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ELECTRICAL INSULATION MATERIAL

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The present invention relates to electrical insulation material, and more particularly to the treatment of asbestos board in such a manner that its insulating properties, and moisture resistance are markedly improved and at the same time maintaining its maximum arc resistance.

Asbestos board consists largely of asbestos bonded together with a mineral binder such as Portland cement. It is used in sheets having a thickness of about ⅛ inch to 2 inches. One of the principal uses for such board is as a switchboard panel material and in this connection it is very essential that the material withstand moisture and the action of an electrical arc. If the material carbonizes under the influence of an electrical arc and permits "tracking" its value as an insulation material under these conditions is lost.

Asbestos board has heretofore been impregnated with material such as asphalts and pitches and while these materials have rendered the board moisture resistant such impregnation results in marked decrease in arc resistance of the asbestos board.

In accordance with the present invention it has been found that if asbestos board is impregnated with certain waxes in certain proportions that the maximum arc resistance of the board is maintained.

In order to illustrate the invention the following example of the manufacture of a switchboard panel is given:

The asbestos board is given a wax dip in a mixture of carnauba and paraffin waxes. The proportions of these waxes are chosen such that just enough paraffin wax is employed with the carnauba wax in order to cause thorough penetration of the mixture through the board. It has been found that if carnauba wax is used by itself only surface penetration of the board results giving a non-uniformly impregnated panel board. It has also been discovered that the paraffin wax acts as a carrier to cause the waxes to thoroughly penetrate the panel board. Thus, while paraffin wax is ordinarily avoided in electrical insulation material because of its poor moisture resistance, it has been found unexpectedly that it will act in conjunction with carnauba wax to cause the latter to penetrate the asbestos board and to give a product which is of excellent moisture resistance and high arc resistance. It has been found that this mixture of waxes will not track even under severe arcing conditions.

As a preferred mixture of waxes to use, two parts by weight of carnauba wax to 1 part by weight of paraffin wax are employed. These waxes are heated together until solution takes place and held at 300° F. at which temperature the asbestos board panels are impregnated. Complete impregnation of a 1 inch panel usually takes place in about 48 to 96 hours.

In order to illustrate how effectively the asbestos panel board material of the present invention maintains the arc resistance at the value given by untreated asbestos board in comparison with the results obtained on a standard panel board material herein designated as X the following tests were carried out.

An electrode arrangement consisting of two #8 brass machine screws with ½'' O. D. brass washers under the screw heads was used. These screws were placed in two holes drilled through the test specimens on one inch centers. Nuts on these screws were drawn up tight to make good contact between the washers and the surface of the specimens. The approximate clearance between washers was ½''.

To simulate service conditions where a severe arc is often started at moderate voltages by dirt accumulated on the surface of the panel, graphite was sprinkled on the test specimen between the electrodes, the surface of the specimen being horizontal. Voltage was then applied, being raised gradually from zero to the value necessary to flash over the electrodes.

With the material designated X flashover occurred at 1500 volts and the material carbonized immediately. After cooling off slightly, the application of a voltage of from 90 to 150 volts caused sparking. Sparking still occurred at this value after brushing and blowing away all free graphite, showing that a highly conducting carbonized path had been formed through the material between the electrodes.

With the material of the present invention and with graphite between the electrodes arc-over occurred at 1400 volts. (This slightly lower voltage value was due to the fact that in this particular test a little excess of graphite over that used in the preceding test happened to be placed between the electrodes.) After arcing for several minutes with no apparent damage to the board, the arc was interrupted, excess graphite was brushed off, and the specimen cooled slightly. Upon reapplication of voltage sparking occurred at 4000 volts but the sparking soon cleared. This operation was repeated several times at succeedingly higher voltages. The material withstood these higher voltages until the air flashover of

10,500 volts (for this electrode spacing) was reached.

The above test has been repeated a number of times in various places including steel mills and the same results obtained each time, namely, the impregnated asbestos board of the present invention would not carbonize and was not electrically damaged by the arc, whereas in all cases standard panelboard material consisting essentially of the same base asbestos board, but which were filled with pitches and the like, carbonized very quickly and were permanently electrically damaged.

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

1. An electrical arc-resistant insulator consisting of asbestos board containing a wax mixture throughout its surface and interior, said wax mixture being composed of two parts by weight of carnauba wax and one part by weight of paraffin wax.

2. The method of maintaing the maximum arc resistance of asbestos board and improving its moisture resistance which comprises immersing the same at 300° F. in a mixture of carnauba wax and paraffin wax in proportions such that the latter carries the waxes into the board beyond surface penetration, and continuing the immersion until complete penetration of the board by the waxes takes place.

3. A switchboard panel consisting of a board of substantial thickness composed largely of asbestos bonded with Portland cement, said board being surface coated and impregnated throughout its entire thickness with a mixture consisting of carnauba wax and paraffin wax in proportions such that the latter carries the entire wax mixture through the surface and into the entire board thickness.

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