(No Model.)

# T. A. EDISON.

## UNDERGROUND CONDUCTOR.

No. 251,552. Patented Dec. 27, 1881.

Fig. 1.

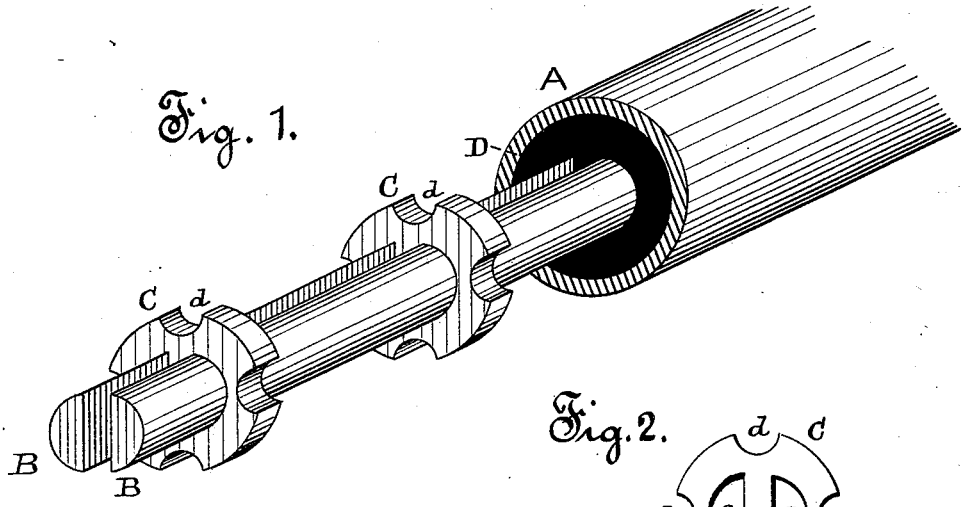



Fig. 2.

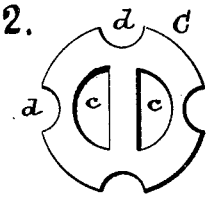



Fig. 3.

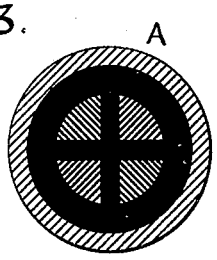



Fig. 4.

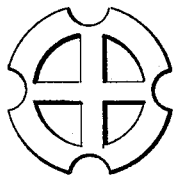


Fig. 5.

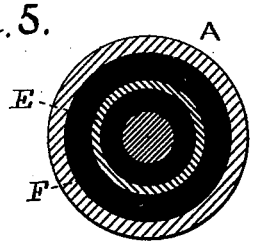



Fig. 6.

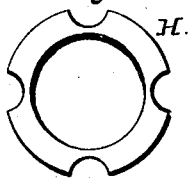
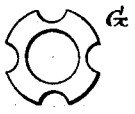



Fig. 7.




Attest:

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# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, ASSIGNOR TO THE EDISON ELECTRIC LIGHT COMPANY, OF NEW YORK, N. Y.

## UNDERGROUND CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 251,552, dated December 27, 1881.

Application filed April 26, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Underground Conductors; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

In my system of furnishing electric light and power to a large number of consumers from one central station it is preferable that the conductors which convey the current to the various translating devices in circuit should be laid underground. Some method, therefore, is necessary by which these conductors can be completely insulated and protected from injury by moisure and other causes. This is the object of the present invention, which, generally speaking, is as follows: The two conductors which form a circuit from and to the place of supply consist of copper rods or bars or tubes which are placed in pipes or tubes of iron of considerably larger diameter. Washers of a suitable insulating material, preferably paper or pasteboard, are placed around and between the conductors, so as not to allow any electrical contact between the conductors themselves, or between a conductor and the metal of the exterior pipe, and the remaining space is filled with asphalt or a similar non-conducting substance, or compound of various substances, so that a perfect insulation is attained. The washers or disks above noted are made with notched edges, so as not to close up the entire cross-section of the tube, so as to enable the insulating compound to enter all parts of the tube. Appropriate arrangements of this kind are shown in the accompanying drawings.

Figure 1 is a view in perspective of a street-main, a portion of the inclosing-tube being removed to afford a view of the conductors; Fig. 2, a sectional view of the insulating washer of Fig. 1; Figs. 3 and 5, sections of other forms of mains; and Figs. 4, 6, and 7, sections of washers used therewith.

In the drawings, A is a pipe or tube, of iron or other suitable metal.

B B, Fig. 1, are copper bars or rods, whose diameters vary according to the number of translating devices to be supplied, but together are much less than the internal diameter of the inclosing-pipe A.

C C are washers, of some such insulating material as paper or pasteboard, what is known as "Manila board" being very suitable therefor, it being as effective as glass for this purpose, with the advantage of more easy manipulation and great economy in cost. These have apertures C C (see Fig. 2) of the same shape as the conductors, which pass through them, fitting closely therein. These washers are of such size that they also fit closely within the tube A and prevent contact between the conductors and the inside of the tube. The space D, which surrounds the conductors between the washers, is filled with any suitable insulating material, asphalt or an asphalt composition being appropriate substances for this purpose, this also filling the spaces between the conductors themselves, the edges of the washers containing notches *d d*, so that apertures are left to enable the insulating compound to flow through the entire length of the tube. Various-sized completed conductors may be made; but as the sizes vary the arc of the circular portion of the conductors should vary, so that the arc of the conductors is always concentric with that of the inclosing-tube, securing a uniform thickness of insulating material between the two.

By using the form of washer shown in Fig. 4 four conductors may be placed in one tube, as in Fig. 3.

Instead of both conductors being solid rods, the arrangement shown in Fig. 5 may be used. In this case one conductor is a tube, as E, through which passes the other, a round rod, F, a pasteboard washer, G, Fig. 7, being placed between them, and a larger washer, H, Fig. 6, between E and A, the remaining spaces being filled with an insulating substance, as above described.

It is evident that any number of different forms of conductors, washers, &c., may be used in addition to those herein described, as may be desired.

By these devices I am enabled to obtain a complete and permanent insulation between the conductors themselves, and also between the conductors and the exterior tube, the latter at the same time preventing any injury from moisture, dampness, or other causes which might affect the conductors or the insulation thereof from reaching the same.

What I claim is—

1. The combination, with an inclosing-tube and electrical conductors contained therein, of washers made of Manila or paste board, supporting the conductors and separating them from the tube and from each other, and notched upon their exterior edges to permit the flow throughout the tube of liquid insulating material, substantially as set forth.

2. A compound electric conductor in which the individual conductors are solid metallic bars, formed each as a segment of a circle, and both separated from each other, and supported within an inclosing-tube by disks or washers of insulating material, substantially as set forth.

3. A circuit for electric currents in which one conductor is a hollow tube and the other a solid circular rod passing through the said tube, and insulated therefrom and supported therein, and separated therefrom by insulating disks or washers, substantially as set forth.

4. A metallic circuit for electric lights, consisting of two semicircular rods supported by and separated from each other in a metallic pipe by a series of insulating-washers, the pipe being filled with a suitable insulating material, substantially as set forth.

5. A metallic circuit composed of semicircular rods secured within but insulated from a metallic containing-tube, the arcs of the conductors and the tube being concentric, substantially as set forth.

This specification signed and witnessed this 22d day of April, 1881.

THOS. A. EDISON.

Witnesses:

WM. H. ALDEN, Jr.,

H. W. SEELY.