Aug. 26, 1941. L. CARL ET AL 2,253,967

INSULATED ELECTRICAL CONDUCTOR

Filed July 21, 1939

Fig. 1.

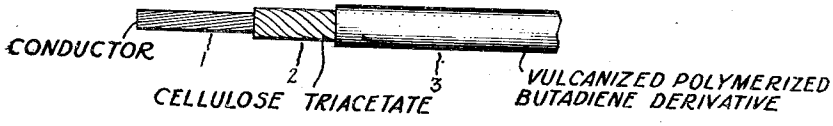
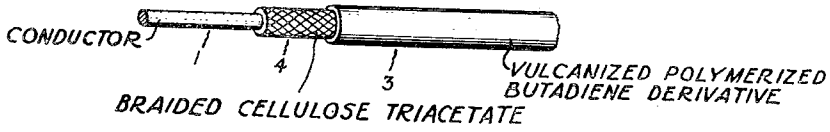


Fig. 2.



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INSULATED ELECTRICAL CONDUCTOR

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Application July 21, 1939, Serial No. 285,814
In Germany August 2, 1938

1 Claim. (Cl. 174—120)

This invention relates to insulated electrical conductors and a method of manufacturing the same.

Electrical conductors have been insulated with rubber and other natural materials with or without the addition of fibrous materials, such as cotton, silk, paper, glass fabric, asbestos, and the like, and these natural materials have been replaced by artificial insulating materials applied to the conductor either as seamless or wound coverings. The various artificial insulating materials have included cellulose esters, poly-acrylates, and polyvinyl compounds suitably plasticized to facilitate their application to the conductor. These plasticized materials in general have been characterized by comparatively low resistance against attack by oil, acids, and alkalis primarily due to the necessary presence of large quantities of softening or plasticizing agents.

One object of this invention is to produce a flexible or non-brittle insulation of high resistance to deformation under heat and pressure. Another object is to provide a chemically resistant insulation for electrical conductors which, although comparatively thin, is of high insulating value.

Other objects of the invention will become apparent from the following description thereof taken in connection with the accompanying drawing in which Figs. 1 and 2 illustrate two forms of the improved insulated conductor.

The objects of this invention are accomplished by applying directly to an electrical conductor a layer or layers of a cellulose triester of the lower fatty acids, particularly cellulose triacetate, and applying over this cellulose triacetate layer, an additional layer or layers of a synthetic vulcanizable material, such as the polymerizates commercially known as "Buna" and containing a butadiene hydrocarbon. "Buna" is the butadiene polymer resulting from the polymerization of butadiene in the presence of metallic sodium. Corresponding halogenated compounds, such as chloroprene, may be substituted for the butadiene hydrocarbons. As shown in the drawing, one or more layers of the cellulose triester may be applied to the conductor 1 in the form of a helically wrapped tape 2 as shown in Fig. 1. Over these underlying layers of cellulose triacetate, the vulcanizable synthetic material 3 is applied by any of the well known methods such as by extrusion or the like. Alternatively, the cellulose ester may be applied in the form of a fabric or braid 4 as shown in Fig. 2.

It has been found that a conductor or cable insulated in this manner may have its outer layer or covering of vulcanizable material heated to a vulcanizing temperature without suffering any deterioration in the electrical or mechanical properties of the underlying cellulose derivative layer. With a vulcanizing temperature of 130° C., mechanical and electrical properties of the cellulose triacetate are retained completely, primarily because these cellulose triesters are applied to the conductor in the form of a tape or a fabric without the addition of the usual softening or plasticizing agents. As no softening agents are removed from the underlying cellulose layer as in the case of the ordinary cellulose acetates or other derivatives requiring a plasticizer, the cellulose triester has substantially the same composition and properties after vulcanization as before. The synthetic vulcanizable material of the outer sheath may contain suitable vulcanizing ingredients, fillers, or other modifying ingredients.

If desired, additional cellulose triacetate tapes may be wound over the seamless synthetic caoutchouc layer for the purpose of retaining this layer during vulcanization. These tapes may be removed after the vulcanization is complete. Cables prepared as herein described may be further coated or armored with the usual materials.

Insulated electrical conductors prepared in accordance with this invention are particularly useful as lines or cables wherever a great resistance to heat and pressure is required or where ageing and chemical resistance are important factors.

What we claim as new and desire to secure by Letters Patent of the United States, is:

An insulated cable comprising a conductor, a helical wrapping of an unplasticized cellulose triacetate capable of withstanding temperatures of 130° C. without deterioration on said conductor, and an outer covering vulcanized in situ comprising a polymerized butadiene derivative resulting from the polymerization of butadiene in the presence of metallic sodium, said cellulose triacetate wrapping being mechanically and electrically the same after vulcanization of the butadiene derivative as when applied to the conductor prior to vulcanization.

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