COATING OR PLASTIC.

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COMPOSITE MATERIAL

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3 Claims. (Cl. 106—24)

This invention is a composite material preferably in fabricated form, for use in building construction where the material is intended to serve in lieu of lath and plaster, and to be applied directly to the studding and headers. The components entering into the composition have been selected to impart the qualities of fire-resistance, low thermal conductivity, and sound absorption.

Heretofore, unfired so-called "plaster boards" or "wall boards" and wall tiles have been on the market, designed primarily for use in the construction of fireproof building walls. Generally these articles may be grouped into two classes, defined by the character of binder employed, namely (1) those which employ a sulphate binder such as gypsum, and (2) those which employ a silicate binder, such as hydraulic or Portland cement. The present invention relates to the second class.

The prior art shows it to be old to construct fire-resistant building material of non-burning non-metallic inorganic substances, such as asbestos and a binder of hydraulic or Portland cement. Other inorganic fire-resistant substances are also sometimes added to increase the insulating characteristics and at the same time maintain a low thermal conductivity. However, when the proportion of the cement binder is gaged to insure a workable tensile strength, the proportion of cement with respect to the other constituents in the commercial "mixes" is so great as to provide a very hard, more or less brittle material, which is so dense and hard that in sheet form nails or similar fastening devices used for the purpose of securing the sheets to the wall studding, will fracture the board or else will bend instead of penetrating. Therefore, holes must be bored therein for the passage of screws or nails. However, despite that additional labor and cost of installation, the sheet will frequently fracture during the boring operation, and in practice will also fracture in the vicinity of said nail holes when the holding strain of the nail is brought to bear upon the slab. In addition to the foregoing, wall boards of this type, with a relatively high proportion of cement content are liable to crack under intense heat and for this reason are more or less unstable. In view of the characteristics mentioned, such sheets are not at all adapted for use as cores for veneer-like facings, such as disclosed in an application of Roger W. Williamson (Serial Number 651,235) now Patent 2,037,294. In addition to this, if the mix is modified by adding a micaceous material, the board will not be so brittle, but in that modified state it will lack the tensile strength necessary to resist the tendency of the veneer-like facing to strip from the surface of the core. In other words, there is a problem of securing a firm bond between the facing and a core of this character.

In practice, it has been found that a mixture of hydraulic or Portland cement, asbestos and a micaceous material with water, when thoroughly mixed with water and allowed to set under pressure, without firing, in a manner well understood in the art, produces a very hard rigid body, which not only possesses low thermal conductivity and high heat resistant characteristics, but is also of substantial dielectric capacity.

When the proportion of the micaceous ingredient has been increased with the intention of imparting to the finished sheet greater softness, as well as improved insulation quality, the result has been to produce a sheet material of lighter weight and a texture so soft that it becomes friable at edges and at those places where penetrated by nails and fastening devices. Also its tensile strength is so reduced that the surface areas will not be suitable for the veneering purposes for which this invention is primarily intended, which purpose is mentioned in the next paragraph.

One of the objects of the present invention is to overcome the above mentioned difficulties by providing an unfired non-burning or fire-resistant body which may be shaped into any desired form, the same being constructed of non-combustible plastic silicates, whereby said body will be highly fire-resistant, and normally crack-resistant, but will nevertheless possess the characteristic that it may be readily penetrated by nails and similar sharp securing devices. A further object is to provide a fire-resistant board-like material which will be particularly adapted for use as a core for wood veneering and other similar ornamental facings, such as described in the Williamson application, supra, in that it will possess the desired softness as well as the necessary tensile strength and toughness required for this purpose.

A further object is to provide a dry mixture of non-combustible silicates including a crack and fracture resistant element, all possessing the characteristic of becoming plastic when mixed with water, so as to be moldable into any desired shape.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In carrying out the invention it is desirable to employ a mixture of asbestos, a micaceous mate-

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rial, an hydrous aluminum silicate, and a silicate binder, the mixture being made plastic by the addition of water, and then molded while in the plastic state.

It is preferred to use asbestos and a micaceous silicate is in the form of vermiculite, zonolite, jeffersite or any of the other equivalent and well known foliated mica silicates. The toughening or tempering material may be any hydrous aluminum silicate of the kaolin group, but of course the best results are obtained by the purest quality. The binder is preferably in the form of any standard hydraulic or Portland cement.

The proportions of the various materials may be varied as desired but the following is given as an example:—

	Parts by weight
Asbestos	30
Vermiculite	15
Kaolin	10
Hydraulic or Portland cement	45

In practice, the asbestos, vermiculite, kaolin and cement, which are all dry infusible non-metallic inorganic silicates are thoroughly mixed in any suitable manner, and after they are thoroughly commingled water is added to produce plasticity.

Whether the core is the product of the mold method, or is made by a continuous process method is immaterial, and inasmuch as both methods are well known in the art, and no claim is here made for the method of making and drying the material, these methods will not be referred to in greater detail.

It is preferred to fabricate the material in the form of relatively thin sheet-like boards, because this is the most desirable form to function as the supporting cores for veneering. In this form, by reason of the toughness imparted by the kaolin, it possesses adequate strength and stability for all normal requirements in such capacity, and penetrable by nails and the like. Aside from this, by reducing the volume of material required, a great saving is effected in cost of manufacture and overhead involved in installation.

The asbestos is incorporated because of its known fire-resistant characteristics, and the vermiculite is employed not only because of its fire-resistant characteristic but also because it possesses the additional characteristics of low thermal conductivity and high dielectric value. The asbestos and the vermiculite are both readily mixed with the hydraulic or Portland cement in such a thorough manner that the materials may be uniformly distributed throughout the mixture with small effort. The incorporation of the kaolin in the mix imparts a certain desirable toughness to the molded material, and at the same time renders the board less friable at the edges than is possible with the prior art boards. Notwithstanding this, it tempers the mix so as to make the board less susceptible to cracking or fracturing, while penetrable by nails or the like, all of which is accomplished without destruction or substantial impairment of the tensile strength and fire-resistant characteristics of the other materials. In other words, the combination of Portland or other cement with kaolin constitutes a tempered silicate binder for the asbestos and the vermiculite. The kaolin also tends to counteract excessive softness of the board, due to the incorporation of the vermiculite, and for this reason it is desirable that the proportion of the kaolin content shall vary with the proportion of the vermiculite. The proportion of the cement is also preferably varied in proportion to the amount of kaolin employed.

The advantages of the invention will be readily understood by those skilled in the art to which it belongs. For instance, it will be observed that a board, or other object processed from the mixture above described will exhibit a very high degree of hardness and toughness and will also possess many other desirable characteristics such as high fire resistance, and a maximum degree of cohesion under fabrication, without brittleness of body and friability of edges, and yet be susceptible of penetration by nails and other sharp devices of similar character without cracks or fractures. Sheets made from the mixture above described are also valuable as cores for wood veneering and other ornamental surfaces, in that they may be firmly bonded with such facings.

This application is a substitute for application Serial Number 651,236 filed January 11, 1933 and officially allowed October 17, 1934.

Having thus explained the nature of the invention and described an operative manner of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the forms of its use, what is claimed is:—

1. A composite sheet consisting of an unfired non-friable substantially hard and tough sheet-like refractory body comprising a mixture of a hydraulic cement binder, asbestos, a foliated micaceous material, and a tempering agent consisting of a hydrous aluminum silicate of the kaolin group, the proportions of tempering agent with respect to the total mixture being such that the body is readily workable with edge tools and penetrable by sharp metal anchoring devices without danger of body fracture.

2. A composite sheet consisting of an unfired non-friable substantially hard and tough sheet-like refractory body comprising a mixture of a hydraulic cement binder, asbestos, a foliated micaceous material, and a tempering agent consisting of a hydrous aluminum silicate of the kaolin group, the volume of the tempering agent being so definitely proportioned to the volume of the foliated micaceous material that said body is readily workable with edge tools and penetrable by sharp metal anchoring devices without danger of body fracture.

3. A composite sheet consisting of an unfired non-friable substantially hard and tough sheet-like refractory body consisting of a mixture of approximately 45 parts by weight of hydraulic cement binder, approximately 30 parts by weight of asbestos, approximately 15 parts by weight of vermiculite and approximately 10 parts by weight of kaolin, the proportion of kaolin with respect to the total mixture being such that said body is readily workable with edge tools and penetrable by sharp anchoring devices without danger of body fracture.

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