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TERMINAL FOR ELECTRIC CABLES.

(Application filed Feb. 17, 1899. Renewed Nov. 10, 1899.)

(No Model.)

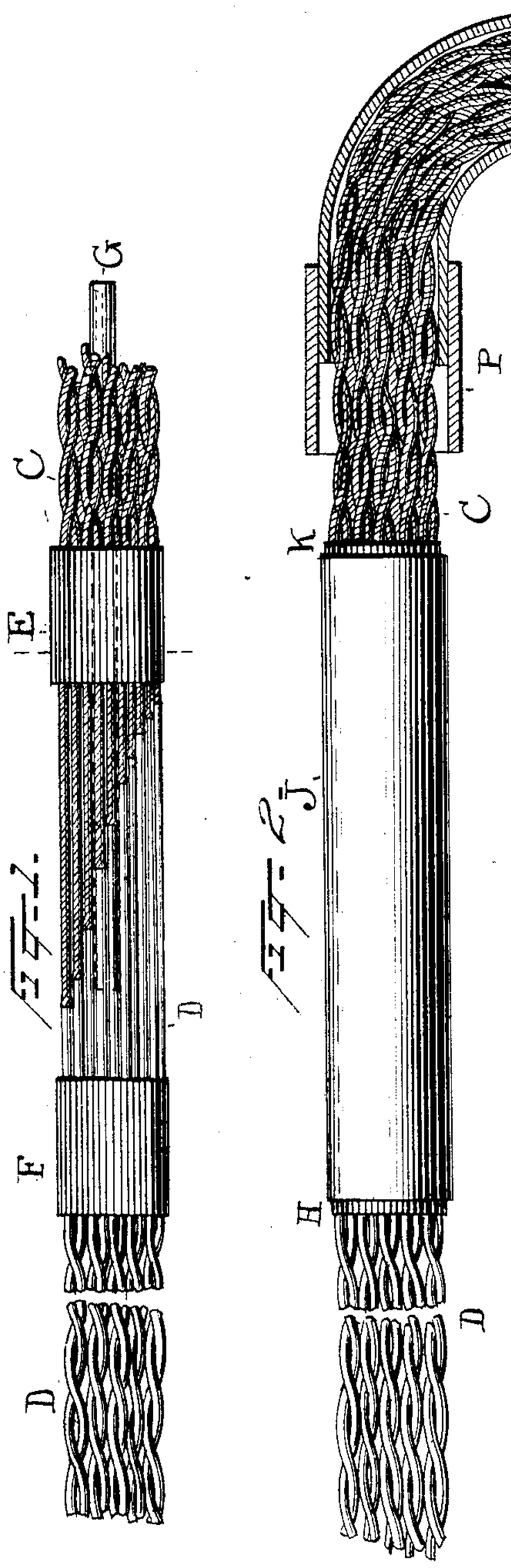

Fig. 2.

Fig. 2.

Fig. 4.

Fig. 3.

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TERMINAL FOR ELECTRIC CABLES.

SPECIFICATION forming part of Letters Patent No. 640,365, dated January 2, 1900.

Application filed February 17, 1899. Renewed November 10, 1899. Serial No. 736,539. (No model.)

To all whom it may concern:

Be it known that I, WILLARD L. CANDEE, of the city of New York, (Brooklyn,) county of Kings, State of New York, have invented certain new and useful Improvements in Terminals for Electric Cables, of which the following is a specification.

My invention relates to cables composed of a number of electric conductors individually insulated from one another by a braid of fibrous substance or by a wrapping of paper or other like material, constituting an insulating material possessing strong features of merit, but susceptible to attack or injury from moist air. A series of such insulated conductors are usually incased air-tight in an impermeable sheath or tube, such as lead pipe. The insulation is thoroughly dried and there is a continually-varying degree of pressure within the tube or pipe as compared with atmospheric pressure. In the process of transporting and of laying such cables in position great care must be exercised to prevent the exposure of the ends of the cable to air and moisture, which are readily taken up by the fibrous covering and will follow along the conductors by capillary action, aided by variations with respect to atmospheric pressure. The result of this is to impair or destroy the insulation to a greater or less extent, according to the amount of moisture absorbed. Where this occurs, it is a source of trouble and expense, frequently necessitating cutting out and replacing defective portions. To avoid this difficulty in a measure and to supply a portable terminal, it has been proposed to cover the end of the cable with a metallic cap; but this is serviceable only during transportation, since the cap must be removed when the cable is laid to expose the ends of the several wires to be united, as to an adjacent section. During this latter operation the ends of the wires are necessarily exposed, and if the ground be moist or if the atmosphere is charged with moisture the damage will be as great as if no metallic cap had been employed.

The present invention is an improvement upon the cable-terminal shown and described in United States Letters Patent No. 428,745, dated May 27, 1890, granted to me, where the invention consists in surrounding the several wires of the cable for a certain distance from the end of the section with a waterproof substance or compound, so as to fill the interior of the protecting sheath or casing, the waterproof material acting as a plug or dam to prevent the passage of air and moisture.

The object of the present invention is to more perfectly secure the result sought to be attained by the improvement described in the Letters Patent referred to.

My improved cable-terminal consists of a section of cable containing a series of conductors individually insulated with rubber, gutta-percha, or other similar material combined with the cable in which each conductor is insulated with a fibrous paper or similar insulating material. The conductors of the first-named section are spliced to corresponding conductors of the cable. Surrounding such insulated fibrous or paper-covered conductors individually and collectively at a distance some inches from the point of splicing there is a fixed section of impermeable insulating material that can only be rendered mobile with difficulty, if at all, and at substantially the same distance upon the opposite side of the splice there is a similar section of impermeable insulating material closely surrounding the rubber or gutta-percha coated conductors. A section of an impermeable casing, like a section of lead pipe, is drawn over the point where the conductors are spliced. Each end of the section is caused to make an air and water tight junction with the projecting section of insulating material. The space between the fixed sections of insulating material and the inclosing sleeve or casing is filled with an insulating material or compound—such as mineral wax, ozocerite, a compound of wax and resin, or any equivalent material having a low melting-point and easily rendered mobile—thus completely excluding air and moisture from the inclosed space and the interstices. This material is preferably introduced through a tube. The tube is then removed and a plug of insulating material is placed in position to stop the opening made by withdrawing the tube. The sheathing or casing inclosing the fibrous insulated cable is usually of lead pipe, and this is united to the adjacent end of the sleeve or section of casing referred to by a section of

the same material employing an air and water tight joint, such as the plumbers' wipe-joint.

The accompanying drawings illustrate my invention.

Figure 1 shows the splice between the fibrous-coated and the rubber-coated conductors, with the fixed sections of insulating material upon each side of the splice and a tube through which the mobile insulating material is introduced. Fig. 2 shows the sleeve or case united to the projecting insulating-sections at its opposite ends. Fig. 3 is a detail of the plug in position, and Fig. 4 is a modification.

In Fig. 1, C is the cable, consisting of a series of conductors, each of which is covered with an insulating substance, as a braid of fibrous material, like cotton, or a wrapping of paper or the like. D is a short section of cable, each conductor being coated with rubber or gutta-percha or any similar material not susceptible to attack by moist air and not easily rendered mobile—that is to say, such a material that moist air cannot follow the metallic conductors either through the rubber or between the rubber and the wire—whereas in the case of the fibrous material of the cable C air and moisture will permeate the insulating material and follow the wire inside its coating. As shown in the drawings, the points of the splice of the several conductors break joints with respect to each other. At a short distance from the point of splicing—say two or three inches—at a point on the fibrous conductors C there is a fixed section of impermeable insulating material E, either okonite, rubber, gutta-percha, or some equivalent insulating material. This is made to surround the conductors individually and collectively. It may be allowed to project slightly from the exterior surface. Upon the opposite side of the splice and surrounding the rubber-coated conductors D there is a similar fixed section F, preferably of the described material, surrounding the conductors individually and collectively. Each of these sections constitutes an impassable barrier to air and moisture. A sleeve or section of an impermeable metal J, such as a section of lead pipe, is slipped on over these sections of insulating material, and the ends thereof are made to form an air and moisture proof junction with the sections of insulating material E and F, respectively, as shown at H and K in Fig. 2. The space inclosed by these sections E and F and the case J are now filled with the mobile insulating material, such as mineral wax, ozocerite, or wax and resin, a material or compound having a comparatively low melting-point. To accomplish the filling, a tube G is forced in at or about the center of the fibrous-coated conductors C. The mobile insulating material in a fluid state is poured in, the tube being gradually withdrawn as the space is filled. As soon as the space is filled a plug of insulating material, preferably rubber or ozocerite, is forced into the opening made by the tube and the filling is allowed to cool. The pipe-section or case P is now slipped on over the section J, and a wipe-joint is made.

Fig. 3 is a cross-section through the section of insulating material E, showing how insulating material fills the interstices and projects slightly from the surface of the cable. The sleeve or section of metal J is shown in position. At the point where the tube G has been withdrawn a plug of insulating material *x* is forced to provide an air-tight seal at that point.

In Fig. 4 I have shown a modification which consists in crimping the sleeve or section of metal J upon opposite sides of the section of insulating material E or F, so as to prevent longitudinal displacement by the pressure of air.

It will be seen that in a cable constructed as shown and described it will not be possible for moisture to find access to the fibrous covering of the conductors C, so as to impair the insulation of the conductors or to change their electrical condition, even when the end is exposed or when the work of laying the cable is carried on under unfavorable conditions.

What I claim, and desire to secure by Letters Patent, is—

1. A terminal for insulated cabled conductors consisting of a short section of cabled conductors respectively connected to the conductors of an insulated cable, combined with two separated adjacent and fixed sections of impermeable insulating material closely surrounding the conductors and projecting from the surface thereof, an impermeable shell or casing inclosing the conductors having its ends united to said sections respectively, to form an air-tight junction therewith and an insulating material having a low melting-point filling the space formed by the casing and fixed sections, substantially as described.

2. In a cable-terminal the cable consisting of a series of conductors coated with a form of insulating material susceptible to attack by moist air, combined with a section of cable composed of a series of conductors coated with an insulating material not susceptible to attack by moist air, an electrical junction between the respective conductors of the two sections, a fixed section of impervious insulating material projecting from the surface of each section near said junction, an impermeable shell or casing having its ends united to said sections respectively to form an air-tight inclosure and an insulating material having a low melting-point filling the space or inclosure formed by said casing and sections, substantially as described.

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