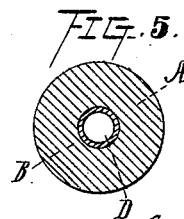
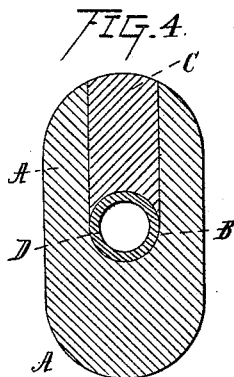
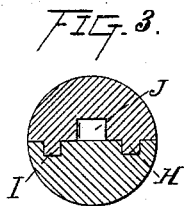
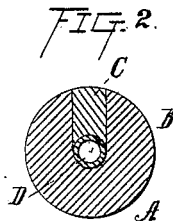
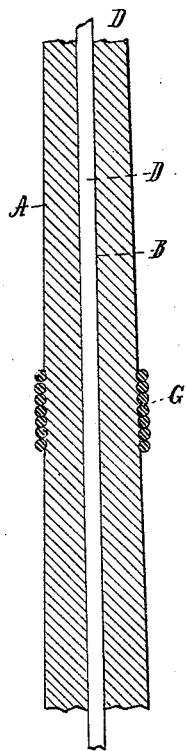
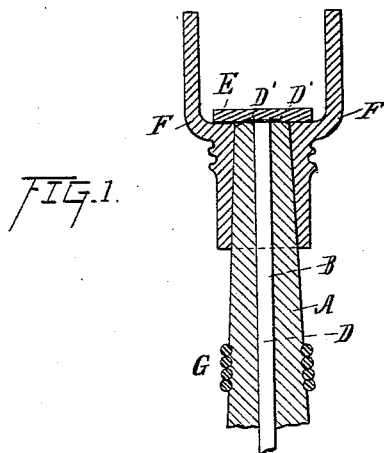


(No Model.)

C. A. LIEB.
TROLLEY POLE FOR ELECTRIC RAILWAYS.

No. 457,356.

Patented Aug. 11, 1891.



WITNESSES:
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UNITED STATES PATENT OFFICE.

CHARLES A. LIEB, OF NEW YORK, N. Y.

TROLLEY-POLE FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 457,356, dated August 11, 1891.

Application filed March 28, 1891. Serial No. 386,779. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. LIEB, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Trolley-Poles, of which the following is a specification.

My invention relates to improvements in trolley-poles; and it consists in the peculiar construction and arrangement of the parts, as hereinafter set forth.

Figure 1 illustrates a vertical longitudinal section of a pole embodying the invention, the pole being broken away in sections. Fig. 2 illustrates a cross-section near the upper end of the pole. Fig. 3 illustrates one method of constructing and uniting the parts of the pole. Fig. 4 illustrates a cross-section at or near the base of the pole, the method of construction being the same as shown in Fig. 2. Fig. 5 illustrates a cross-section of a pole made of a single piece of material bored longitudinally and with the conducting tube or rod inserted in the bore.

Referring first to Figs. 1, 2, and 4, A is the pole. It is preferably made of wood or other suitable non-conducting material, and through its length is cut a groove B, which preferably extends to the medial or central line of the pole, and C is a tongue or strip of wood, which is so made as to exactly fit the groove in the pole, but does not extend to the bottom of it. On the contrary, it is narrower than the depth of the groove and preferably concave on its inner edge. Thus there is left a tubular opening at the central part of the pole, through which a brass or other metallic tube D is placed, which extends from end to end of the pole. Instead of a tube a wire or solid rod may be used. At the upper end the rod projects slightly beyond the end of the pole, and being preferably flanged out laterally, as at D', (see Fig. 1,) is or may be soldered to a metallic plate E, which is in turn soldered to the frame F of the trolley-wheel. Thus a very secure and satisfactory contact is made for the conduction of the current which is taken off at the base of the pole by making suitable connections with the tube, rod, or wire at that end.

G are bands of wire, which are wound firmly

about the pole and are soldered together to strengthen it. There may be as many of them as desired, and solid sleeves or bands of metal may be used instead of the wire; but I prefer the wire, because it may be drawn down upon the pole so hard that it will embed itself in the wood somewhat, and thus be firmly held in place.

The upper smaller part of the pole I prefer to make round in cross-section, as shown in Figs. 2, 3, and 5; but at the lower part I find I can dispose the material in an elliptical shape, as shown in Fig. 4, and secure a lighter and much stronger pole, because the wood may then be presented edgewise to the strain. The inserted strip C should be inserted at one of the sides having the larger radial dimension, as shown.

Although I prefer that there should be a groove cut in the pole and a piece inserted, as shown in Figs. 2 and 4, because if so and the inserted piece be properly secured with hydraulic glue or otherwise substantially fastened the pole is really stronger than if solid, because the inserted piece will have all of its grain presented edgewise to the strain. I sometimes, however, bore the pole from end to end and insert the rod, tube, or wire therein, as seen in Fig. 5, and I also sometimes put the two pieces which are to compose the pole through a molding machine or planer and cut tongue-and-groove recesses and projections in them, as shown at H and I, Fig. 3, the hole or recess through which the tube, rod, or wire passes being shown at J.

Instead of making the poles of wood, I sometimes make them of successively superposed layers of paper or the like material, they being preferably wrapped about the conductor and adhered together by suitable cementing material and preferably treated also with a suitable waterproofing material.

The above are instances only of various methods in which my invention may be practiced.

I secure many advantages by my improved construction. Among them are reduced weight, increased strength, better electrical connection, freedom from accidents to the conductor whereby liability to become "dead" on the track is reduced, freedom from short-circuiting through an exposed conductor, it being

insulated against contacts from without, and also improved appearance and improved mechanical construction.

It will be specially noticed that the pole 5 will be very greatly stiffened and will not be materially increased in weight, provided the conductor inclosed within it be made in the form of a tube. I have found that a brass tube about half an inch in diameter, made of 10 light stiff metal, gives excellent results. The conduction is of course very good, the weight of the pole not materially increased, and, in fact, considering the reduced size of the pole, which is rendered possible by the presence of 15 this stiffening-tube, the weight of the pole may be reduced, especially at its upper part, to less than that of the ordinary poles. Another advantage results from the use of a tubular conductor inclosed within a pole—that is, 20 if the pole by an accident should become broken the tube will bend, but may nevertheless be bent back again, and will have sufficient stiffness to sustain the trolley-wheel and the broken-off portion of the pole under 25 ordinary circumstances, so that the car may be run home again and not block the line.

I claim—

1. A trolley-pole having a tubular metallic conductor inclosed therein, substantially as 30 set forth.

2. A trolley-pole made of a plurality of pieces of wood, the grain whereof runs in different directions, and a conductor inclosed in the pole, substantially as set forth.

35 3. A trolley-pole made of a plurality of pieces of non-conducting material having a conductor placed in an inclosed passage within the pole, substantially as set forth.

4. A trolley-pole made of non-conducting 40 material and having a tubular conductor inclosed therein, substantially as set forth.

5. A trolley-pole having a substantially round contour in cross-section at its upper 45 portion and an elliptical or oblong contour in cross-section at its lower portion, and a con-

ductor inclosed within the pole, substantially as set forth.

6. A trolley-pole made of a plurality of pieces of material and having a round contour in cross-section at its upper end and an 50 elliptical or oblong contour in cross-section at its lower end, one of the pieces being applied to the other at one of the points of larger radial diameter, substantially as set forth.

7. A trolley-pole made of a plurality of 55 pieces of material and having a round contour in cross-section at its upper end and an elliptical or oblong contour in cross-section at its lower end, one of the pieces being applied to the other at one of the points of larger 60 radial diameter, and a conductor inclosed within the pole, substantially as set forth.

8. A trolley-pole having a substantially round contour in cross-section at the upper end and an elliptical or oblong cross-section 65 at its lower part, substantially as set forth.

9. A trolley-pole made of a plurality of pieces of non-conducting material, the conductor whereof is inclosed within and protected by it, substantially as set forth. 70

10. A trolley-pole made of a plurality of pieces of wood, bands encircling the pole, and a conductor placed within the same, substantially as set forth.

11. A trolley-pole made of a plurality of 75 pieces of wood, and a tubular conductor placed in a passage within the pole and which snugly fits the passage, substantially as set forth.

12. A trolley-pole made of a plurality of 80 pieces of wood, bands encircling the pole, and a tubular conductor inclosed within the pole and protected by it, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 24th day of March, A. D. 1891.

CHARLES A. LIEB.

Witnesses:

J. E. HOFFMAN,

PHILLIPS ABBOTT.