Nov. 6, 1934. W. E. BOYLE 1,979,444

ABRASION RESISTING TUBE

Filed July 30, 1932

Fig. 1.

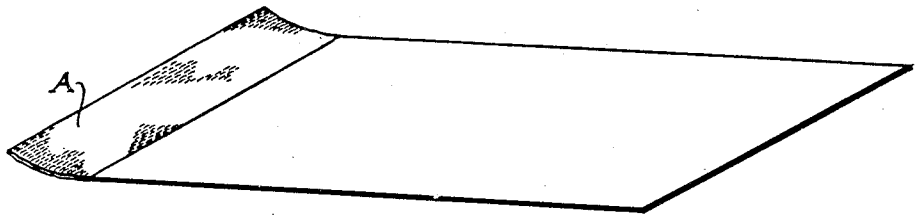


Fig. 2.

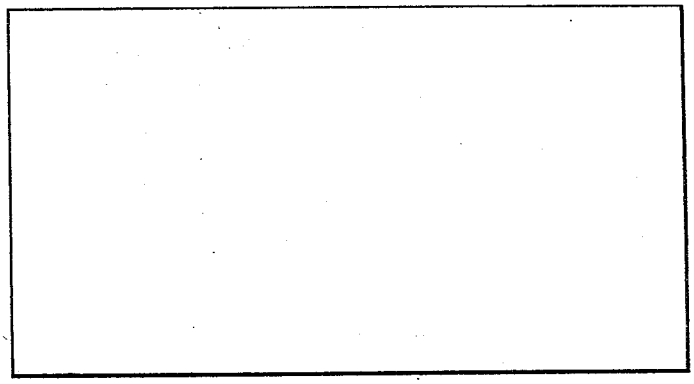
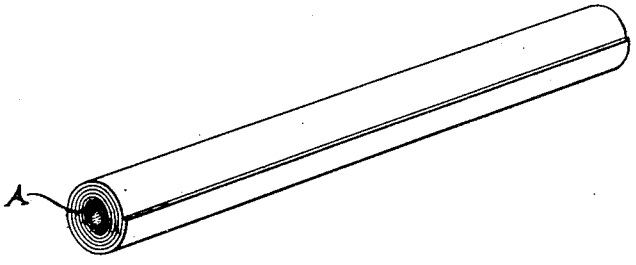


Fig. 3.



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ABRASION RESISTING TUBE

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4 Claims. (Cl. 173—28)

This invention relates to protective sleeves or tubes which are adapted to be applied to overhead conductors to protect them against abrasion and other mechanical injury and to provide additional insulation at the points of application, such sleeves or tubes having particular utility when employed in connection with overhead distribution systems in which certain of the conductors are installed in close proximity to trees.

Swaying tree branches often cause service interruptions, usually by intermittent grounding of the conductors in their vicinity. As ordinary weather-proof wire will not withstand for long the abrasive action of swaying tree limbs, specially covered wire known to the trade as "tree wire" has been proposed, the said wire having a heavy rubber insulation reinforced with abrasive-resisting tapes and braids. It is the practice to further reinforce this kind of wire, as well as the ordinary weather-proof wire referred to, with sleeves made of wood, fibre, or the like, whereby to provide additional protection at the points where the conductor may come into contact with the tree limbs.

One object of my invention is a sleeve or tube which is adapted to provide adequate reinforcement of a relatively permanent nature to either bare or insulated conductors.

A further object is to provide a sleeve or tube which has high dielectric and abrasion resisting characteristics.

A still further object is to provide a sleeve or tube which is applicable to conductors of various diameters, this object contemplating a sleeve or tube which, when it is applied to a conductor, automatically adjusts itself to the size of the conductor.

A still further object is to provide a sleeve or tube which may be applied with facility.

A still further object is to provide a sleeve or tube which is light in weight and which is so designed that the diameter of the conductor will not be increased to an objectionable degree at the point where it is applied.

The sleeve or tube is formed from a base material which is impregnated or coated with a binder. The base material is preferably of a fibrous character and may, for example, be of duck, jute, paper or the like. The binder is preferably a synthetic resin such as, for example, "Bakelite" or the like and it may, if desired, include a filler such as bituminous matter or a shelf-lubricant such as graphite.

In the manufacture of the sleeve or tube, assuming for purposes of illustration that the base material is duck and the binder a 40 to 50 percent phenol-formaldehyde resin, the duck may be passed through a bath of the resin or otherwise suitably coated with it. The resin is first dried to the proper stage. Heat and pressure are then applied to the sheet to cure the resin to the extent desired. The sheet is then rolled into a tube while hot and held in this shape while it cools. As the sheet cools the binder hardens and sets, thereby causing the various convolutions of the tube to resiliently retain their shape when the tube is released. The tube can be unrolled or opened to enable its application to a conductor. When released the various convolutions thereof automatically contract toward their original shape, the tube preferably being so formed that the inner convolution engages the conductor as it approaches its original shape.

The invention is illustrated in the accompanying drawing in which:

Figure 1 is a perspective view of a finished tube stretched out in the form of a sheet.

Figure 2 is a plan view of a modified form of tube which is also stretched out in the form of a sheet.

Figure 3 is a perspective view of a tube rolled to final shape, the tube being formed from a sheet of the kind shown in Figure 1.

The shaded portion A of the sheet shown in Figure 1 is that part which provides the inner convolution of the tube, that is to say the convolution which lies adjacent the conductor. Preferably the surface of this part of the tube is rough so that it will engage the conductor and prevent the tube from slipping along the conductor after it has been arranged in the desired position. After the binder is dried, preparatory to the operation in which it is cured, the entire surface of the sheet is rough. In the curing operation that part of the surface which is treated becomes hard and smooth. The desired surface characteristics of the zone A, therefore, may be obtained by so arranging the sheet with reference to the dies of the curing equipment that the said zone escapes treatment. The treatment of the sheet in the manner described is not objectionable as the zone in which the binder is cured is of such a length as to afford the desired dielectric and abrasion-resisting qualities.

In the embodiment illustrated in Figure 2 the binder is cured throughout the entire sheet. In this embodiment, therefore, the inner convolu-

tion of the tube is similar in physical characteristics to the outer convolutions.

The tube described has high dielectric properties. Owing to the high resistance which it offers to abrasion, its frequent replacement is avoided. Preferably it fits closely around the conductor, thereby preventing the formation of air and water pockets. The factor of safety against electrical failure can be increased by increasing the thickness of the tube wall, it being understood in this connection that the desired wall thickness can be obtained by varying the weight of the base material, by varying the number of convolutions or by varying both of these factors. The tube will also afford adequate protection when installed after the insulation of a wire has failed. The above advantages are obtained with only a small increase in the overall diameter of the conductor, thereby insuring a neat appearance and a relatively low ice load. The tube is very light in weight as compared to other protectors. It can be made in any desired length and diameter. It can be readily applied at the desired point, without necessitating the cutting of the wire, by a simple unrolling and re-rolling operation. No bolts, screws or clips are required to secure it in position. It is applicable to ordinary bare or weatherproof wire as well as to so-called "tree wire". Maintenance costs are low as the tube is resistant to water, chemicals, heat, oil, actinic rays and fire.

As pointed out heretofore, the tube tends to retain its form and hence when it is unrolled during its application to a conductor and then released it automatically contracts itself upon the conductor as it returns to its original form or as close to such form as the conductor will permit. During such contraction the inner convolution of the tube engages the conductor and owing to the roughened condition thereof the guard will be held from slipping along it, it being understood in this connection that the securement of the tube against slipping may be effected in any suitable manner. In curing the sheet from which the guard is formed the sheet is provided with a hard, smooth surface. Thus, the binder not only causes the tube to retain a prescribed shape but it also provides the sheet with a surface which is highly resistive to abrasion, the smoothness of the surface reducing the friction between the tube and an abrading object to a minimum. The tube, therefore, is capable of withstanding the rubbing action of a contacting object over long periods of time.

Having thus described the invention, what is claimed, is:

1. An abrasion resisting guard comprising a fabric sheet impregnated with a binder which consists of a phenol-formaldehyde condensation product, said sheet being rolled to provide a tube, said binder causing the tube to resiliently retain its shape, whereby it can be unrolled to enable its application and whereby, when released, it will return to its original shape.

2. An abrasion resisting guard comprising a fabric sheet impregnated with a binder which consists of a phenol-formaldehyde condensation product, said sheet being spirally wound to provide a tube, said binder causing the tube to resiliently retain its shape, whereby it can be unrolled to enable its application and whereby, when released, it will return to its original shape.

3. An abrasion resisting guard comprising a fabric sheet impregnated with a binder which consists of a phenol-formaldehyde condensation product, said sheet being spirally wound to provide a tube, said binder causing the tube to resiliently retain its shape, whereby it can be unrolled to enable its application and whereby, when released, it will return to its original shape, the inner convolution of said tube being adapted to engage the object upon which the guard is arranged and hold the said guard against slipping from the position in which it is arranged.

4. An abrasion resisting guard for a conductor comprising a sheet of duck impregnated with a binder which consists of a phenol-formaldehyde condensation product, said sheet being rolled to provide a tube, said binder causing the tube to resiliently retain its shape, whereby it can be unrolled to enable its application and whereby, when released, it will contract around the said conductor.

WILLIAM EDWARD BOYLE.