(No Model.)

J. J. MILLER.

CONDUIT FOR UNDERGROUND OR SUBWAY ELECTRIC SYSTEMS.

No. 454,177. Patented June 16, 1891.

Fig. 1.

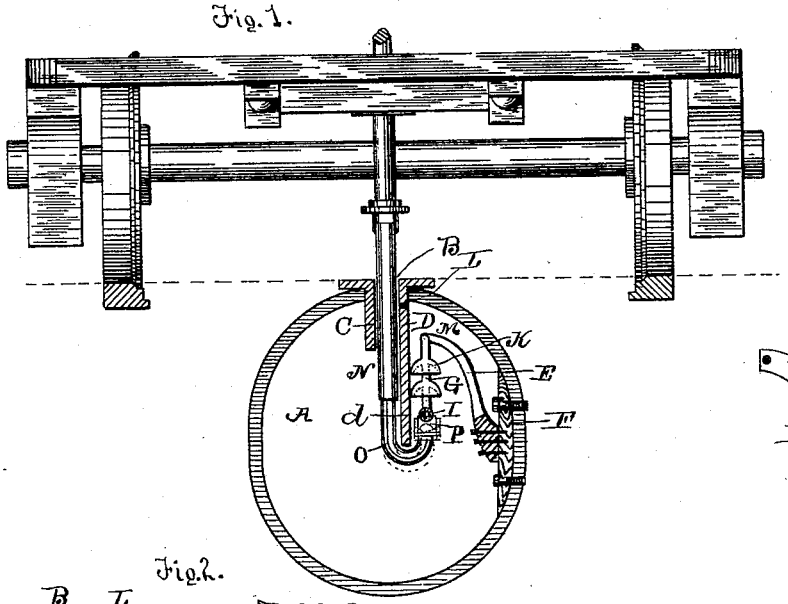


Fig. 2.

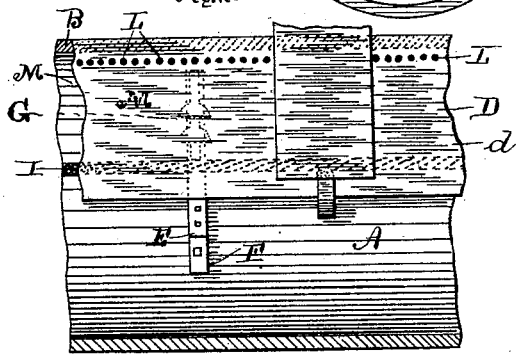


Fig. 3

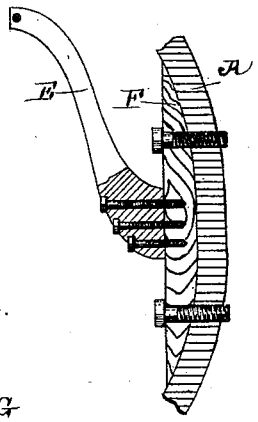


Fig. 4.

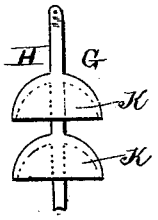
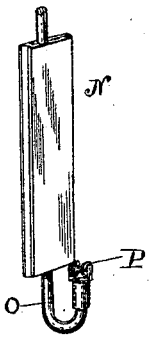


Fig. 5.



WITNESSES:

Wm. B. Cox.

A. G. Boysmith.

INVENTOR

John J. Miller.

BY

D. D. Doyle.

ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN J. MILLER, OF PITTSBURG, PENNSYLVANIA.

CONDUIT FOR UNDERGROUND OR SUBWAY ELECTRIC SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 454,177, dated June 16, 1891.

Application filed February 14, 1891. Serial No. 381,465. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. MILLER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Conduits for Underground or Subway Electric Systems for Traction-Roads; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object to provide means for securing an even and perfect contact between the trolley and the wire and prevent accidental "jumping" and "sparking;" furthermore, to provide means to protect the wire from rain and frost and the accumulation of moisture; furthermore, to provide improved means for supporting the trolley-wire, whereby a heavier wire may be employed in order to economize the power; furthermore, to provide improved means for insulating the wire to prevent deflection of the current; furthermore, to provide means to prevent accidental contact with the wire and guard against improper interference and tampering therewith; furthermore, to provide means for suspending the trolley-wire in a subway or conduit of any of the ordinary well-known forms, such as are employed for cable-traction, &c., and, furthermore, to provide means for preventing injury to the wire in case the car leaves the track.

With these objects in view the invention consists in the construction and arrangement of the brackets for supporting the wire within the conduit, in the arrangement of the insulating devices, in the construction and arrangement of the bell-hanger by which the wire is connected to the bracket, in the arrangement of the guard within the conduit, in the arrangement of the wire out of alignment with the slot in the conduit, and in certain details of construction and arrangement, which will be fully described hereinafter in connection with the drawings, wherein—

Figure 1 is a transverse sectional view of a conduit provided with my improvements, and showing a portion of a truck and a trolley-arm inserted through the slot of the conduit. Fig. 2 is a longitudinal sectional view of the conduit. Fig. 3 is a detail view of one of the brackets. Fig. 4 is a similar view of one of the hangers. Fig. 5 is a detail view of the trolley-arm.

The conduit A is of the ordinary form and construction, and may be either circular or oval in cross-section, or elliptical, as shown in the drawings, and it is provided at its top with a longitudinal slot B. This slot is provided on opposite sides with slot-rails C and D, between which the trolley-arm passes. The slot-rail C is of the ordinary form, and the slot-rail D is provided with a depending extension or web *d*, thereby forming a guard which extends down toward the center of the conduit. To the side of the conduit is secured a supporting-bracket E, which is insulated therefrom by an interposed block F, of wood, hard rubber, or similar non-conducting material, said brackets being curved inwardly and upwardly toward the slot and terminating a short distance to one side of the latter. This bracket is secured to the side of the conduit nearest to the guard-rail, and its upper end is close to the top of the guard-rail. To the extremity of the bracket is attached a vertical hanger G, which consists of a central stem H, to the lower end of which is secured the trolley-wire I and the outwardly and downwardly flared drip flanges or bells K K. This hanger is preferably of hard rubber, thereby forming an additional means of insulation for the trolley-wire. The length of the hanger is such that the wire is suspended above the lower edge of the guard-rail, and is concealed and protected by the latter, so that a wire or rod inserted in the slot cannot come in contact with the trolley-wire. Furthermore, the wire is suspended above the center of the conduit, and therefore out of the way of water or rubbish which may collect in the bottom of the conduit.

Any moisture which may collect upon the hanger will not drop upon the wire, but will be carried outward by the drip flanges or bells and dropped upon each side of the wire.

The guard D is provided at its top with a row of perforations L L, which serve to ventilate the chamber M, which is formed between the guide and the side of the conduit, and enable the bracket, hanger, and wire to dry.

The trolley-arm N is provided at its lower

end with a U-shaped extension O, upon the end of which is mounted the trolley P. This U-shaped extension enables the trolley to be carried in rear of the guard and above its lower edge, whereby when the trolley-arm is raised until the trolley is in contact with the wire the moisture from the outside cannot reach either the wire or the trolley, and therefore a perfect electrical contact is always maintained. The trolley-arm cannot convey moisture from the outside to the trolley, owing to the U-shaped extension.

From the above description it will be seen that the wire is suspended above all accumulations of water and rubbish in the conduit, and is protected from drippings by the double bell-hanger. Furthermore, the wire is doubly insulated from the conduit by means of the block and hanger, and therefore there can be no appreciable deflection of the current through the supports. Furthermore, the highest point of the bracket is at the point of its connection with the hanger, and therefore the bracket drains toward the side of the conduit and the hanger drains from the edges of its bells, thus preventing the wire from being connected with the side of the conduit by a film of water. Furthermore, the wire is protected from an accumulation of moisture on its surface, and the trolley is carried above the reach of water in the bottom of the conduit, and therefore there is nothing to interfere with a perfect contact between the trolley and the wire.

The resistance which a small wire offers to the current and the impossibility of supporting heavy wires above the surface or over head have proved to be serious obstacles to overhead electric systems, for the reason that a large percentage of the power is lost in overcoming the resistance of the conductor; but when the wire is placed under ground and thoroughly insulated, as above described, the brackets may be placed as close as is necessary to support a wire of a suitable size, and therefore the item of resistance will be of less importance. Furthermore, the effectiveness of an inclosed wire is greater than that of a wire which is exposed to the air, for the reason that in the latter case a portion of the current is carried off by or is distributed into the air.

When the trolley-wire is supported as above described, all swinging or dancing is prevented, thus enabling the trolley to maintain an even and perfect contact therewith throughout. The trolley-arm is guided steadily in the slot, and therefore all jumping of the trolley from the wire is avoided. This feature is of importance, for the reason that each time the trolley leaves the wire and strikes it a spark passes between them, the effect of this being to burn the wire and render it liable to breakage.

From the above description it will also be seen that the danger to life is reduced to a minimum, for the reason that the insulation of the wire is perfect and there is no way by which the wire can be reached through the slot.

The wire and supporting devices occupy but a small portion of the space within the conduit, as will be seen by referring to the drawings, and therefore the remaining space may be utilized by telegraph, telephone, and electric-light companies for their wires without interfering with the traction-road. In the drawings I have shown a number of hooks or brackets on the side of the conduit for the use of companies desiring subway space. If desired, the other slot-rail C may also be extended to form a guard to protect these wires from moisture and prevent them from being reached through the slot.

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

1. In combination with a conduit or subway, the guard-rail and the depending hangers arranged between the said rail and the adjacent side of the conduit and terminating above the lower edge of the rail, having the trolley-wire secured to their lower ends and provided above the same with bell-shaped drip flanges or guards, as set forth.

2. In combination with a conduit or subway, the brackets secured to the side of the same, the hangers suspended from the extremities of the brackets and provided with drip-flanges and having the trolley-wire secured to their lower ends, substantially as and for the purpose specified.

3. The combination, with a slotted conduit provided with a guard D, of the brackets secured to the side of the conduit and terminating near the outer edge of the guard, and the double bell-hangers connected to the ends of the brackets and having the trolley-wire secured to their free ends, substantially as and for the purpose specified.

4. The combination, with a slotted conduit, of insulated brackets, the hangers of insulating material depending from the free ends of said brackets and provided with bells or flared flanges, and guard-rails arranged between the hangers and the slot in the conduit and extending below the lower ends of the former, substantially as and for the purpose specified.

5. The combination, with a subway or conduit provided with a trolley-slot, of the guard-rail arranged on one side of the said slot and provided with ventilating-perforations, the hangers and brackets arranged between the guard-rail and the adjacent side of the conduit, and the trolley-wire attached to said hangers, substantially as specified.

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

JOHN J. MILLER.

Witnesses:
WILLIAM F. ROBB,
WM. B. COX.