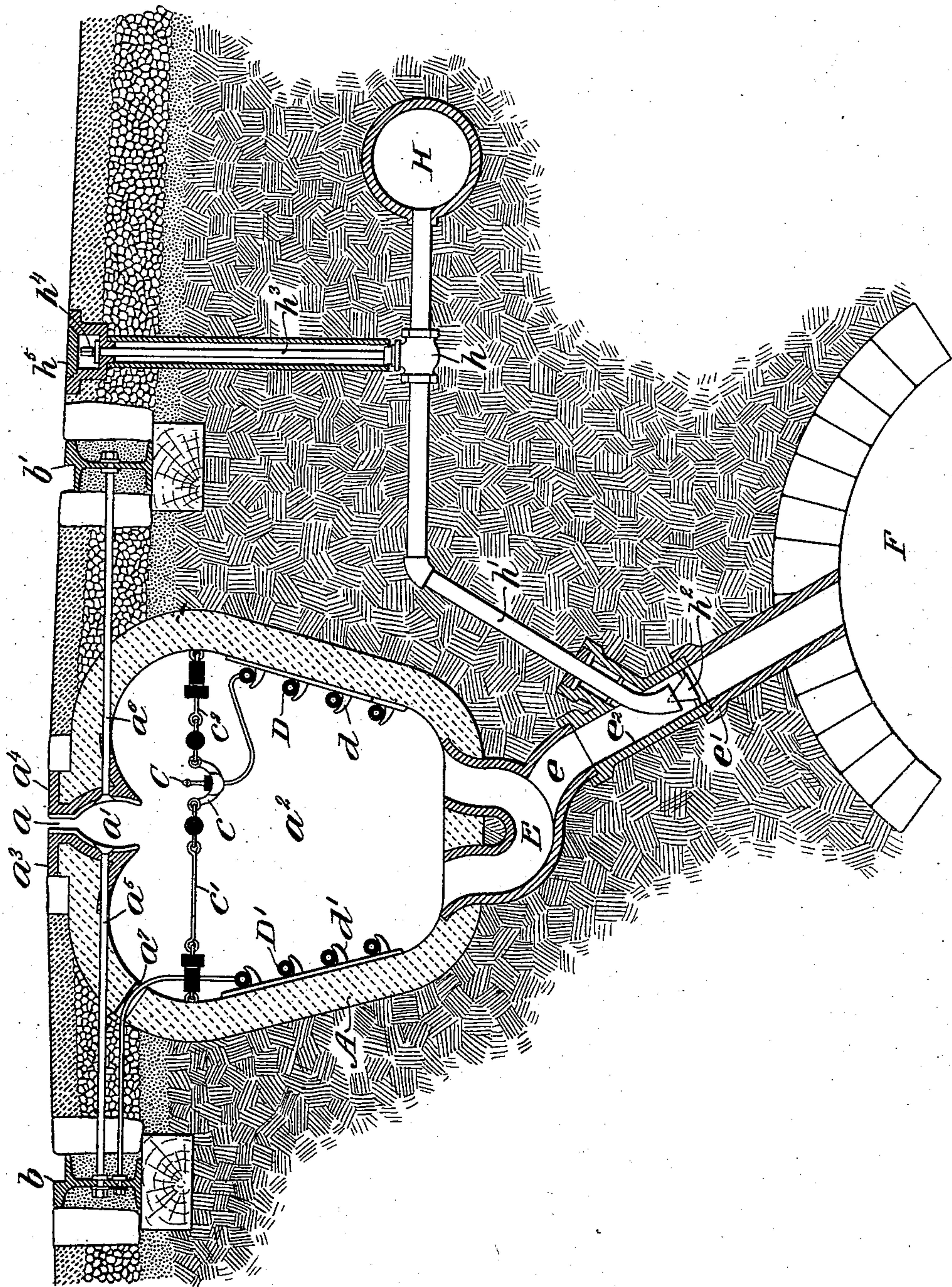


(No Model.)

H. B. NICHOLS & F. H. LINCOLN.
UNDERGROUND ELECTRIC RAILWAY.

No. 548,786.

Patented Oct. 29, 1895.



Witnesses:
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UNITED STATES PATENT OFFICE.

HENRY B. NICHOLS AND FREDERICK H. LINCOLN, OF PHILADELPHIA,
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UNDERGROUND ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 548,786, dated October 29, 1895.

Application filed March 11, 1895. Serial No. 541,211. (No model.)

To all whom it may concern:

Be it known that we, HENRY B. NICHOLS and FREDERICK H. LINCOLN, citizens of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Underground Electric Railways, of which the following is a specification.

Our invention has relation to an underground structure or conduit for the reception and support of feeder-wires and main conductor of an electric railway; and it relates, also, in connection therewith, to means for maintaining the structure or conduit, as well as the main conductor, comparatively free from moisture to lessen electric leakage and to maintain a high standard of insulation.

The principal object of our invention is to provide an underground-trolley system in which a high standard of insulation is insured and the avoidance of condensation in, about, or around the main conductor suspended from cross-guys attached to the structure, and with the provision of means whereby the interior of the structure is maintained in a dry state or free from moisture.

Our invention, stated in general terms, consists of an electric railway constructed and arranged in substantially the manner hereinafter described and claimed.

The nature and scope of our invention will be more fully understood from the following description, taken in connection with the accompanying drawing, illustrating in vertical central section an underground structure embodying features of our invention, showing the main conductor connected by means of suspended insulated cross-guys with the structure and also showing the feeder-wires supported therein and suction means in elevation, and in cross-section a culvert.

Referring to the drawing, A represents a conduit which in cross-section is substantially heart shape and is provided with a slot a in the top communicating with a contracted chamber a' in direct communication with a lower chamber a^2 . The contracted upper chamber a' is capped with angle-irons a^3 and a^4 .

b and b' are rails set into a suitable foundation, as is also the conduit A.

a^5 and a^6 are tie-rods arranged at suitable distances apart and engaging the angle-irons and rails to insure the walls of the slot a being maintained normally uniform in width throughout the length of the conduit for the travel of a trolley-arm through the slot, and with the wheel, brush, or other contact of the arm (not shown) adapted to engage the main conductor C, located in the lower chamber a^2 . This conductor C is supported on an insulated hanger c , which is suspended and supported in required position by means of insulated cross-guys c' and c^2 from the sides or surfaces of the conduit.

D and D' are two series of feeder-wires supported on racks d and d' , arranged in tiers and secured to the sides of the conduit A. One of the series of feeder-wires D is connected with the main conductor C, while one of the other series of feeder-wires D' is connected through a slot a^7 in the wall of the conduit A with the rail b .

In the base or bottom of the conduit A is provided a U or other shaped drain E, with a neck e , which, by means of a pipe connection e' , extends into a culvert F for a twofold purpose—first, to drain off the conduit A, and, second, to aid in the suction induced by the passage of air through the culvert, as well as by the means to be hereinafter described.

H is a water-main provided with a stop-cock h and with a pipe connection h' . The pipe h' is introduced through a Y-section e^2 , united with the pipe e' and with the neck e , for example, in the manner illustrated. The forward end of the pipe h' is enlarged and is provided with a rose or V-shaped plug or cap h^2 , arranged in connection with the end of said pipe h' , so as to serve as a deflector or sprayer of water forced or caused to flow through the main H and its pipe connection h' , and thereby, with the air from the culvert F, to induce sufficient suction to effectually maintain the conduit A free from moisture and to lessen very appreciably electric leakage from the main conductor C. The stop-cock h is provided with an operating-rod h^3 and key h^4 . This operating-rod extends vertically through an underground tube provided at the top with a box having a cover h^5 .

It may be here remarked that moisture en-

tering through the slot *a* of the contracted chamber *a'* of the conduit A will naturally follow the freest line of travel along the internal walls of the conduit A, which course
 5 therefor will be induced in consequence of the drain E by direct connection with the culvert F and the suction induced by the fluid flowing from the main H and its accessories, whereby the main conductor C, throughout
 10 the length and breadth of the conduit A, can be maintained in an entirely practical condition for insuring the best possible results in the use of wires underground for the propulsion electrically of vehicles over surface road-
 15 ways and with the avoidance of condensation in, about, or around the main conductor.

It may be here remarked that we prefer to arrange the main conductor out of alignment with the slot of the conduit A, for such aids
 20 in the maintenance of a high standard of insulation and also avoids condensation on, around, or about the main conductor C, which prevents short-circuiting of the same, as well as electric leakage.

25 Instead of allowing water to flow through the pipe H, exhaust-steam or air may be conveyed therethrough into the pipe *e'* of the conduit A to the culvert F and equally good results be obtained.

30 Having thus described the nature and objects of our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In an electric railway, an underground

slotted structure having a conductor located therein out of alignment with the slot, a drain 35 located in the base of the structure and substantially in alignment with the slot thereof, a pipe leading from said drain to a culvert or other discharge, said drain being adapted to collect and receive moisture accumulating in 40 said structure, and means located in said pipe for inducing suction to assist in the discharge from the drain to the culvert of the accumulated moisture, substantially as described.

2. In an electric railway, an underground 45 slotted structure having a conductor located therein out of alignment with the slot, a drain located in the base of the structure and substantially in alignment with the slot thereof, a pipe leading from said drain to a culvert or 50 other discharge, said drain being adapted to collect and receive moisture accumulating in said structure, and a steam or water spray pipe located in said pipe and adapted to induce suction to assist in the discharge from 55 the drain to the culvert of the accumulated moisture, substantially as described.

In testimony whereof we have hereunto set our signatures in the presence of two subscribing witnesses.

HENRY B. NICHOLS.
 FREDERICK H. LINCOLN.

Witnesses:

J. WALTER DOUGLASS,
 THOMAS M. SMITH.