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2,379,756

INSULATING SHEATH ON AN ELECTRICAL CONDUCTOR STRAND

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FIG. 1

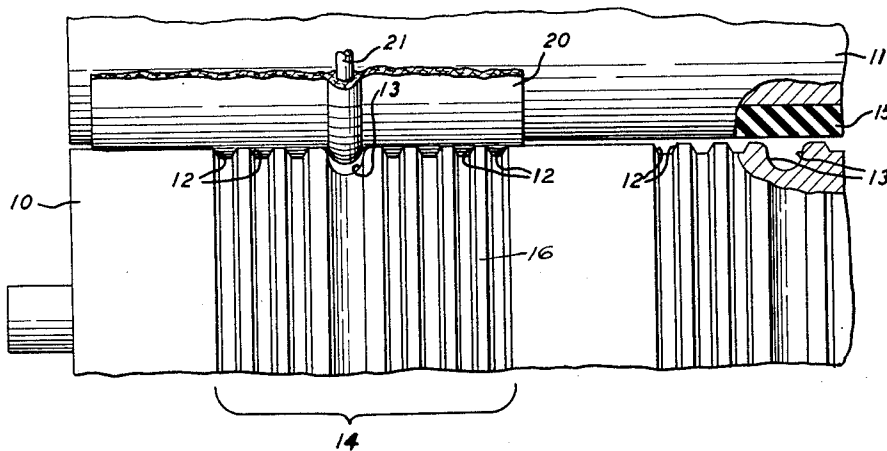


FIG. 2

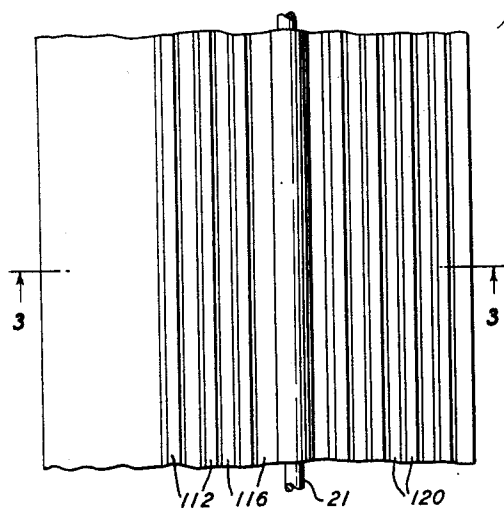


FIG.3

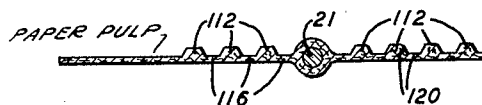
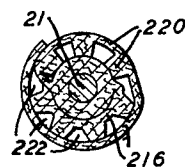


FIG. 4



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INSULATING SHEATH ON ELECTRICAL
CONDUCTOR STRANDS

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4 Claims. (Cl. 174—124)

This invention relates to electrical conductor strands, and more particularly to an insulating sheath on an electrical conductor strand.

In some instances electrical conductor wires have of recent years come to be insulated by forming directly on the wire a continuous seamless sheath of pulpous insulating material, e. g. paper pulp fibres of cellulose, felted or intermatted together. Wires thus insulated have excellent electrical characteristics for many uses because the sheath of felted fibres contains a high proportion of its volume as air entrapped within and between its fibres; and, for many uses, the higher the proportion of air thus held within the gross surface of the sheath, the greater the usefulness of the sheath as electrical insulation.

An object of the present invention is to provide an insulated conductor having an improved sheath of pulpous material as described containing a materially increased proportion of entrapped air within the gross surface of the sheath.

With the above and other objects in view, the invention may be embodied in an electrical conductor wire having an insulating sheath of pulpous material thereon compacted into a substantially grossly continuous and seamless sheath but also formed within the body of the sheath with longitudinal ducts substantially empty except for air.

Other objects and features of the invention will appear from the following detailed description of one embodiment thereof taken in connection with the accompanying drawing in which the same reference numerals are applied to identical parts in the several figures and in which

Fig. 1 is a broken diagrammatic view in elevation of a pair of rollers for squeezing a tape of wet paper pulp having a wire embedded therein;

Fig. 2 is a plan view of a portion of such tape after squeezing;

Fig. 3 is a section on the line 3—3 of Fig. 2; and

Fig. 4 is a view similar to Fig. 3 showing the tape formed into a cylindrical sheath about the wire.

The general procedure and apparatus for creating a tape of wet pulpous material such as paper pulp, applying a wire to the partially formed tape, completing the tape to contain the wire, and folding and felting the tape into a seamless sheath about the wire are old and form no part of the present invention. Hence these are not disclosed here. Suitable procedure and apparatus for these purposes are disclosed and described in detail in U. S. Patent 1,615,394 of January 25, 1927,

to J. S. Little, to which reference may be had, if desired, for these features. Reference is also made to co-pending applications Serial Nos. 406,852 and 406,853, for apparatus and method for making the sheath, respectively.

In Fig. 1 herein is shown a pair of rolls 10 and 11 to receive a plurality of flat ribbons or tapes 20 of wet paper pulp each having a metal wire 21 embedded and contained within it. The lower roll 10 is provided with a surface of hard material, metal, hard rubber, hard fibre, artificial resin or other suitable substance, and is formed with parallel peripheral grooves 12 and 13 of two kinds distributed in repeated duplications of one set or pattern 14 for each wire bearing tape 20. For clarity, only one tape is shown, but in practise there will usually be a plurality of tapes. The middle groove 13 of each set or pattern 14 of grooves is deeper and wider than any other groove of the set and receives and gives passage to that part of the tape 20 which contains the wire 21. On either side of the groove 13 is a plurality of parallel grooves 12 all preferably alike and equally spaced apart. The roll 11 is smooth on its surface and is made to have its outer surface relatively soft and elastically yielding, e. g. by making the body of the roll throughout of suitable material or by providing a hard cored roll with a surface layer or sheath 15 of suitable material, e. g. soft vulcanized rubber, vulcanized corn oil, or the like.

A tape 20 with its wire 21 in passing over the roll 10, has its lateral portions at each side of the wire 21, strongly compressed by the roll 11 where the tape lies on the lands 16 while the portions between these compressed parts are merely pressed down into the grooves 12 by the roll 11 without any material compression of the substance of the tape in these portions. Hence the tape emerges from the rolls 10 and 11 substantially in the state disclosed in Figs. 2 and 3. The longitudinal strip portions 116 which were pressed by the lands 16 of the roll 10 are thin, dense and tough while the intercalated longitudinal strip portions 112 of the tape which were kept free of pressure by the grooves 12 of the roll 10 are thick, fluffy and relatively weak.

The longitudinally ridged tape 120 thus created is then wrapped about the wire 21, as shown in Fig. 4, to form a generally cylindrical seamless sheath 220 about the wire, and the whole is dried. A characterizing and important feature of the structure so made, is the presence in the sheath 220 of longitudinally extending passages 222 created by the wrapping of the longitudinally ridged

tape 120. It is the presence of these longitudinal voids, passages or ducts 222 within the body of the sheath 220 in the finished product that notably increases the value of the sheath as an insulator. Another feature of importance is the presence within the sheath of the longitudinally extending, thin, hard pressed, tough strips 216 corresponding to the elements 116 in Figs. 2 and 3. Paper pulp and fluffy paper at best have no great tensile strength, and when the sheathed wire is subjected to more or less severe bending or pulling or friction in subsequent manipulation or use there may be danger of rupture of the sheath, especially transversely of the wire. In the wire shown in Fig. 4 the longitudinal strips 216 integrally parts of the sheath have a tensile strength which may be several times that of any part of a sheath of undifferentiated structure, and so tend to support and save the sheath 220 as a whole where an ordinary pulp sheath might well be ruptured.

The embodiment of the invention herein disclosed is illustrative and may be variously modified and departed from without departing from the spirit and scope of the invention as pointed out in and limited by the appended claims.

What is claimed is:

1. In an insulated electric conductor, a fibrous pulp material, an electric conductor embedded in the pulp material, said pulp material having a

ribbed flap portion to provide air ducts, and said flap portion being wrapped around the embedded conductor.

2. In an insulated electric conductor, a ribbon of pulpous material, an electric conductive core embedded in the ribbon of pulpous material, and said ribbon having indentations therein to form air ducts when the indented ribbon is wrapped around the embedded core.

3. In an insulated electrical conductor, a sheath of pulpous material, an electrically conductive core embedded in the sheath, the said sheath having integrally united strip portions which are dense and tough continuously throughout their length and projecting portions which are fluffy and relatively weak continuously throughout their length.

4. In an insulated electrical conductor, a sheath of pulpous material, an electrically conductive core embedded in the material of the sheath, the said sheath having integrally united longitudinal strip portions which are dense and tough continuously throughout their length, and outwardly extending portions which are fluffy and relatively weak continuously throughout their length, said strip portions being wrapped around the embedded conductor to provide longitudinally extending ducts within the body of the sheath.

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