Jan. 1, 1935. W. E. BOYLE ET AL 1,986,181

SHIELD FOR ELECTRICAL CONDUCTORS

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Fig. 1.

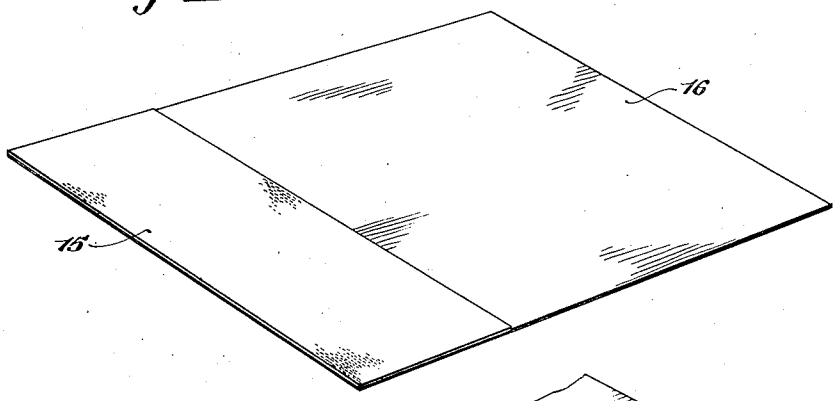


Fig. 2.

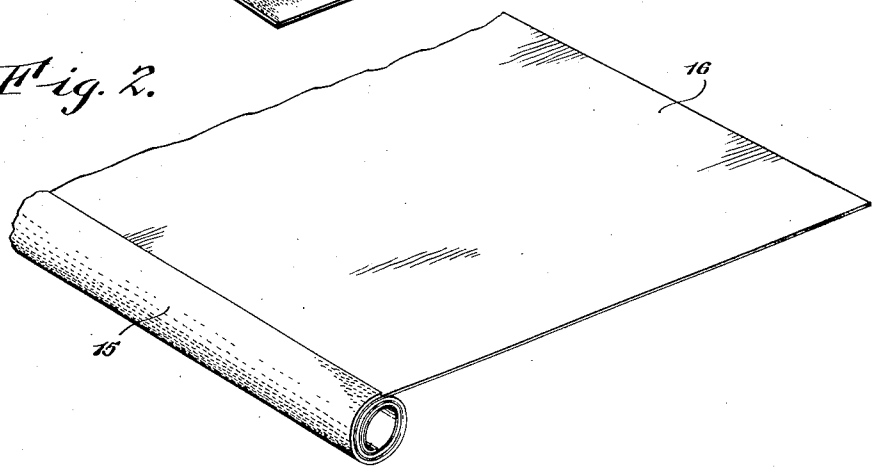


Fig. 3.

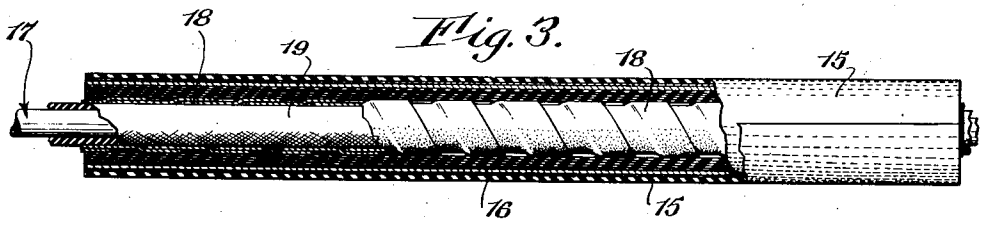
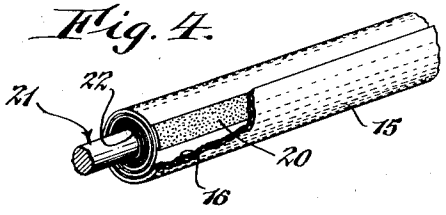


Fig. 4.



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Fig. 5.

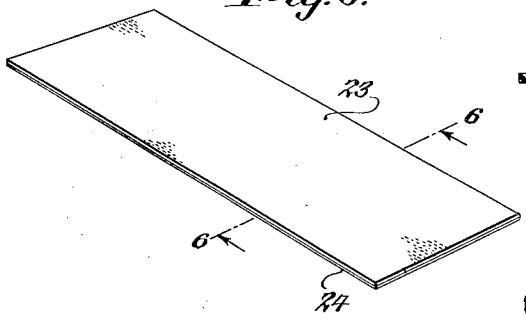
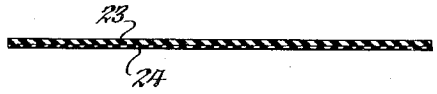


Fig. 6.



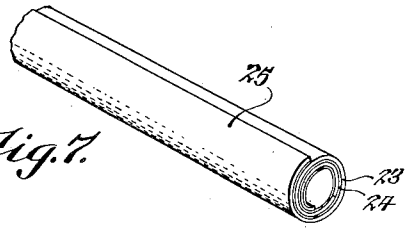


Fig. 7.

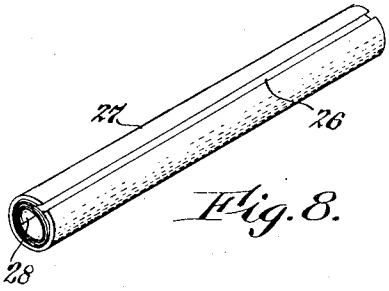


Fig. 8.

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SHIELD FOR ELECTRICAL CONDUCTORS

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Application March 2, 1933, Serial No. 659,286

11 Claims. (Cl. 173—28)

This invention relates to a protective shield for encasing a body or a part thereof and more particularly the invention is concerned with a shield having a body formed of relatively stiff material, the said body being yieldable to enable its arrangement upon the object with which it is associated and being adapted when thus arranged to contract and firmly engage the object. The shield is characterized by features which render it adavantageous as an electrical insulating sheath; as a guard against abrasion or wearing of a part of an object which, owing to its environment, is subjected to a rubbing contact with an adjacent object; as a medium for preventing access of rain or moisture to the encased part; or as a means for reinforcing the object against bending strains or stresses.

For purposes of illustration the invention is described in connection with various forms of electrical conductors. When employed in this manner the shield is adapted to be arranged around a part of the conductor which, owing to its close proximity to a limb of a tree or other contacting movable object is likely to be subjected to a rubbing or abrading action. The limb, or other object, therefore, rubs against the shield and injury to the conductor or impairment of the service is prevented. In this connection it is to be understood that this use of the invention is referred to by way of example only as the features by which the invention is characterized are such that it may be employed to advantage in connection with various other forms of bodies, whether metallic or non-metallic and is not necessarily limited to electrical conductors.

One object of the invention is to provide a shield which may be secured effectively and with facility in the desired position.

A further object is to provide a shield having high dielectric properties of a permanent character.

A still further object is to provide a shield which will readily accommodate itself to bodies of various sizes.

A still further object is to provide a shield which is adapted to prevent penetration of water or moisture to that part of the body which it encases.

A still further object is to provide a shield which is applicable to various forms of electrical conductors, this object contemplating a shield which may be applied with equal facility to either insulated or non-insulated conductors.

Embodiments of the invention are illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of a shield in which features of the invention are incorporated, the shield being shown at an intermediate stage of its development.

Figure 2 is a perspective view of the shield in final form.

Figure 3 is a view partly in section and partly in elevation of the shield as applied to an insulated electrical conductor.

Figure 4 is a perspective view of the shield as applied to a non-insulated conductor, the shield in this embodiment including supplemental sealing means for preventing loosening of the various convolutions of the shield.

Figure 5 is a perspective view of a modified form of shield at an intermediate stage of its development.

Figure 6 is a transverse section taken along line 6—6 of Figure 5.

Figure 7 is a perspective view, in final form, of the shield shown in Figure 5.

Figure 8 is a perspective view, in final form, of another embodiment of the invention.

The shield, as illustrated in Figure 1, includes a body 15 and a tailpiece 16, both of which are of sheet-like form. The latter is preferably of a greater length than the former, while both are of substantially the same width. The body 15 consists of a base material which is preferably of fabric-like character, for example, jute, paper, cloth, etc., the said material being impregnated in any suitable manner with a filler such as, for example, a phenol-formaldehyde condensation product or other synthetic resin. The filler may include any desirable bituminous matter.

After the filler is applied to the base material and it has been permitted to dry to the extent desired the sheet thus provided is subjected to pressure and heat in accordance with conventional practice, whereby to cure the filler. When the filler is cured to the extent desired the sheet, while still hot is formed in a tight roll and held in this form in any suitable manner until it has cooled. When cool the body will retain its tubular shape (Figure 2) and while it can be unrolled it will, when released, return to its tubular form with considerable force.

The tailpiece 16 may consist of any suitable insulating material of flexible or cloth-like character such as, for example, varnished cambric, rubber or any other material which may be rolled and unrolled without impairing to an objectionable degree its di-electric properties. The tailpiece 16 is secured to the body 15 in any suitable manner. This may be accomplished conveniently

by arranging the body 15 and one end of the tailpiece upon one another during the application of pressure and heat to the body 15, whereby the latter and that portion of the tailpiece 16 which overlies the body are cemented together, it being understood that the remainder of the tailpiece is not treated and retains its original condition. When the tailpiece is secured to the body in this manner (Figure 1) the latter is rolled while hot into the spiral shape shown in Figure 2 and suitably held in this condition until it has cooled in the manner described. It is to be understood that the body 15 may be formed of some non-fibrous material such as, for example, celluloid or it may be, if desired, of laminated form. The purpose of the tailpiece 16 is to impart to the shield high di-electric properties which are of a permanent character.

In the use of the shield, assuming its purpose is to protect an insulated electrical conductor 17 (Figure 3) against injury from a contacting limb or other abrading object that part of the conductor which is to be protected is first covered with spirally wound double faced adhesive tape 18, the latter being wrapped around the insulating covering 19 of the conductor. The tailpiece 16 of the shield is then wound tightly around the taped section thus provided, the tubular body approaching the built-up section of insulation during this operation. In accordance with the invention the body 15 is unrolled and wound around the insulating sheath which is provided by the convolutions of the tailpiece 16. In this operation the body 15 is unrolled against its normal tendency to retain its rolled shape and is arranged around the conductor. The contractile characteristics of the body 15 are relatively high and hence when the body is arranged in the manner described and then released it automatically contracts itself to firmly engage the conductor. The convolutions of the tailpiece tightly engage the taped section of the conductor and the shield is thus held against movement lengthwise of the conductor.

From the foregoing it will be apparent that when the shield is applied in the manner described the various convolutions of the tailpiece provide an insulating sheath around that portion of the conductor which is to be protected. The di-electric properties of the tailpiece are high and hence possibility of injury to the insulating covering 19 of the conductor or the shield is negligible. The body 15 of the shield tightly encases the insulating sheath provided by the tailpiece, thereby providing a hard surfaced shell around the conductor which is highly resistive to the abrading action of a tree limb or other movable object which otherwise would rub against the conductor at this point. The body 15, therefore, receives the abrading action of the limb or movable part and hence injury to the conductor or impairment in the service is prevented. It will further be apparent that owing to the resiliency of the body 15 and its tendency to retain a tubular form of predetermined diameter that the shell may be applied with facility and when arranged in the desired location will automatically contract to firmly engage the conductor. Loosening of the convolutions of the shield or movement of the latter along the conductor are, therefore, prevented without the necessity of employing clamps or similar devices and the shield may be applied without the aid of tools.

If desired, however, a strip of adhesive tape 20 (Figure 4) may be utilized to secure the convolutions of the shield when they have adjusted themselves to engage the conductor in the manner described, the said strip being adapted to secure the outer end of the body to the adjacent convolution thereof. In this embodiment the shield is shown in connection with a non-insulated conductor 21. In the use of the shield in connection with a conductor of this type the conductor is taped as at 22 (in a manner similar to the taping indicated at 18 in Figure 3) preferably throughout that portion of its extent which is to be encased by the shield. After the application of the tape 22 the shield is applied in the manner described in connection with Figure 3.

The invention contemplates the provision of a shield having the characteristics described wherein the material which imparts the di-electric properties to the shield is co-extensive with the body of the shield. The embodiment shown in Figure 5 includes a body 23 and a layer of insulating material 24. The former is similar to the body 15 described in connection with Figure 1 while the layer 24 may be of any suitable insulating material such as, for example, varnished cambric, rubber, asphalt paint, insulating varnish, or other material which will retain an imperforate condition. The body 23 is formed into a roll 25 similar to the manner described in connection with Figures 1 and 2 and it may be applied to a conductor in substantially the same manner. It will be apparent that the shield in this case consists of a plurality of convolutions of insulating material between which are disposed the various convolutions of the body 23. It is understood, of course, that the insulating layer 24 which is shown in Figure 5, as applied to the body 23 prior to the formation of the latter into tubular form may be applied to the body 23 after the latter has been formed into its permanently rolled shape. The shield, therefore, similarly to the one described in connection with Figure 1 has high di-electric characteristics as well as being capable of withstanding the abrasive action of objects which rub against it.

In the various embodiments illustrated the body 23 is formed of such a length that it is adapted to provide a plurality of convolutions when applied in the manner described. This has the advantage that the shield may be applied to objects of various sizes while at the same time insuring at least a single convolution of the body around the object. In the embodiment shown in Figure 8 the shield consists of a tubular body 26 which is formed with a longitudinally extending slit 27, the said body being provided with a tailpiece 28 of insulating material which is similar to and which functions in substantially the same manner as the tailpiece illustrated in Figure 1. The body 26 is preferably treated in the manner described in connection with Figures 2 and 7 whereby to render it highly resistive to abrasion. The tailpiece 28 is adapted to provide an insulating sheath between the body 26 and the conductor upon which the body is arranged. It is flexible and the body 26 holds it tightly rolled upon the conductor and protects it against abrasion.

I claim as my invention:

1. A shield for an electrical conductor including a hollow body formed from a fabric material impregnated with a binder consisting of a phenol-formaldehyde condensation product, said body being yieldable to enable its arrangement upon said conductor and being adapted when thus arranged to contract and firmly engage the conductor and a relatively flexible sheet of insulating material

carried by said body and adapted to be wound around the conductor beneath said body during the application of the shield.

2. A shield for an electrical conductor including a spirally wound body formed from a sheet of material which is highly resistive to an abrading action, the said body being so formed that while it may be unrolled to enable its arrangement upon said conductor it is adapted when thus arranged to contract and firmly engage the conductor and a sheet of insulating material carried by said body and adapted to be wound around the conductor beneath said body during the application of the shield.

3. A shield for an electrical conductor including a relatively stiff hollow body formed from a sheet of material which is highly resistive to an abrading action and which is yieldable to enable its arrangement upon said conductor, said body being adapted when arranged to contract and firmly engage the conductor and a relatively flexible sheet of insulating material which is secured to one end of said body and which extends beyond said body in the form of a tailpiece, said sheet of insulating material being wound around the conductor beneath said body during the application of the shield.

4. A shield for an electrical conductor including a spirally wound body formed from a sheet of material which is highly resistive to an abrading action, the said body being so formed that while it may be unrolled to enable its arrangement upon said conductor it is adapted when arranged to contract and firmly engage said conductor and a sheet of varnished fabric carried by said body and adapted to be wound around the conductor beneath said body during the application of the shield, said sheet being in the form of a tailpiece, whereby to provide an insulating sheet around the conductor between the body and the conductor.

5. A shield for an electrical conductor including a relatively stiff tubular body formed from a spirally wound sheet of material which is highly resistive to an abrading action, said body being formed so that it may be unrolled to enable its arrangement upon said conductor and being adapted when thus arranged to contract around said conductor and a sheet of relatively flexible insulating material carried by said body in the form of a tailpiece, the said last mentioned sheet being long enough so that it may be wound around the said conductor to provide a multi-layer insulating sheath between said body and said conductor.

6. A shield for the purpose described including a relatively stiff tubular body formed from a spirally wound sheet of material, said body being so formed that it may be unrolled to enable its arrangement upon the object with which it is associated and being adapted when thus arranged to contract and firmly engage the object and a sheet of relatively flexible material carried by said body in the form of a tailpiece and being adapted to be wound around the object during the application of the shield.

7. A shield for the purpose described including a relatively stiff tubular body in the form of a split tube, said body being so formed that the adjacent ends may be separated to enable its arrangement upon the object with which the shield is associated and being adapted when thus arranged to contract and firmly engage said object and a sheet of relatively flexible material carried by said body and being adapted to be wound around said object during the application of said shield.

8. A guard for an electrical conductor including a hollow body formed from a sheet of fabric material which is impregnated with a binder consisting of a phenol-formaldehyde condensation product, said body being relatively stiff but yieldable to enable its arrangement upon a conductor and being adapted when thus arranged to contract and firmly engage the conductor and a relatively flexible sheet of insulating material secured to one end of the said body and being adapted to be wound around the conductor beneath said body during the application of the guard.

9. A guard for an electrical conductor including a hollow body formed from a sheet of fabric material which is impregnated with a binder consisting of a phenol-formaldehyde condensation product, said body being relatively stiff but yieldable to enable its arrangement upon a conductor and being adapted when thus arranged to contract and firmly engage the conductor and a relatively flexible sheet of varnished cambric secured to one end of said body and being adapted to be wound around the conductor beneath said body during the application of the guard.

10. A shield for the purpose described including a relatively stiff body of the shape of a split tube and formed from a fabric material which is impregnated with a binder consisting of a phenol-formaldehyde condensation product, said body being so formed that the adjacent ends may be separated to enable its arrangement upon a conductor and being adapted when thus arranged to contract around the conductor and a sheet of relatively flexible insulating material carried by said body and being adapted to be wound around said conductor beneath said shield during the application of the latter.

11. A shield for the purpose described including a relatively stiff body formed from a fabric material which is impregnated with a binder consisting of a phenol-formaldehyde condensation product and which is rolled into a tube, said body being resilient enough to permit its being opened and rolled upon a conductor and being adapted when released after its application to contract upon the conductor and a layer of relatively flexible insulating material applied to the inner side of the material forming said body, said layer of material being capable of retaining its dielectric properties while permitting the said body to be applied and to function in the manner described.

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