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METHOD OF COATING ARTICLES

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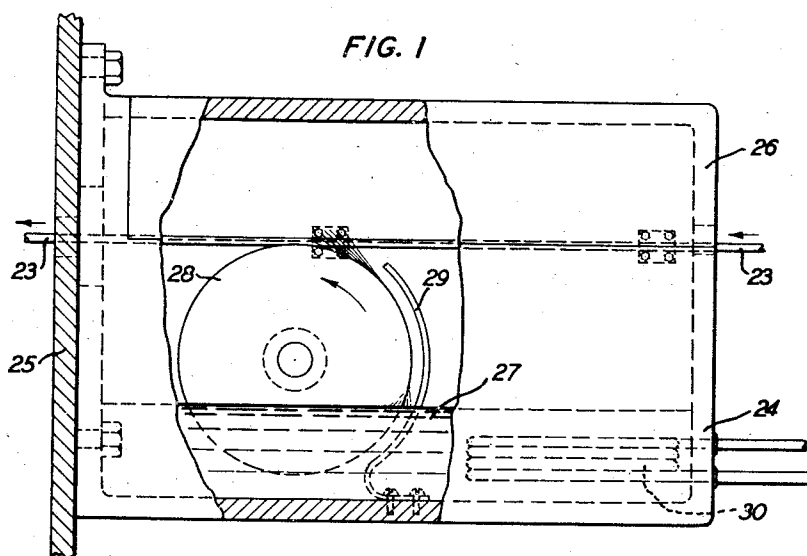


FIG. 2

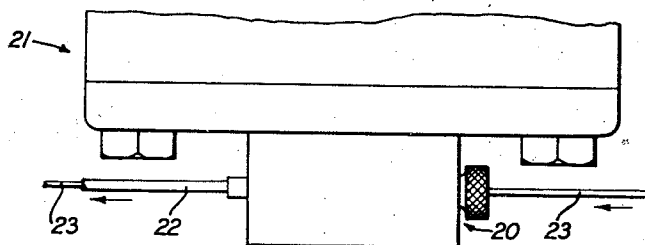
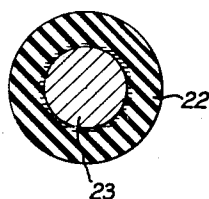


FIG. 3



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METHOD OF COATING ARTICLES

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9 Claims. (Cl. 91—68)

This invention relates to a composition of matter for use in and a method of coating articles, and more particularly to a composition for use in and a method of coating a metallic wire such as, for example, a tinned copper wire with an insulating material whereby the resistance of the coating to being stripped from the wire may be given any desired value between wide limits.

An object of the invention is to provide a composition for use in and a method of forming a coating of a compound on articles wherein as a preliminary step to the application of the compound, a composition is applied to the article to enhance or diminish the natural adhesion to the article of the subsequently applied coating, the components of the composition being proportioned to have the desired effect.

With the above and other objects in view one embodiment of the invention comprises a composition consisting principally of two ingredients: one an adhesion resisting substance such as a liquid oil, molten paraffin wax, or the like; the other an adhesion promoting agent such as formic, acetic, oleic or palmitic acid or the like. The invention is further embodied in a method of coating a wire with insulating compound which includes the steps of depositing a thin coating or film of the above described composition on the wire and then applying and forming the insulating compound thereon. The resistance to stripping from the wire of the finished coating will then depend upon the relative proportions of the ingredients of the composition used and can be predeterminedly varied by varying those proportions.

Other objects and characteristic 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 broken view in side elevation of a device for treating with the preliminary composition a wire to be subsequently coated with insulating compound;

Fig. 2 is a similar view of a device for applying and forming a coating of insulating compound on the treated wire; and

Fig. 3 is an enlarged cross section of a treated and coated wire.

As herein disclosed, the invention contemplates a new step in an old method of insulating wire involving the use of a new composition of matter. The method may be practised by the use of old

and well-known apparatus, and hence the apparatus is disclosed in the drawing in a semi-diagrammatic and fragmentary manner, the apparatus being no part of the invention.

In Fig. 2, element 20 is the coating head of an extrusion coating machine, generally indicated at 21, in which a coating 22 of insulating compound may be applied and formed on a wire 23 passing through the head. For a detailed description of the construction and operation of an apparatus 20, 21 adapted for use in practising the present invention reference may be had to the specification and drawing of United States Patent No. 1,770,969, to George L. Cherry, for a Method of and apparatus for sheathing cables, issued under date of July 22, 1930.

In order to control the adhesion of the coating 23 to the wire 22, the wire is given a novel preliminary treatment in the apparatus of Fig. 1. This apparatus comprises a tank 24 attached to a support 25 and having a hinged cover 26. Preferably the support 25 is some stationary part of the machine 21, and the tank 24 and the coating head 20 are located in alignment so that the wire 23 may pass in a straight line first through the tank 24 and then through the coating head 21.

The tank 24 contains a liquid bath 27 of the composition which is one of the subjects of the present invention. The composition comprises essentially an oil which tends to diminish the adhesion to the wire of the subsequently applied insulating compound, and an ingredient such as formic, acetic, oleic or palmitic acid, which tends to enhance the adhesion of the compound to the wire.

A distributing wheel or roll 28 is mounted to rotate freely in the tank with its lower portion extending down into the liquid bath and its upper surface substantially tangential to the path of the wire through the tank. The roll 28 is driven by the friction of the wire thereon and carries composition up from the bath and deposits it on the wire. A stationary arcuately curved shield 29 may be stationarily mounted at the rising side of the roll 28 to prevent excessive splashing.

In operation the wire 23 is drawn by any convenient means not shown, such as a capstan from a supply not shown, through the tank and in contact with the roll and then through the coating head, emerging therefrom with a coating of insulating material, which may then be vulcanized, if necessary, in any appropriate apparatus not shown and whose resistance to being stripped from the wire depends principally on the relative proportions of oil and acid in the bath.

Thus in one instance the bath contained 37.5% of a well-known mineral oil widely used as an automobile lubricant and commercially known as 600W oil, together with 12.5% of oleic acid; and the insulating compound consisted of 25% re-
 5 claimed rubber, 20% smoked sheet rubber, 5% mineral rubber, 5% zinc oxide, 2% sulfur, 2% pine tar, and 41% whiting.

In this instance the resulting coating adhered
 10 to the wire with sufficient tenacity to permit of handling the wire on the capstans, take-up devices and similar apparatus used in handling such wire, while at the same time the coating could be cleanly and relatively easily stripped from
 15 the wire wherever it was desired to bare the wire, as for soldering other wire or terminals or the like thereto.

With a higher ratio of oil to acid the insulating coating adheres less tenaciously to the wire until,
 20 if no acid be used at all, there is no adhesion of the coating to the wire. On the other hand, if the proportion of acid be increased, a point is reached at which the coating adheres so firmly that the coating will shear within the body there-
 25 of if an attempt be made to strip it, leaving a film of the insulating material as if welded to the metal.

The molecular mechanics of the processes involved are not clear. However, it would appear
 30 that the oil by itself tends to form a film on the wire preventing contact and hence adhesion of the insulating compound to the wire; and that the acid acts on the surface of the wire, etching it to roughness and forming salts. The roughened
 35 surface of the wire will tend to promote adhesion mechanically. Also it may well be that the metallic salts formed migrate more or less into the insulating compound and tend to harden the inmost film thereof in and around the rough-
 40 nesses of the wire.

It has been found that formic, acetic, oleic and palmitic acids are capable of producing the desired and characteristic effect while stearic and some other organic acids are not effective. It
 45 has also been found that any oil, whether of animal, vegetable or mineral origin, which will form a workable solution or emulsion with any one of the above four acids is effective. Furthermore a wax such as paraffin wax may be used if
 50 means be provided to heat the tank 24, such as a steam coil 30, to keep the bath molten and liquid.

In the embodiment herein disclosed the invention is shown as applied to the coating of wire
 55 with electrically insulating composition, but the invention is not limited to such use only. In fact, it is applicable wherever a compound analogous in character but not necessarily in function is to be applied to a metallic object, and it is desired
 60 to control the tenacity of adhesion of the compound to the article. The embodiment of the invention herein disclosed is illustrative merely, and may be widely modified and departed from in many ways without departing from the spirit
 65 and scope of the invention, as pointed out in and limited only by the appended claims.

What is claimed is:

1. A composite article comprising a metallic body, a coating of a vulcanized material contain-
 70 ing rubber on said body and an intermediate layer compounded of a mixture of an ingredient tending to promote adhesion between said body and said vulcanized material, said ingredient being selected from a group consisting of formic,
 75 acetic, oleic and palmitic acids and another in-

redient tending to resist adhesion between said body and said vulcanized material, said second named ingredient being selected from a group consisting of oils and paraffin waxes, said adhe-
 5 sion resisting ingredient being capable of forming a solution or an emulsion with said adhesion promoting ingredient, said intermediate layer being in contact with the metallic body and the vulcanized material containing rubber.

2. An insulated electric conductor comprising 10 a metallic strand, an insulating coating formed thereover and an intermediate layer compounded of a homogeneously blended but chemically uncombined mixture of a lubricating oil and oleic acid, said oil being capable of forming a solution
 15 or an emulsion with said acid, said intermediate layer being in contact with said metallic strand and insulating coating.

3. The method of insulating an electrical conductor with an insulating material, which in-
 20 cludes depositing upon the conductor a film of a mixture of an ingredient tending to resist adhesion between said conductor and said insulating material, said ingredient being selected from a group consisting of oils and paraffin waxes, and another ingredient tending to promote adhe-
 25 sion between said conductor and said insulating material, said second named ingredient being selected from a group consisting of formic, acetic, oleic and palmitic acids, said adhesion resisting ingredient being capable of forming a solution or an emulsion with said adhesion promoting ingre-
 30 dient, and thereafter forming on said conductor and film a coating of an insulating material, the proportions of the adhesion resisting and adhe-
 35 sion promoting ingredients being relatively variable to vary the degree of tenacity of adhesion between the conductor and the insulating material.

4. The method of coating a metallic article 40 with a vulcanized insulating material containing rubber, which includes the steps of depositing on the article a film of a mixture of an ingredient tending to resist adhesion between said metallic article and said insulating material, said ingre-
 45 dient being selected from a group consisting of oils and paraffin waxes, and another ingredient tending to promote adhesion between said metallic article and said insulating material, said second named ingredient being selected from a group
 50 consisting of formic, acetic, oleic and palmitic acids, said adhesion resisting ingredient being capable of forming a solution or an emulsion with said adhesion promoting ingredient, subsequently applying a coating of a vulcanizable insulating material on said metallic article and film and
 55 thereafter vulcanizing the coating.

5. The method of insulating an electrical conductor with an insulating material, which in-
 60 cludes depositing upon the conductor a film of a mixture of a lubricating oil and oleic acid, said oil being capable of forming a solution or an emulsion with said acid, and thereafter forming on said conductor and film a coating of an insulating material, the proportions of the oil and
 65 acid being relatively variable to vary the degree of tenacity of adhesion between the conductor and the insulating material.

6. The method of coating a metallic article 70 with a vulcanized insulating material containing rubber, which includes the steps of depositing on the article a film of a mixture of a lubricating oil and oleic acid, said oil being capable of forming a solution or an emulsion with said acid, subsequently applying a coating of vulcan- 75

izable insulating material on said metallic article and film and thereafter vulcanizing the coating.

5 7. The method of insulating an electrical conductor with a vulcanized insulating material, which comprises treating the surface of the conductor with a mixture of an ingredient tending to resist adhesion between said conductor and said insulating material, said ingredient being
10 selected from a group consisting of oils and paraffin waxes, and another ingredient tending to promote adhesion between said conductor and said insulating material, said second named ingredient being selected from a group consisting
15 of formic, acetic, oleic and palmitic acids in proportions of the order of 87.5% and 12.5% respectively, said adhesion resisting ingredient being capable of forming a solution or an emulsion with said adhesion promoting ingredient, and there-
20 after applying a coating of a vulcanizable insulating material on said conductor.

8. The method of controlling the tenacity of adhesion between an article and a coating of a material thereon which includes interposing be-
25 tween the article and the coating a film of a mixture comprising an ingredient tending to promote adhesion between said article and said coating material, said ingredient being selected from a group consisting of formic, acetic, oleic and
30 palmitic acids, and another ingredient tending to

resist adhesion between said article and said coating material, said second named ingredient being selected from a group consisting of oils and paraffin waxes, said adhesion resisting ingredient being capable of forming a solution or an
5 emulsion with said adhesion promoting ingredient, the ratio of one ingredient to the other being adjusted according to the degree of tenacity of adhesion required.

9. The method of insulating an electrical con-
10 ductor with a vulcanized insulating material, which comprises treating the surface of the conductor with a mixture of an ingredient tending to resist adhesion between said conductor and said insulating material, said ingredient being
15 selected from a group consisting of lubricating oils and paraffin waxes, and another ingredient tending to promote adhesion between said conductor and said insulating material, said second
20 named ingredient being selected from a group consisting of formic, acetic, oleic and palmitic acids in proportions of the order of 87.5% and 12.5% respectively, said adhesion resisting in-
25 gredient being capable of forming a solution or an emulsion with said adhesion promoting ingredient, and thereafter applying a coating of a vulcanizable insulating material on said conduc-
tor.

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