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S. RUBINSTEIN ETAL

3,229,623

MARKING METAL SHEATHED CABLES

Original Filed Oct. 10, 1960

Fig. 1 PRIOR ART

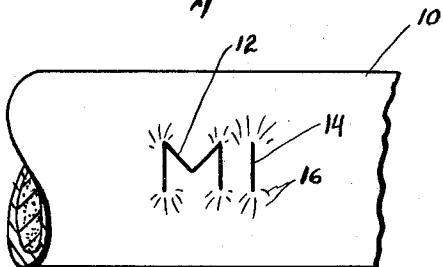


Fig. 2

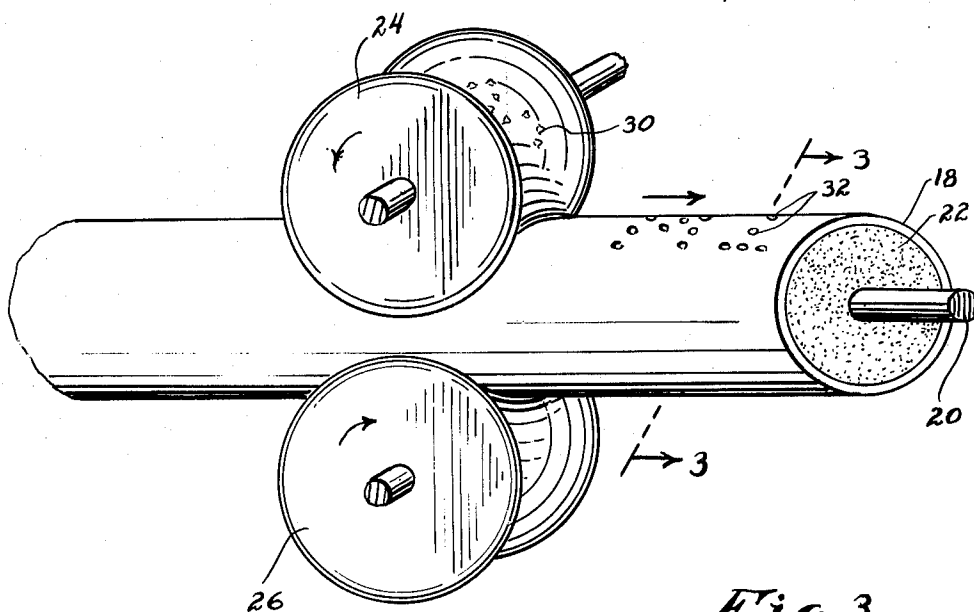


Fig. 3

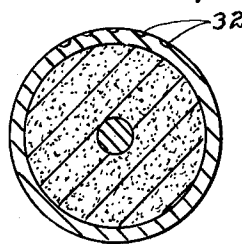
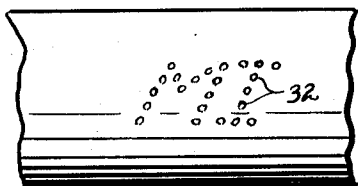


Fig. 4



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MARKING METAL SHEATHED CABLES

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Continuation of application Ser. No. 61,621, Oct. 10, 1960. This application June 15, 1964, Ser. No. 375,170

3 Claims. (Cl. 101—32)

This application is a continuation of our application Serial No. 61,621, filed October 10, 1960, now abandoned.

This invention relates to marking of tubes and, more particularly, to an improved marking and method of marking metallic tubes ensheathing mineral-insulated electrical cable without adversely affecting the mechanical properties of such tubing.

Marking of the metallic sheath of mineral-insulated electrical cables with indicia, such as the manufacturer's name and the type of cable, has been accomplished in several ways by the art.

The characters making up the marking indicia have been printed in ink directly upon the tubing. However, permanency of the ink is always questionable. In some types of sheathed cables, the sheath is annealed as a last step in the manufacturing process and the annealing temperature would destroy the imprinted marking.

Marking of the tubing by appending labels or tags thereto has been employed. In addition to the expense of the application of such tabs, the tags are unsightly, are likely to come off, and become a hindrance during installation.

Embossing of the tubing has been employed. For example, the sheath of electrical cable is indented with a wide, longitudinally-extending groove in which the characters forming the indicia are raised. The wide groove which must be depressed in the sheath weakens the sheath, particularly with thin wall sheathing, and makes watertight terminations difficult.

A common method of marking has been to employ a marking wheel having raised characters of the desired indicia. The marking wheel is rolled over the sheath tubing to stamp the characters of the desired indicia in the sheath. Unfortunately, this method has the disadvantage of adversely affecting the mechanical strength of the sheath, particularly the sheath's resistance to bending stresses, and the sheath often ruptures during installation.

It is, therefore, the primary object of this invention to provide an improved tubing marking and method of marking such tubing.

In accordance with a preferred embodiment of this invention, the characters forming the indicia on the tube are composed of a plurality of discontinuous indentations in the tube.

In accordance with the preferred method of practicing this invention, the tubing is marked by forming the characters on the tube wall from a plurality of closely-spaced but separated indentations.

This invention may be more clearly understood by reference to the following detailed description, taken in conjunction with the accompanying drawings, of which:

FIGURE 1 is a plan view of character marking made in accordance with the prior art;

FIGURE 2 is a perspective view illustrating the method of forming characters on the tubular sheath of electric cable;

FIGURE 3 is a cross section view taken along lines 3—3 of FIGURE 2, and

FIGURE 4 is a plan view of the characters marked on the tubular sheath of electrical cable in accordance with this invention.

Referring to FIGURE 1, there is shown a length of

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tubing 10, such as the metallic sheath of electrical cable, on which is applied indicia consisting of characters 12 and 14. This marking is typical of the marking applied by the prior art in which the characters are stamped into the tubing. The continuous nature of the characters causes stress concentrations illustrated by stress lines 16 at the ends of each character. These stress concentrations adversely affect the mechanical properties of the tube, particularly its resistance to rupture during bending of the tube.

The character marking and the method of marking in accordance with this invention may best be seen by reference to FIGURES 2—4, in which there is shown tubing 18 which might be the outer sheath of electrical cable having a central conductor 20 insulated from the sheath and maintained in concentric relationship thereto by densely-packed mineral insulation 22.

Cable is passed between a marking roller 24 and a backup roller 26 for application of the indicia characters to the tubing thereof. The marking roller carries the indicia characters, each in the form of a plurality of discontinuous, closely-spaced raised projections 30, which projections may have a circular, elliptical, or other convenient form. The projections indent the tubing in a plurality of closely-spaced indentations 32, which indentations form the characters of the marking indicia to be applied.

The stress distribution around the independent small indentations 32 is uniform and discontinuous from dot to dot as opposed to the localized stress concentrations at the termini of solid indented characters of the form shown in FIGURE 1.

For comparison of the resistance of tubing to localized fracture under bending stress, unmarked tubing, tubing marked by the continuous indentations of FIGURE 1, and tubing marked with the discontinuous indentations of FIGURE 3, were subjected to identical tests. The samples used were lengths of production run, mineral-insulated, copper-sheathed cable. The marked and unmarked samples were bent around a mandrel having a diameter of ten times the diameter of the cable (U.L. minimum bend diameter for installation purposes). Each sample was bent 180 degrees around the mandrel and then bent 180 degrees in the opposite direction. The cycle was repeated until the sheath fractured. When testing marked samples, the marked portion was maintained in such position as to be under maximum stress. The test results are given in Table I.

TABLE I.—NUMBER OF BENDS TO FRACTURE TUBULAR SHEATH

Test	Unmarked cable	Marked by continuous characters (Fig. 1)	Marked by discontinuous characters (Fig. 4)
1-----	8	13	27
2-----	10	13	38

¹ Sheath fractured at characters.
² Sheath fractured adjacent to marked characters.
³ Sheath fractured on opposite side of cable from marked characters.

For further improvement of stress distribution, the characters may be inclined at an angle other than 90 degrees of the axis of the cable, as specifically shown in FIGURE 4.

Thus, there is provided in accordance with this invention, an improved tubing marking and method of marking such tubing which is both simple and efficient and which results in improved mechanical properties of the marked sheathing, particularly to bending stresses.

This invention may be variously modified and embodied within the scope of the subjoined claims.

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What is claimed is:

1. The method of marking a legend on a metal sheath and protecting from bending fracture said metal sheath of a mineral-insulated electrical cable having a conductor therein surrounded by densely packed mineral insulation encased in the metal sheath, which method comprises forming several indentations in the outside surface of the sheath, spacing the indentations from one another along a row with the stress distribution along the row discontinuous at successive indentations, forming several other indentations in the metal sheath similar to the first indentations and spaced from one another along other rows, applying a legend to the sheath by locating the rows of indentations in positions to constitute letters that form the legend, and subsequently bending the cable.

2. The method described in claim 1 characterized by forming the indentation in an annealed copper sheath, and indentating the sheath to a depth that is less than the radial thickness of the sheath.

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3. The method described in claim 1 characterized by forming the characters with some lines thereof each located in a plane transverse of the longitudinal axis of the cable and forming rows of indentations along lines that are in planes at acute angles to the axis of the sheath so that the lines of indentations, when on the outside of a bend in the cable, are at an angle other than 90 degrees to the longitudinal axis of the cable.

References Cited by the Examiner

UNITED STATES PATENTS

1,274,788	8/1918	Saunders	40—2.2 X
1,815,716	7/1931	Ker	101—24
1,932,357	10/1933	Styri	101—28
1,956,951	5/1934	Hinsky.	

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