April 21, 1936. C. F. OBERMAIER 2,038,378

ELECTRICAL INSULATION MATERIAL

Filed Nov. 20, 1931

Fig. 1.



Fig. 2.

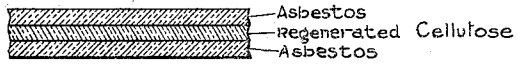


Fig. 3.

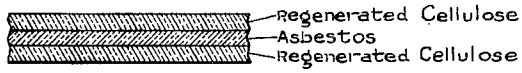


Fig. 4.

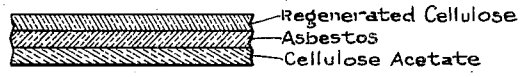


Fig. 5.

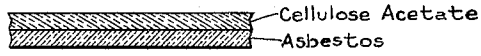


Fig. 6.

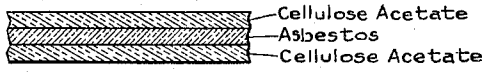
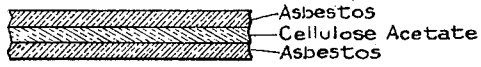


Fig. 7.



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UNITED STATES PATENT OFFICE

2,038,378

ELECTRICAL INSULATION MATERIAL

Carl F. Obermaier, York, Pa., assignor to General Electric Company, a corporation of New York

Application November 20, 1931, Serial No. 576,433

4 Claims. (Cl. 154—2.6)

This invention relates to electrical insulation material and to methods of making the same.

Asbestos listing, which is tape woven from fine asbestos yarn, has been used for some time in the electrical industry as insulation material. This tape has been difficult and expensive to manufacture especially in thin sheets. Such material as well as the so-called asbestos paper tape possesses very little strength.

In accordance with the present invention asbestos either felted or in the form of a fine paper-like material in sheet form is combined in a suitable manner with a cellulosic material, such as, for example, regenerated cellulose, known in the trade for instance as "cellophane", or a cellulose derivative such as cellulose acetate. By the term "cellulosic material" as hereinafter used, therefore, it is to be understood that such classes of material as enumerated above are included.

One practical result of my invention is the production of a sheet or tape of combined cellulosic material and felted asbestos which is adapted for use as insulation of wire in cable construction as more fully set forth in the copending application of Carl F. Obermaier and Murray H. Owen, Serial No. 558,535, filed August 21, 1931, and assigned to the assignee of the present invention.

The cellulosic material not only lends strength to the asbestos but the combined material is rendered high in dielectric value due to the cellulosic material and heat resistant due to the felted asbestos. It may be made in the form of sheets, tape, windings, etc. and may be impregnated or coated with such materials as insulating varnishes, synthetic resins and the like, making the whole better in insulation value and eliminating subsequent coating operations where the material is used for example as a tape in insulating windings of electrical apparatus. In certain cases, the material may consist of a single sheet of cellulosic material combined on one or both sides thereof with asbestos or the asbestos may be sandwiched between a plurality of sheets of cellulosic material and suitably combined therewith.

For a consideration of what is believed to be novel and the invention, attention is directed to the following specification, the accompanying drawing, and the claims appended thereto.

Figure 1, in the accompanying drawing, illustrates one modification of my invention; Figure 2 is a second modification while Figures 3, 4, 5, 6 and 7 illustrate still further modifications of the invention.

In accordance with one method of producing the insulation material of my invention asbestos paper sheet known as asbestos felt, of suitable quality and thickness, depending on the conditions under which the insulation material is to operate, is combined with cellulosic material by simply using an adhesive to cause combination of the two. For example, where a cellulose derivative, for example, cellulose acetate is combined with asbestos paper sheet, the sheet of cellulose acetate may be treated with a varnish comprising an alkyd resin which may or may not contain therein such modifying agents as natural resins, vegetable oils and/or the acids derived therefrom as for example the drying oils like linseed, chinawood oil and the like, or the acids derived from these oils. The asbestos paper is combined with the cellulose acetate, preferably under pressure, or pressure and heat, to cause firm adherence and the combined material is either air dried or heat treated to cure the resin as the case may require. Where a non-resinous adhesive is used as for example, a water soluble glue, the sheets may be combined directly under pressure and air-dried. In place of the cellulose acetate it is, of course, understood that other cellulosic materials such as enumerated heretofore may be used.

In accordance with a further method of manufacturing the insulation material of the invention the cellulosic material is employed in a plastic state which it may be caused to assume by the use of heat and/or pressure and/or solvents and applied to asbestos sheet material using, if necessary, a suitable adhesive to aid in the combination of the materials. After being thus brought together the combined material is oven treated to dry the same and expel solvents, if any are present in the mass.

Where it is desired to prevent the asbestos sheeting from absorbing too much adhesive a suitable sizing material, for example, starch, casein, etc., may be applied to the asbestos before the adhesive is applied. This will insure less trouble in removing solvents and prevent the utilization of too much adhesive material.

A still further method to make the insulation material is to prepare a suitable solution of the cellulosic material employed, and spray the latter by means of suitable spray apparatus on felted asbestos as it passes by the former on a conveyor apron, drying the sprayed material and repeating the spraying operations, if desired or necessary. After the asbestos has gained some strength due to the initial spray the combined

material may be passed through a bath of the cellulosic material and further coated in this way.

It is within the scope of the present invention to utilize felted asbestos in sheet form in connection with cellulosic material of different types in a single insulation. That is, the invention not only comprehends the combination of a single cellulosic material with felted asbestos, but where desirable or necessary suitable combinations of different types of cellulosic material may be used in making the insulation material. For example, regenerated cellulose may be combined with felted asbestos which in turn may be combined with cellulose acetate and the whole if desired further coated or impregnated with insulating varnishes, synthetic resins, etc.

Various obvious modifications will occur to those skilled in the art to which the invention pertains, and it is desired to include all such modifications within the scope of the appended claims.

In a copending divisional case, Serial No. 64,856, filed Feb. 20, 1936, I have specifically claimed the combination of cellulose acetate and asbestos as electrical insulation material.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An electrical insulation material comprising a plurality of sheets of regenerated cellulose and a sheet of asbestos therebetween and suitably combined with said regenerated cellulose.

2. A flexible insulation material comprising felted asbestos combined on one side thereof with regenerated cellulose in sheet form and on the other side thereof with a film of cellulose acetate.

3. A unitary flexible electrical insulation material of high dielectric strength composed of a continuous sheet of regenerated cellulose united with a coextensive continuous sheet of felted asbestos.

4. A unitary flexible electrical insulation material of high dielectric strength composed of a continuous sheet of regenerated cellulose united on each side thereof with felted asbestos in sheet form coextensive with said sheet of regenerated cellulose.

CARL F. OBERMAIER.