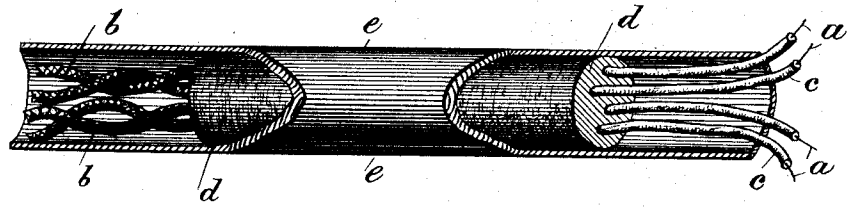
(No Model.)

W. L. CANDEE.

ELECTRIC CABLE.

No. 428,745. Patented May 27, 1890.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLARD L. CANDEE, OF BROOKLYN, ASSIGNOR TO THE OKONITE COMPANY, OF NEW YORK, N. Y.

ELECTRIC CABLE.

SPECIFICATION forming part of Letters Patent No. 428,745, dated May 27, 1890.

Application filed March 19, 1890. Serial No. 344,531. (No model.)

To all whom it may concern:

Be it known that I, WILLARD L. CANDEE, of the city of Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in the Construction of Electric Cables, which improvement is fully set forth in the following specification.

This invention has reference more particularly to the construction of cables or multiple electric conductors of the class in which the individual conductors are insulated from one another by a braid of fibrous substance or by a wrapping of paper or of other like material, which so long as it is perfectly protected from moisture constitutes an efficient electrical insulation. The cables now in use are generally constructed in this manner, the group of conductors being incased in an impermeable sheath or tube of lead or similar material. In the transportation and laying of such cables great care must be exercised to prevent exposure of the ends of the separate sections to moisture, which being readily taken up by the fibrous covering will follow along the conductors by capillary action and impair or destroy insulation for a greater or less distance, according to the amount of moisture absorbed. Where this occurs it constitutes a source of great trouble, no matter how carefully the joints may have been formed, frequently necessitating the cutting out and replacing of defective portions, whereby expense and delay are entailed. To avoid this difficulty in a measure, it has been customary to cover the ends of the sections of cable with a lead or other metallic cap. This expedient, however, is serviceable only during transportation, since the caps must be removed when the cable is laid and the ends of the several wires united. During this operation the wires are necessarily exposed, and if the ground be excessively moist or if rain be falling the damage may be as great as if the cable had not been protected in the manner explained.

The object of the present invention is to obviate the difficulty above pointed out by the production of a cable having paper or fibrous insulation around the several conductors which shall be perfectly protected against access of moisture not only during transportation, but also during the operation of laying the cable in any atmospheric conditions or when the trench contains water. This object is accomplished by surrounding the several wires of the cable for a distance of, say, six inches or more from the ends of the sections in a water-proof substance or compound—such as okonite, rubber, gutta-percha, or the like—filling with such substance the interior of the protective sheath or casing. At the ends of the conductors where the water-proof compound is applied the fibrous wrapping or envelope is removed, so that the okonite or other material comes into direct contact with the wires and envelops them individually as well as collectively.

The presence in the cable of a plug or filling of water-repellant substance at intervals effectually prevents access of moisture to such parts of the conductors as are inclosed in the fibrous insulating material, and in conjunction with the exterior case or sheath serves to protect the insulation as perfectly as if the conductors were separately incased in a water-proof insulating compound for their entire length.

In carrying out the invention the protective ends may be prepared separately and attached to the ends of the cable and the whole incased in the close-fitting tube or pipe of lead or other material.

The accompanying drawing shows a short length of cable constructed in accordance with the invention, the outer casing being partly removed.

The several conductors *a* composing the cable are insulated, as usual, by a fibrous braid or wrapping *b* of any material such as commonly employed for that purpose. At or near the end of the cable or section thereof, in place of the fibrous insulation, the several conductors are provided with a coating or envelope *c* of water-proof material or compound—such as okonite, for example—extending for a suitable distance from the ends, and a mass *d* of the same or a like compound is formed around the entire group of wires, the whole being inclosed by the exterior sheath or pipe *e*.

It will be seen that in a cable constructed as shown in the drawing it would be impos-

sible for moisture to find access to the fibrous covering *b*, so as to impair the insulation of the conductors, even when the work of laying the cable is carried on in a rainy season.

For the sake of simplicity the drawing shows only a small number of conductors *a;* but it will be understood that in practice the insulated wires lie close together and are sufficient in number to fill practically the entire space within the pipe or sheath *e*.

While particular reference has been made herein to multiple electric conductors, it is evident that the improvement is applicable to a single insulated conductor—as, for example, an electric-light wire, which may be insulated by a wrapping of cotton saturated with paraffine, incased in a lead tube and protected at its ends by being embedded in a water-proof compound, as above described.

The protection afforded by the present invention is advantageous where the fibrous insulation is treated, as commonly done, with paraffine or like substance to prevent deterioration and impairment of the electrical insulation, which would otherwise take place.

I claim as my invention—

An electric cable composed of a conductor or group of conductors individually insulated except at the ends by a braid or wrapping of fibrous material and an impermeable sheath or covering, the terminals of the conductors being covered by and embedded in a water-proof insulating compound which fills and closes the end of the sheath or covering, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLARD L. CANDEE.

Witnesses:

VICTOR E. BURKE,

ALFRED D. BEEKEN.