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**FIRE-RETARDANT DECORATIVE
INSULATING BOARD**

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5 Claims. (Cl. 117-72)

This invention relates to fiber board, made from wood or other vegetable fiber, and more particularly to insulating board of this type, having fire-retardant properties and a decorative finish.

Fiber insulating board is customarily manufactured from wood or other vegetable fiber by felting as on a Fourdrinier wire, or by otherwise molding the fiber furnish to form a wetlap, pressing the latter to abstract water therefrom and consolidate it to required thickness, whereupon the boards cut therefrom are passed through a drying oven to remove the balance of the water content thereof.

For interior use, it is generally required that the finished board have a decorative finish on the surface thereof exposed to view.

The decorative coating compositions generally used in the manufacture of such board, however, exhibit a tendency to develop glossy spots on the high parts of the finished board. This evidently results from the frictional contact with other boards during subsequent stages of production and handling or during transit to the place of use. This tendency towards the formation of gloss in spotted areas, is highly objectionable and constitutes an inherent characteristic of the coating composition. It is recognized that this defect may be overcome by utilizing coating compositions which will form a decorative finish whose surface is initially characterized by a certain amount of uniform gloss. The compositions heretofore used for that purpose, however, are costly because of the high ratio of gloss-producing agent necessarily employed in relation to the amount of pigment. Moreover, when the board is one which is required to meet required standards of fire-resistance, the amount of fire-retarding agent that must be incorporated in the composition is sufficiently high to obscure the gloss that might otherwise characterize the finished surface.

An object of the invention, therefore, is to provide a composition which may readily be applied to the surface of fiber insulating board for imparting a decorative effect as well as fire resistance to the finished board.

Another object of the invention is to provide a composition of this character and which will be substantially free of any tendency to development of glossy spots on the finished surface by reason of frictional contact with other boards during manufacture and/or transit.

Still another object of this invention is to provide a fiber insulating board possessing flame-resistant properties adequate to meet required standards, and having a decorative finish which presents a uniformly glossy appearance, is sufficiently flexible to maintain its integrity when the board is flexed, and is also capable of withstanding material impairment by washing.

With the foregoing and other objects and advantages in view, the invention resides in the composition and mode of utilizing the same for providing fiber insulating board with a flame-resistant, decorative finish on the surface thereof, and in the improved fiber insulating board pro-

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duced thereby, all as fully hereinafter described and more particularly defined in the appended claims.

In accordance with our invention, the compositions used for the decorative finish of the board, contain a gloss-producing agent serving also as a binder for the pigment, the gloss-producing agent being present in sufficient quantity to produce a uniformly glossy surface in the decorative finish without obscurement of the gloss, notwithstanding the presence of flame-retarding material in the coating in quantities which enable the board to meet the standards required in respect of flame-resistance.

To flexibilize the inherent brittleness which characterizes the film of the decorative coating by reason of the relatively large amounts of the gloss-producing agent present therein, there is incorporated in the coating composition a flexibilizing resin which serves also as a binder and water-proofing agent, and which is compatible with the other ingredients of the composition.

In producing the flame-resistant, decorative insulating board of our invention, there is first formed, in any conventional manner, a wetlap or felted web of wood or other vegetable fiber, such as sugar cane bagasse, or the like.

The thus formed wetlap is then, in accordance with the invention, coated on its upper surface, with a composition which serves to provide a priming coat for the decorative finish coatings subsequently to be applied thereto, and to provide a surface that is substantially flame-resistant, and of a color approximating that of the finish coating. This base coating is applied to the board substantially immediately prior to its entry into the ovens through which the board is passed for drying the same.

This base coating is provided by an aqueous composition containing a relatively high proportion of mineral clay, together with a suitable binder such as starch, and suitable pigment, when the decorative finish is to be other than white.

As illustrative of a composition that may be employed for the prime coat in the practice of the invention, is the following:

	Parts by weight
Clay	800
Pearl starch	50
Anti-vermin and anti-mildew agent	5
Water in sufficient quantities to make approximately 250 gallons.	

This composition serves well when the subsequently applied decorative finish coating hereinafter described is to be white in color. Where the decorative finish, however, is to be other than white, suitable pigments may be incorporated in sufficient quantity so that the prime coat will be of a color approximately that of the finish coat.

When applied at the rate of 9 to 12 gallons per thousand square feet, viz., to deposit approximately 30 to 40 pounds of clay per thousand square feet, this composition provides a prime coat which is considerably resistant to the spread of flame, by reason of the presence of the high amount of clay, especially when the latter is one which is of the kaolin type. The composition is best applied by means of felt-covered rolls in pressure contact with the surface of the wetlap immediately after it emerges from the conventional wet presses and prior to entrance of the wetlap boards into the drying ovens. By reason of the expanding action which the wetlap undergoes upon emerging from the wet presses, the composition tends to be more or less dewatered thereby, and hence may, if desired, be applied in a plurality of coats.

The expanding action above mentioned, in conjunction with the pressure exerted by the applicator roll or rolls, serves not only to provide a film of the composition on

the treated surface, but also to permeate the sub-surface portions of the relatively thick sheet of wetlap with the clay and other inert components of the composition.

When the thus treated board is then dried, there results a surface that serves not only as a base or priming for the decorative coating to be subsequently applied, but also as a medium which imparts a substantial degree of resistance to the spread of the flame, thereby reducing the burden of flame-proofing which would otherwise need to be borne by the subsequently applied decorative coating in order that the finished board meet required standards in respect of flame-resistance.

After the board and the prime coating applied to the surface thereof as above set forth have been simultaneously dried, as by passing them through the conventional drying ovens, the decorative finish is applied to the primed surface.

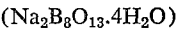
The decorative finish, according to the invention, is provided by an aqueous composition which contains, essentially, in addition to pigment, and a flame-retarding material, a water-dispersible relatively inexpensive binder which serves also as a gloss-producing agent, and a binder which serves also to minimize the brittleness of the film caused by the gloss-producing agent and to impart a sufficient degree of water-proofness to the film to render it washable. Preferably, also, there is included a preservative.

The gloss-forming agent consists of starch, preferably of the thin-boiling variety, and is present in quantities of from approximately 30% to 60% by weight of the pigment present. In general, the starch should constitute approximately 8% to 20% of the total solids content of the composition.

The film-flexibilizing binder and water-proofing agent may be either an acrylic resin or a vinyl acetate resin of a type and of a melting point to be readily fusible at the temperatures employed for drying the coating composition, although its plasticization may be achieved or assisted, if desired, by incorporating known chemical plasticizers. Preferably, the resin is incorporated as a pre-formed aqueous dispersion thereof, containing 50 to 60% by weight of the resin. The quantity of such dispersion incorporated in the composition is such as to provide approximately 75% to 200% resin, by dry weight, based on the weight of the starch, or from approximately 12% to 20% based on the total solids content of the composition.

In general, in relation to the amount of pigment, the combined weight of the resin and starch should be within the range of from one to two parts thereof, for each part of pigment.

The flame-retarding agent is preferably a water-soluble borate such as disodium octaborate tetrahydrate



The theoretical composition of this borate is substantially as follows:

	Percent
Boron trioxide	66.2
Sodium oxide	14.7
Water crystallization	17.1

This flame-retarding agent, when present in quantities of from not less than about 25 percent to no more than about 40 percent by weight of the total solids content of the decorative coating composition, has been found to impart adequate flame-resistance to the finished board without impairing the gloss or washability of the film.

In order to prevent occurrence of mold and to repel attack by insects, there is incorporated in the composition a suitable preservative. Sodium pentachlorophenate serves this purpose well, and may be employed in amounts of from 5 to 10 percent based on the weight of the starch.

The decorative coating is applied to the surface previously prime coated as above described, in quantities to provide about 1.5 to 2.0 pounds of the flame retarding

agent per thousand square feet of the surface. When applied at that rate, the finished board tested according to the conditions of test specified in Commercial Standard CS-42-49, exhibits an area of char ranging from 9.0 to 11.0 square inches, with no glow or smoldering continuing 60 seconds after removal of the igniting flame. Thus, it meets the requirements of those as well as other accepted standards for flame-resistant fiber insulating board.

As illustrative of a composition for producing the decorative finish according to the invention, the following example is given:

	Parts by weight
Water	1000
Pigment	250
Disodium octaborate tetrahydrate	200
Starch	150
Acrylic resin dispersion	200
Preservative (sodium pentachlorophenate)	9

When the coating was applied at the rate above indicated, and then dried in the conventional manner, the finished board not only exhibited the fire-resistant properties above set forth, but also exhibited a uniform gloss on the surface, the dried film of the coating being also washable and sufficiently flexible to permit flexing of the board without cracking the film.

In actual practice, it is preferred to form the decorative finish by utilizing two separate coatings, in the first of which some of the pigment may be replaced by clay. By proceeding in this manner, there is the advantage, among others, that the total amount of costly pigments required to product the desired colors or shades, may be reduced by incorporating into the first of the two coatings substantial quantities of opacifying material such as clay, serving to hide the base surface.

The decorative coatings are preferably applied by means of rotary brushes, although other conventional means may be utilized.

It will be understood that the details above set forth are for the purpose of illustrating the invention and not for restricting the same thereto, and that variations within the spirit of the invention are intended to be included in the scope of claims hereto appended.

Having described our invention, what we claim is:

1. A flame-resistant, decorative, fibre insulating board having on a surface thereof, a prime coating comprising essentially mineral clay and binder, deposited in an amount to provide approximately 30 to 40 pounds of clay per thousand square feet of surface, and a uniformly glossy decorative finish coating applied over said prime coating, said decorative coating comprising pigment, a fire-retarding agent comprising a water-soluble borate salt, starch as a gloss producing pigment binder and a flexibilizing and water-proofing resin selected from the group consisting of acrylic resin and vinyl acetate resin, said starch being present in an amount within the range of approximately 8% to 20% of the total solids of the decorative coating, said flexibilizing resin being present in an amount within the range of approximately 12% to 20% by weight of the total solids of the decorative coating, said fire-retarding agent being present in an amount of from about 1.5 to about 2.0 pounds per thousand square feet of surface and constituting from about 25% to about 40% by weight of the total solids of said coating, the combined weight of the gloss-producing starch binder and the resin being in the range of from 1 to 2 parts thereof for each part by weight of pigment.

2. An insulating board as defined in claim 1, wherein said gloss-producing binder consists of starch, and wherein said resin is a vinyl acetate.

3. An insulating board as defined in claim 1, wherein said gloss-producing binder consists of starch, and wherein said resin is an acrylic resin.

4. An insulating board as defined in claim 1, wherein

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said starch is present in an amount within the range of approximately 30 to 60 percent by weight of the pigment.

5. A process of producing a flame-resistant decorative fibre insulating board, which comprises applying to the surface of the board wet-lap, immediately as it emerges from the conventional presses, a prime coating comprising a mixture of clay and a binder, said coating being applied in amounts to provide approximately 30 to 40 pounds of clay per thousand square feet of the surface, drying the thus-coated board, and then applying over said primed surface a decorative coating comprising pigment, a fire-retarding agent comprising a water-soluble borate salt, starch as a gloss-producing pigment binder, and a flexibilizing and water-proofing resin selected from the group consisting of acrylic resin and vinyl acetate resin, said starch being present in an amount within the range of approximately 8% to 20% of the total solids of the decorative coating, said flexibilizing resin being present in an amount within the range of approximately 12% to 20% by weight of the total solids of the decorative coating, said fire-retarding agent constituting from

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about 25% to about 40% by weight of the total solids of said decorative coating, the combined weight of the gloss-producing starch binder and the resin being in the range of from 1 to 2 parts thereof for each part by weight of the pigment, said coating being applied to said surface in an amount to provide from about 1.5 to about 2.0 pounds of the fire-retarding agent per thousand square feet of the surface.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,889,235

June 2, 1959

John F. Campbell et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, lines 1 to 3, for "John F. Campbell and Edward M. Cagle, of Meridian, Mississippi," read -- John F. Campbell and Edward M. Cagle, of Meridian, Mississippi, assignors to The Patent and Licensing Corporation, of New York, N. Y., a corporation of Massachusetts, --; line 12, for "John F. Campbell and Edward M. Cagle, their heirs" read -- The Patent and Licensing Corporation, its successors --; in the heading to the printed specification, line 4, for "John F. Campbell and Edward M. Cagle, Meridian, Miss." read -- John F. Campbell and Edward M. Cagle, Meridian, Miss., assignors to The Patent and Licensing Corporation, New York, N. Y., a corporation of Massachusetts --.

Signed and sealed this 20th day of October 1959.

(SEAL)

Attest:

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Commissioner of Patents