June 6, 1939. R. E. BISHOP 2,161,447

METHOD OF OBTAINING ELECTRICAL INSULATION AND THE PRODUCT

Filed Dec. 11, 1937

Fig. 1.

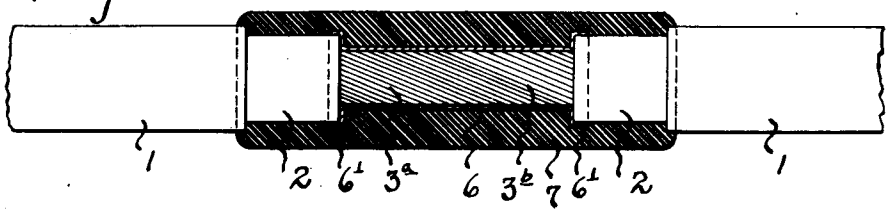


Fig. 2.

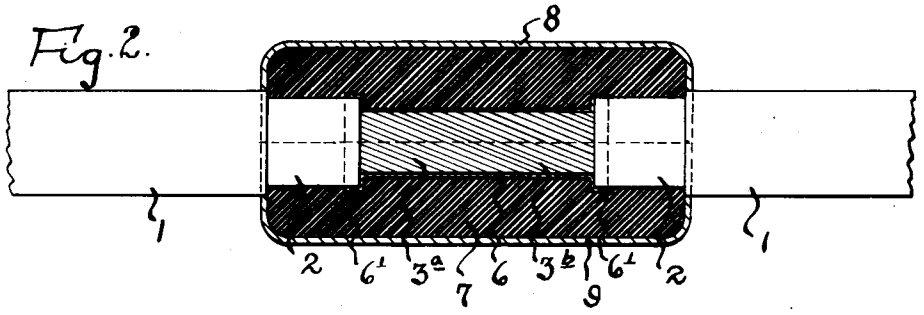
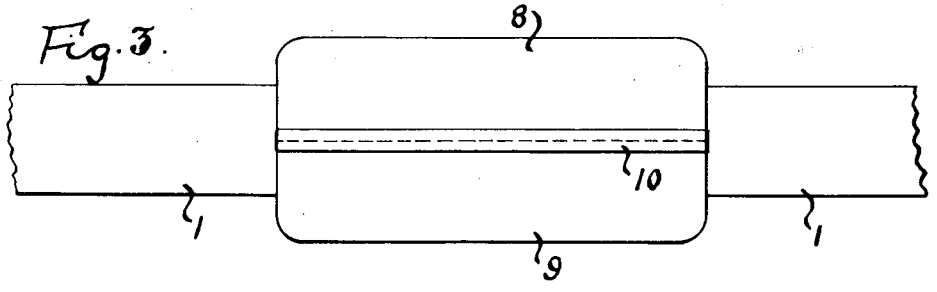


Fig. 3.



INVENTOR.
Richard E. Bishop.

BY

Darby & Darby.
ATTORNEYS.

Patented June 6, 1939 2,161,447

UNITED STATES PATENT OFFICE

2,161,447

METHOD OF OBTAINING ELECTRICAL INSULATION AND THE PRODUCT

Richard E. Bishop, South Orange, N. J., assignor to A. C. Horn & Company, Long Island City, N. Y., a corporation of New York

Application December 11, 1937, Serial No. 179,376

4 Claims. (Cl. 174—84)

This invention is concerned with improved methods and products for effecting the insulation of electrical connections, apparatus and the like, and the product.

The general object of the invention is to provide a new method and product and concerned with the insulation of electrical connections and apparatus of all kinds, and particularly with methods of electrically insulating circuit joints and connections while energized.

The many detailed objects of this invention will be apparent from the following disclosure, particularly when taken in connection with the attached drawing which is presented in an illustrative sense.

This invention resides substantially in the combination, construction, arrangement, relative location of parts, steps and series of steps, all as will be fully described in this specification.

In the accompanying drawing,

Figure 1 is a longitudinal, central, cross-sectional view through a cable joint insulated in accordance with the method of this invention;

Figure 2 is a similar view of a further modification; and

Figure 3 is an outside elevational view of the joint of Figure 2.

At the present time the most common method of insulating freshly made joints in wires and cables, and of the exposed parts of electrical apparatus consists in wrapping the exposed metal parts with many layers of insulating tape which is employed in several well known forms. Frequently there is interposed between the adjacent layers of tape, insulating, and/or adhesive varnishes, strips of insulating fabric such as varnished cambric, oiled silk, and the like. The building up of a satisfactory insulation of this type which is very commonly done in the field, involves a considerable amount of time and skilled operators who are highly paid. The result is that joints insulated in this manner are expensive.

Since this work must frequently be carried on while the metal parts or circuits are energized, no more satisfactory method than this has heretofore been devised. There are of course known and used types of premolded or cast insulating fittings or castings which have been used, but since they are often of necessity formed of two mating parts they are not sufficiently watertight, especially when used in the field such as in manholes in the street, to permit of very extensive use thereof. In addition, although they save time in installation they are of necessity rather expensive. The result is, because of their cost and ineffectiveness in many places they are not very extensively used.

The invention herein disclosed involves the use of materials novel for this purpose, and methods of employing them which make their use for the first time possible and practical. As noted above, the insulation of exposed metal parts in electrical circuits, and particularly wire and cable joints, must often be applied while the metal parts are energized, with the result that heretofore fluid containing insulating materials, and particularly those containing water or moisture have not been available for use because of the almost certain injury which would occur to the operator in applying them to the energized parts. However, by means of this invention this may now be accomplished in a number of different ways, employing highly insulating materials particularly desirable for the purpose, in a manner so as to form a continuous homogeneous body of insulation surrounding the metal parts, and in the case of cables bonded to portions thereof to form a thoroughly watertight seal of high protective characteristics.

In accordance with this invention latices of various forms and particularly latex in combination with various ingredients in mixture therewith are employed. Admixed to latex for example is a suitable non-conducting, moisture-absorbing ingredient, preferably in powder form, such as aluminous cement or its equivalent. In addition when desired moisture-absorbing fibrous materials such as jute, hemp, asbestos, and the like may be incorporated into the mass which in addition impart some additional strength thereto. Furthermore, when desired there may be added to the mixture various materials commonly employed with rubber latices to act as hardening, setting and vulcanizing agents, and when further desired, agents which accelerate these actions. Such materials are well known in the arts in many forms. Instead of latex, rubber dissolved in various volatile solvents known for the purpose, or prevulcanized rubber may be employed in combination with the ingredients mentioned above in connection with the use of latex, as well as with various volatile solvents.

Fluid plastic masses of latices of the above described forms are conducting, with the result that they have not heretofore found use for the purpose of insulating exposed metal parts in electrical circuits. On the other hand, they have many desirable characteristics for the purpose

but heretofore no method has been available for using them.

There are disclosed in the attached drawing methods which now make them available for these purposes. By way of illustrating the principles and methods of the invention there has been shown in the figures the ends of an electric cable consisting generally of an outer insulating casing 1, which takes many forms, and an inner casing 2, which frequently is of rubber or rubber composition, alone or in combination with fabrics. In Figure 1 it will be seen that the outer insulating casing 1 has been removed for the necessary distance so as to expose the inner casing 2, both of which of course have been removed to expose the ends 3^a and 3^b of the cable, wire, or conductor to be united. In the drawing these ends have been shown as united, and it is immaterial to this disclosure as to the manner in which this has been done. Surrounding the exposed metal of the conductor is a thin layer 6 of a rapidly drying and/or non-conducting material such as a bituminous base insulating compound of which many forms are known, an insulating varnish such as for example one having a gum base, a wax compound, rubber in tape or sheet form, varnished cambric, oiled silk, or any other electrical insulating material which is in itself non-conducting at the time of application or very quickly thereafter becomes non-conducting. It is preferable that this layer 6 extend beyond and overlap a short distance the ends of the insulation 2 as shown at 6'. As is clear from Figure 1, the layer 6 completely encloses the exposed metal portion of the cable, and in the case where the operator is working on live circuits, this layer affords adequate protection to him for the following operation.

Encasing the portions 2 and 6 and partly overlapping the ends of the portions 1 is a covering or housing which is composed for example, as explained above, of latex in admixture with a moisture-absorbing agent such as aluminous cement in powder form, and if desired fibrous materials such as hemp, jute, asbestos and the like, with or without the addition of a suitable hardening, setting or vulcanizing agent. A mixture of these ingredients of suitable consistency is made up and the operator then molds a mass of it around the joint, as is clearly shown in Figure 1, to form a continuous homogeneous casing 7 for the joint which he may work with his hands without danger of injury even on live circuits because of the protection offered by the layer 6. Plastic materials of this nature may be made up in consistencies which make it possible to mold the material in this manner and have it hold its shape during the period while it is setting, hardening or vulcanizing. The molded mass becomes bonded or welded to the exposed rubber casings 2, which action may be accelerated by first painting them, if desired, with a suitable bonding agent having a rubber base such as for example rubber cut in a volatile solvent. Thus, although the mass is a continuous homogeneous body which as soon as it sets will not break loose from the joint, its attachment thereto is further insured by its bond to the portions 2 of the cable.

At this point it may be well to emphasize that the invention herein disclosed is shown as applied to exposed conductors in a circuit, but may of course be employed to insulate any exposed metal parts of electrical apparatus, and indeed any other apparatus not only to insulate it, but to protect it against injury, corrosion and the like.

Figures 2 and 3 show a further method of accomplishing the objects of this invention. In Figure 2 the insulating layer or film 6 has been used, but it is pointed out that it may in the proper cases be eliminated. In addition the film 6 in this arrangement may be eliminated even in the case of live circuits because the plastic composition 7, prepared as explained above in connection with Figure 1, is placed in suitable quantity in a preformed thin insulating shell comprising the mating parts 8 and 9. This shell may be made of any suitable material either moisture absorbent or resistant. It may, for example, be made of pressed wood pulp, or any one of the synthetic plastic materials such as "Bakelite." The two halves containing the rubber mass are clamped around the joint so that the mating shell portions are aligned. It may then be held in place by wrapping a suitable binder around it until the rubber has set, and if desired to more certainly insure a watertight joint, the line of union between the shell parts may have applied thereover an insulating film as indicated at 10. This film can be any of the materials referred to as comprising the film 6 of Figure 1, which in the case of volatile solvents will quickly dry, or in the case of melted asphalt compounds will quickly cool and set to seal the joint.

When desired, as noted above, the arrangements of Figures 2 and 3 may include the film 6. For further emphasis this film in all forms of the invention either consists of asphalt and/or pitches having a low melting point, which may be easily melted, applied hot, and which quickly cool and solidify. It may be of wax in paste form, or a petroleum product such as petrolatum, or jellies or oils having high insulating qualities. It may be formed of sheets of rubberized or treated fabric such as oiled silk or varnished cambric. It may be built up of a layer of friction or rubber tape which may be used in a much lesser quantity and built more quickly than in the case where the entire insulation is made up therefrom. It is believed that on the basis of the above those skilled in the art will readily appreciate the equivalency for the purpose of other known materials.

It is of course to be appreciated that the form of joint illustrated in the drawing is exceedingly simple, whereas in actual practice these joints are often quite complicated, as in the case where more than two wires come together and often at difficult angles. The advantage of this invention becomes even more readily apparent when considered in connection with complicated and intricate joints where the most skill and longest time is required to adequately tape and protect them by the older methods. The insulating composition herein disclosed can be easily molded around the joint and the part even in cases where it is an unduly complicated one.

From the above description it will be apparent to those skilled in the art that the methods of this invention and the details of the products thereof may be widely varied without departure from the novel subject matter herein disclosed. I do not, therefore, desire to be strictly limited to the disclosure as given for purposes of illustration, but rather to the scope of the appended claims.

What I seek to secure by United States Letters Patent is:

1. A method of insulating a live electrical conductor which comprises encasing the conductor within a thin insulating layer and molding a plastic rubber mass therearound capable of setting, which is conductive while plastic and insulating when set to form an insulating protection therefor.

2. A method of insulating an exposed joint between a pair of rubber insulated cables in a live electric circuit which comprises applying an insulating film to the exposed joint and molding therearound aplastic rubber mass capable of setting which is conductive while plastic and insulating when set and bonded to the rubber insulation of said cables.

3. A method of insulating and waterproofing an exposed portion of an electric cable while in circuit including the steps of applying a liquid insulating coating to the exposed portion thereof and molding thereover a plastic rubber base mass capable of setting which is conductive while plastic and insulating when set to form an insulating and waterproof protection therefor.

4. A method of insulating and waterproofing a joint between a pair of rubber insulated cables comprising the step of encasing the exposed metal joint within an insulating casing and molding a plastic rubber base mass therearound capable of setting which is conductive while plastic and insulating and waterproofing when set.

RICHARD E. BISHOP.