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PROCESS FOR REMOVING RESIN COATING FROM COPPER WIRE

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This invention relates to the treatment of resins, and more particularly to the debonding of such resins as polyvinyl formal resins to remove the resin from a surface to which it adheres.

Polyvinyl formal resins are widely used as insulating materials, particularly on magnet wire. These resins possess flexibility, toughness, temperature stability, solvent resistance, resistance to aging, moisture resistance, dielectric strength, and high bonding strength.

The characteristic of high bonding strength which produces good adherence of the resin to the conductor, though a very valuable quality in the resin, causes difficulty when the resin is to be removed from the surface to which it is bonded.

When wire which is coated with the resin is to be soldered or otherwise secured by an electrically-conducting connection to another conducting surface, the resin must be removed from the portion of the wire which is to form a junction. Many different methods have been used in an effort to remove the resin from wire, for example. Some methods affect the wire itself; other methods affect the resin insulation adjoining the portion of the wire from which the insulating resin is to be removed; while still other methods are slow and expensive.

The present invention is designed to provide a treatment for the resin which readily removes the resin from a surface to which it is bonded without damaging the surface. At the same time, injury or damage to joining portions of the resin is avoided so that the treatment may be selectively applied to a small portion of the resin.

The invention contemplates the treatment of the resin with a concentrated aqueous solution of formic acid which penetrates the resin and causes the resin to soften and swell so that it may be readily removed mechanically from any surface to which it was applied. The formic acid solution does not creep or affect the joining portions of the resin and does not produce breaks in the insulating resin coating. When the resin is attached to copper wire and the treatment of the invention is used, the wire from which the resin is removed is bright, but is undamaged. The invention also contemplates the carrying out of the treatment while avoiding the formation and presence of noxious fumes.

In accordance with the invention, a concentrated aqueous solution of formic acid is provided, and the resin which is to be debonded is introduced into this solution. The solution may be placed in a container, and a layer of an inert liquid which is immiscible with and has specific

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gravity less than the formic acid solution may then be introduced into the container. This liquid layer forms a protecting covering for the bath so that fumes of the formic acid are substantially avoided.

When the polyvinyl formal resin is to be removed from a surface to which it is bonded, it is immersed in the formic acid solution for a short period of time and then removed. The resin is softened and swells and may then be readily removed mechanically from the surface. For example, in the case of wire, the portion of the resin which is treated is merely wiped from the wire after treatment.

The aqueous formic acid solution should be relatively concentrated, and preferably is of a concentration in excess of 90%. The inert liquid which forms the protecting layer over the aqueous formic acid solution may contain any suitable inert liquid which does not form a film on the wire or other material to which the resin is bonded or on the resin itself and which is chemically inert and immiscible with the formic acid solution and which has a specific gravity less than that of the aqueous formic acid solution. For example, volatile petroleum solvents, such as naphtha and cyclohexane, may be used for this purpose. As a specific example of the invention, a bath was prepared containing 95% aqueous solution of formic acid and an immiscible layer of naphtha over the formic acid solution. Copper wire coated with polyvinyl formal resin was immersed in the formic acid solution for a period of one and a half to two minutes. At the end of this time, the wire was withdrawn and the resin which had softened and swelled was wiped from the wire. The entire operation was carried out at room temperature.

Although the invention is particularly applicable to polyvinyl formal resins, it is also suitable for the treatment of polyvinyl acetal resins in general, including polyvinyl butyral and polyvinyl acetal. The term polyvinyl acetal resins as applied herein to the broad class of resins is intended to mean a resin which is formed by the reaction of an aldehyde with polyvinyl alcohol or a reactive derivative of the polyvinyl alcohol, such as polyvinyl acetate or other ester.

Although the invention has been described in connection with a specific embodiment, it will be apparent that modifications and changes may be made without departing from the spirit and scope of the invention.

I claim:

1. A process of removing a polyvinyl formal

resin coating from copper wire, comprising treating the coated wire with a concentrated aqueous solution of formic acid until the resin has softened and swelled, and then separating the softened swollen resin from the wire.

2. A process of removing a polyvinyl formal resin coating from copper wire, comprising immersing the coated wire in a concentrated aqueous solution of formic acid for a few minutes to cause the resin to swell and break the bond between the resin and the wire, withdrawing the wire carrying the treated resin from the solution, and separating the treated resin from the wire.

3. A process of removing a polyvinyl formal resin coating from copper wire, comprising introducing the wire into a bath comprising a concentrated aqueous solution of formic acid and an immiscible layer of a non-film-forming inert liquid of specific gravity lower than the formic acid solution, withdrawing the wire carrying the treated resin from the bath, and removing the treated resin from the wire.

4. A process of removing a polyvinyl formal resin coating from copper wire, comprising treating the coated surface with formic acid until the resin has softened, and then separating the softened resin from the surface.

5. A process of removing a polyvinyl formal resin coating from copper wire, comprising treating the coated surface with a concentrated aqueous solution of formic acid until the resin has softened, and then separating the softened resin from the surface.

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