June 8, 1937. DE HART G. SCRANTOM 2,083,407

APPARATUS FOR REMOVING COATINGS

Filed April 4, 1935

FIG. 1.

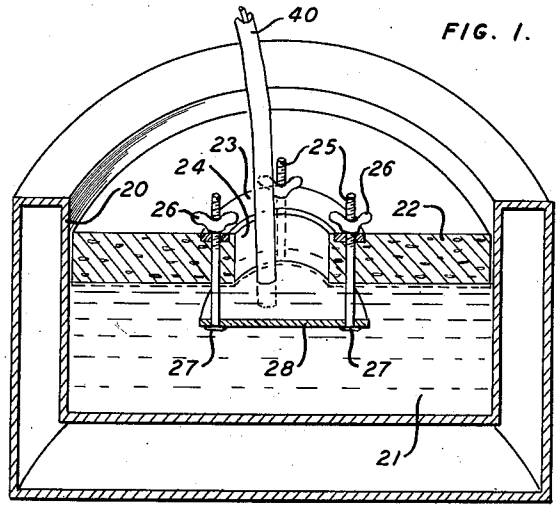


FIG. 5.

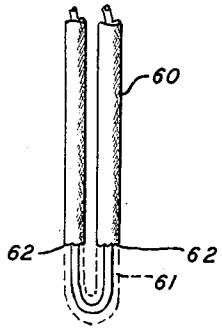


FIG. 2.

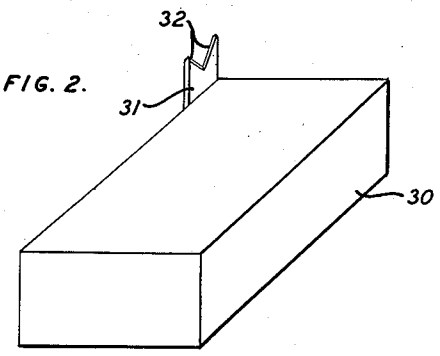


FIG. 3.

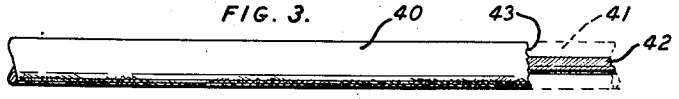
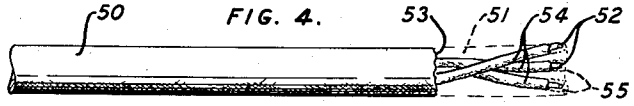


FIG. 4.



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APPARATUS FOR REMOVING COATINGS

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Application April 4, 1935, Serial No. 14,634

8 Claims. (Cl. 62—1)

This invention relates to a method of and apparatus for removing coatings and more particularly to a method of and apparatus for stripping insulation from predetermined portions of insulated electrical conductors.

In the manufacture, alteration and repair of a great variety of electrical apparatus it is necessary to remove coatings of insulating material, such as molded compounds containing rubber, asphalt, textile fibers of various kinds, and other materials from end portions of conductors or from restricted portions elsewhere for example in order to make connections to the conductors.

An object of the present invention is to provide a simple and reliable method and apparatus for removing insulating or other coatings from electrical conductors in a convenient and rapid manner.

One embodiment of the invention is in a method and in an apparatus for practicing the method which comprises the steps of and means for subjecting a portion of an insulated electrical conductor from which insulation is to be removed to a freezing agent, preferably liquid air, until the coating but not the conductive element therein, is rendered brittle, and then subjecting the frozen portion to mechanical shock or pressure to break off the coating.

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 appended to identical parts in the several figures and in which

Fig. 1 is a vertical sectional view in perspective of a vacuum tank containing liquid air and a float therein for practicing one step of the method of the invention;

Fig. 2 is a perspective view of an auxiliary device;

Fig. 3 is a broken side view of a piece of insulated single strand conductor from which an end portion of insulation has been removed;

Fig. 4 is a similar view of a multi-conductor cable, and

Fig. 5 shows a single strand insulated conductor with the insulation removed from a non-terminal portion.

In the embodiment of the invention herein disclosed there is provided a tank **20** preferably having hollow evacuated walls and bottom such as are customarily used in containers for liquid air. The tank is filled to a convenient depth with liquid air **21** or other sufficiently cold chilling agent. Solid carbon dioxid snow may be used, or liquid nitrogen, hydrogen or oxygen, or the like.

A disk-like float **22** of cork or other suitable material such as wood, sponge rubber, an artificial resin or the like floats on the surface of the liquid air and has a vertically disposed aperture **24** of any convenient diameter. A flat annulus **23** of metal may be inset into the top surface of the float around the aperture **24**. A plurality, preferably three or four, of vertical rods **25**, each threaded at its upper end and headed as at **27** at its lower, are disposed, preferably symmetrically, about the aperture, passing through appropriate bores in the float and annulus. A thumbnut **26** is mounted on the threaded upper end of each rod **25** to adjustably regulate the distance of the heads **27** below the under face of the float. A stop **28** in the form of a suitably perforated disk, is supported on the heads **27**.

Fig. 2 represents an auxiliary device comprising a block **30** of any suitable hard material, wood, metal, stone or the like, and an upstanding metal blade **31** secured thereto and having a notch presenting a V-shaped cutting edge **32** at the upper end thereof.

To illustrate one mode of operation, let it be assumed that it is desired to remove from an insulated conductor **40** (Fig. 3) that portion **41** of the insulating coating shown in dotted lines to lay bare the outer right hand end of the single conductive strand **42**, the strand being either a single wire or a group of smaller wires which may be grouped or intertwisted or braided together. The thumbnuts **26** will be adjusted until the top face of the stop **28** stands at a distance below the surface of the liquid air equal to the length **41** of the insulation coating to be removed.

The end of the conductor **40** is then plunged down vertically through the aperture **24** until the tip of the conductor **40** touches the stop **28**, and is held in this position for a length of time sufficient to chill the insulation to brittleness from without inwardly but not sufficient to also render the metal strand **42** brittle. The period of time necessary will vary with the nature and thickness of the insulating coating and for any given instance will have to be learned by experience. When the predetermined period has elapsed the conductor is removed from the liquid air and the frozen portion **41** of its insulation is cracked off. In some instances this may be efficiently done by merely striking the frozen end smartly on any hard smooth surface such as the top of the block **30**. Or the frozen end may be laid on such a surface and tapped with a hammer or other suit-

able tool. Or the frozen end may be crushed more or less gently with a pair of pliers, or in a vise, or in any other suitable device. Under such treatment, the frozen part 41 of the insulating coating cracks, chips or crumbles cleanly away from the interior metallic strand, leaving the latter bare as desired.

In some instances the demarkation between the brittle frozen portion of the insulation and the elastic tough unfrozen part is sufficiently sharp that the end 43 of the insulation remaining is smooth and plane enough for practical purposes. However, it may be desired in some instances to ensure neatness at this face, and in such cases the conductor may be pressed and rolled gently in the knife edged notch 32 to indent its outer surface slightly in a ring demarking the portion 41 from the rest of the insulation, so that this annular indentation will stand at the surface of the liquid air when the freezing is done. It is not usually necessary that the knife make any actual cut into the material; an indentation is ordinarily sufficient. Then when the frozen material is cracked off it breaks cleanly at the indentation, any textile or other fibres which may be incorporated in the insulation cracking cleanly in the plane of the indentation.

There is a large class of multiconductor cables such as is illustrated at 50 in Fig. 4 having a plurality of associated conductor strands 52 each with its individual insulating sheath 54, in which the group of conductors is provided with a common outer sheath of insulation. It may be desired in some instances to remove a portion 51 of the common outer sheath without disturbing any of the individual sheaths 54 thereunder.

In such a case, a little experiment will show how long to subject the end of the cable in any given case to the liquid air to render the outer sheath brittle without destroying the toughness of the inner sheaths 54, and the frozen portion 51 may be cracked off without harming the inner coatings. Then if it be desired to bare a shorter length of the ends of the metallic conductors by removing portions 55 of the sheaths 54, these may be frozen and cracked off in a second operation.

If a portion 61 of insulation not at an end of an insulated conductor 60 is to be bared (Fig. 5), the whole may be doubled at the mid point of the portion to be removed, dipped and frozen to the line 62—62, cracked off, and the conductor straightened again.

Customary methods of removing portions of insulation are to whittle or scrape the sheath off manually with a knife, or to burn it off with a flame. In the one method it is difficult to avoid nicking or scoring the metal strand underneath or even in the case of a compound strand such as litzendraht to avoid severing one or more of the component small wires. In the other method it is difficult to control the burning within a definite limit; and also particularly in the case of rubber compositions fumes are produced which are not merely annoying but may even be poisonous. The method of the invention is rapid, convenient and accurate, neither harming the metal nor producing fumes.

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

What is claimed is:

1. An apparatus for chilling articles and comprising means to hold a supply of a chilling agent, and means responsive to the amount of chilling agent present to control the extent to which an article inserted therein to be partially exposed to the agent may be brought into contact therewith.

2. An apparatus for chilling articles and comprising means to hold a supply of a chilling agent, and adjustable means responsive to the amount of chilling agent present to control the extent to which an article inserted therein to be partially exposed to the agent may be brought into contact therewith.

3. An apparatus for chilling articles and comprising means to hold a supply of liquid air, and means responsive to the amount of liquid air present to control the extent to which an article inserted therein to be partially exposed to the liquid air may be brought into contact therewith.

4. An apparatus for chilling articles and comprising means to hold a supply of liquid air, and adjustable means responsive to the amount of liquid air present to control the extent to which an article inserted therein to be partially exposed to the liquid air may be brought into contact therewith.

5. An apparatus for chilling articles and comprising a chamber to hold a supply of a chilling agent, and a stop supported therein by the chilling agent to limit the extent to which an article inserted therein to be partially subjected to the agent may be inserted thereinto.

6. An apparatus for chilling articles and comprising a chamber to hold a supply of a chilling agent, and an adjustable stop supported therein by the chilling agent to limit the extent to which an article inserted therein to be partially subjected to the agent may be inserted thereinto.

7. A chilling apparatus comprising a tank to hold a supply of a liquefied gas, a float therein, and a stop member carried by the float to limit the extent to which an article to be partially subjected to the liquefied gas may be inserted thereinto.

8. A chilling apparatus comprising a tank to hold a supply of a liquefied gas, a float therein, and an adjustable stop member carried by the float to limit the extent to which an article to be partially subjected to the liquefied gas may be inserted thereinto.

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