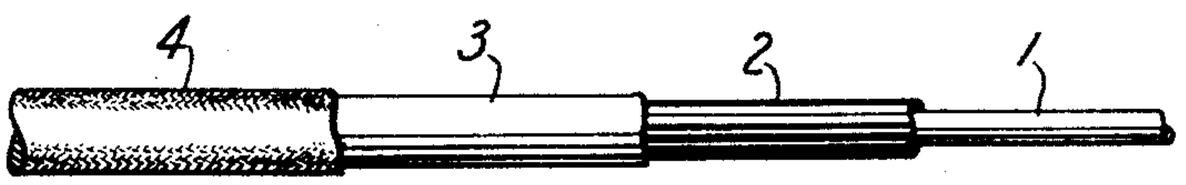
Feb. 14, 1933. H. BOVING 1,897,629

FLAMEPROOF ARTICLE

Filed Oct. 9, 1924



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UNITED STATES PATENT OFFICE

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FLAMEPROOF ARTICLE

Application filed October 9, 1924. Serial No. 742,559.

This invention relates to flame-proof articles and particularly to improvements in so-called "flame-proof" electrically insulated wire.

An object of the invention is to provide methods of and means for flame-proofing articles which will be highly efficient in service and economical.

The features of the invention relate broadly to the flame-proofing of articles with selenium, selenium salts, such as sodium, calcium and magnesium selenites and selenates, compounds and mixtures of selenium and sulphur, and any or all of these with a binding medium, particularly a flame-proof binding medium, such as sodium silicate, and to various applications of these materials to articles, such as fibrous materials or insulated electrical conductors.

The single figure of the drawing shows an insulated wire embodying one form of the invention.

Referring to the figure the insulated wire comprises a core 1 of electrically-conducting material, a coating 2 of rubber or other insulating material applied over the core 1, a second coating 3 of flame-proofing material comprising selenium salts, finely-divided selenium, or finely divided compounds of selenium and sulphur, in a suitable binding medium. This binding medium might be of a type such as ordinary glue for mechanically holding the selenium, etc., but it is preferable to use as the binder a material which also has flame-proofing qualities, such as sodium silicate or water glass. The binder is applied over the insulating coating 2, and an exterior textile covering 4, such as cotton or flame-proofed cotton, is applied over the flame-proofing coating 3.

One way of producing the flame-proof insulated wire embodying the invention is to pass a wire of electrically-conducting material which may have an insulation covering such as rubber, rubber compounds or enamel, through a bath containing a solution of a binding medium having selenium salts or finely divided selenium in suspension therein, the solution being of the proper consistency to give the required thickness of coating. The wire may be drawn through the solution in any suitable manner, but preferably should be drawn out of the solution in a vertical direction so as to obtain a coating of uniform thickness around the wire. When the wire is withdrawn from the solution, after a short interval of drying, the material will be set so that a uniform coating 3 of the dried or partially dried mixture comprising selenium and the binding medium will be obtained. The flexibility and adhesiveness of the coating will be sufficient so that the wire may be reeled or so that it will stand the customary amount of handling in a braiding process to follow.

The binding medium used with the finely-divided selenium or selenium salts as pointed out above, may be any material having suitable adhesive and insulating qualities, such as glue, but it is preferable to use a solution of sodium silicate or water-glass, which, in itself, has very good flame-proofing qualities. The amount of selenium necessary to obtain the desired amount of flame-proofing, and, therefore, the cost of the coating, may be decreased if selenium salts, or finely divided compounds of selenium and sulphur, are used, instead of the finely divided selenium alone, with the binding medium. Suitable selenium salts are sodium, calcium and magnesium selenites or selenates. A very small amount of these materials, especially if they are used with the sodium silicate or water-glass binder, is sufficient to give effective flame-proofing.

In accordance with the invention, it has been found that a fibrous or textile material, such as cotton, can be effectively flame-proofed by impregnating it with one or more selenium salts, such as sodium or ammonium selenites or selenates.

This flame-proofing effect is due to the fact that the selenium vapor which is given off when the conductor is subjected to the action of a flame is concentrated close to the wire where it forms a blanket which dilutes the otherwise flammable gases which break through. The selenium vapor also prevents the heat of the flame from affecting the insulation on the wire which, if permitted,

would create more flammable gases. This deoxidizing action of selenium is so intense that a small amount, if evenly distributed throughout the fabric insulation, is sufficient to render the insulation flame-proof. Hence in order to decrease the cost and to produce a uniform distribution of the selenium it is preferable to mix with the selenium a cheaper element such as sulphur which has somewhat similar properties. A compound containing between 10 and 20 per cent selenium and between 80 and 90 per cent sulphur has been found very effective for flame proofing. Larger proportions of selenium can be used but are, of course, more costly. There is a decided advantage in having the flame-proofing coating directly over the insulation where it is most needed to prevent the insulation from burning.

The flame-proof coating may be further protected from abrasion and the effects of vibration by applying an outer textile covering or serving 4, preferably of cotton or cotton braid, over it by any of the processes well-known in the art. An additional flame-proof and water-proof protection may be obtained by impregnating the textile fabric with any suitable flame-proofing material, for example, with sodium magnesium borate.

If desired, the textile covering 4 may be applied before the coating containing the selenium has dried, so that the coating in its liquid or partially set condition is taken up to some extent by the covering. In either case, the selenium and binding medium are effectively prevented by the cover from flaking off or being rubbed off from handling or bending of the wire. A practically continuous coating of the flame-proofing material is thus maintained over the insulation coating.

The wire produced as above described is found to be an efficient flame-proof conductor, and has practical application as "jumper" wire used in distributing frames in telephone central offices. However, it is not restricted to such use, but may be used in any other situation where flame-proofing is necessary.

What is claimed is:

1. An electrical conductor having a flame-proofing coating of selenium and sodium silicate applied thereover.

2. An electrical conductor having a flame-proofing coating comprising a selenium salt and sodium silicate applied thereover.

3. An electrical conductor having a flame-proofing coating comprising a binding material and selenium and sulphur.

4. An electrical conductor having a flame-proofing coating comprising sodium silicate and selenium and sulphur applied thereover.

5. A wire having an electrical insulation of rubber, a flame insulation of selenium and sodium silicate, and a mechanical insulation of closely woven cotton over said flame-insulation.

6. A wire having an electrical insulation of rubber, a flame insulation containing selenium, sodium silicate and sulphur, and a mechanical insulation of closely woven cotton over said flame-insulation.

In witness whereof, I hereunto subscribe my name this 8th day of October A. D., 1924.

HENRIK BOVING.