Pyrolizable Enamel Coated Wire Comprising Manganese and Cobalt Chelates

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Original Filed March 8, 1962

Figures:
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- 11
- 12
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- 14
- 16

Enamel comprising manganese and/or cobalt chelate.
PYROZLIZABLE ENAMEL COATED WIRE COMPRISING MANGANESE AND COBALT CHELATES

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Divided and this application July 13, 1966, Ser. No. 618,647

6 Claims. (Cl. 117—215)

This application is a division of application Ser. No. 178,349, filed Mar. 8, 1962, now Patent Number 3,294,731.

Our invention relates to an improvement in metal coating enamels of the type comprising fusible glass elements where it is intended to pyrolyze the organic constituent and fuse the glass to form the final coating. Particularly our invention relates to the inclusion in said enamels of manganese and cobalt chelates.

In the preparation of electrical windings for very high temperature service it has been disclosed by the present applicants in an application now pending to coat magnet wire with a fusible glass held in place by an organic enamel, to form the coated wire into windings, to burn or pyrolyze off the organic constituent and to fuse the glass so that the insulating components of the completed winding are entirely vitreous and free from carbon compounds with the result that the winding can be safely operated at temperatures in excess of 500° C., which would completely destroy conventional windings.

In the course of manufacturing windings of the type described above there is a critical period, during and directly following the pyrolysis of the organic enamel and prior to the complete fusion of the glass where the latter may become separated from the wire it is intended to cover. This wire is usually a nickel-plated copper wire and in prior art methods there is no adhesion of glass to the nickel surface after the organic binder has been pyrolyzed.

It is an object of our invention to maintain the integrity of the glass insulation of an electrical winding during and subsequent to the fusion of the glass into a contiguous coating.

We have found that when a small percentage of a cobalt or manganese chelate is added to the enamel composition the glass remains in position on the wire and we have invented an electrical system comprising a conductor, fusible glass insulation surrounding the conductor, and an organic binder supporting the insulation. The binder is intended to be pyrolyzed prior to the fusion of the glass insulation and it comprises a minor amount of cobalt or manganese chelate. Our insulation may comprise glass particles suspended in enamel and the amount of chelate will preferably comprise 0.5—3% by weight. We prefer to use cobaltous or manganese ethylenediamine tetraacetate.

We have invented a magnet wire enamel comprising 10—25 parts by weight of fusible powdered glass, 75—90 parts by weight of organic enamel such as terephthalate modified phenyl-methyl-siloxane resin, and 0.5—3 parts by weight of manganese or cobaltous chelate. **Example**

In an example a magnet wire enamel was formulated as follows:

<table>
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<th>Component</th>
<th>Lbs.</th>
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<tr>
<td>Finely powdered aluminum borosilicate glass</td>
<td>2.8</td>
</tr>
<tr>
<td>Cobaltous ethylenediamine tetraacetate</td>
<td>0.14</td>
</tr>
<tr>
<td>Manganese ethylenediamine tetraacetate</td>
<td>0.14</td>
</tr>
<tr>
<td>Terephthalate polyester modified phenyl-methyl-siloxane (50% solids, in xylene)</td>
<td>14.0</td>
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The slurry of the example was applied to a nickel-plated copper wire and baked at 250° C. to form a uniform coating. The wire was then wound into a coil and placed in an oven at 300° C. for 15 minutes to burn off the enamel. Thereafter the oven temperature was raised to 650° C. for ½ hour to fuse the insulation. When anable Cores of excess of the coil wire forming the coil it was subsequently cooled the coil wire forming the coil was found to be insulated with a uniform coating of fused glass.

Features of our invention are shown in the appended drawing.

The drawing shows a section of a coil made to our invention prior to pyrolyzing the enamel.

In the drawing a coil is indicated generally by the numeral 10 made up of a plurality of turns of a magnet wire 11. The wire 11 has a copper conductor 12 with an outer plating 13 of nickel to prevent oxidation of the copper at high temperatures of operation. The nickel coating is much exaggerated in the drawing and it will be understood that we do not wish to limit our invention to any particular selection of conductor material. Surrounding the conductor 12 is an organic enamel 14 in which has been suspended and baked prior to the formation of the coil 10 a sufficient percentage of glass particles 16 to completely coat the conductor 12 after the enamel 14 has been pyrolyzed and the glass has been fused. It is a feature of the enamel 14 that it comprises a small percentage of manganese and cobalt chelate.

The electrical system comprising the wire 12 and glass-comprising enamel 14 may be shipped and stored for long periods prior to forming into windings.

We have invented new and useful articles and compositions for which we desire an award of Letters Patent.

We claim:

1. An electrical system comprising a conductor, fusible glass insulation surrounding said conductor, an organic binder supporting said insulation said binder being pyrolyzed prior to the fusion of said insulation, and a minor amount of metal chelate selected from the class consisting of cobalt and manganese chelates compounded in said binder.

2. An electrical system comprising a conductor, an enamel coating said conductor, fusible glass particles suspended in said enamel, said enamel being pyrolyzed prior to the fusion of said particles, and a minor amount of metal chelate selected from the class consisting of cobalt and manganese chelates compounded in said binder.

3. An electrical system comprising a conductor, fusible glass insulation surrounding said conductor, an enamel binder supporting said insulation said binder being pyrolyzed prior to the fusion of said insulation, and about 0.5—3% by weight of a cobalt chelate compounded in said binder.

4. The system of claim 3 wherein said chelate in cobaltous ethylenediamine tetraacetate.

5. An electrical system comprising a conductor, fusible glass insulation surrounding said conductor, an enamel binder supporting said insulation said binder being pyrolyzed prior to the fusion of said insulation and about 0.5—3% by weight of a manganese chelate compounded in said binder.

6. The system of claim 5 wherein said chelate is manganese ethylenediamine tetraacetate.

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WILLIAM L. JARVIS, Primary Examiner.