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COATED WALL TILE

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1 Claim. (Cl. 117—72)

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This invention relates to synthetic resin enamel finished wall title and more particularly to a simplified system of coating the substrate in the manufacture of such wall tile and enamel compositions used in conjunction therewith.

So-called imitation wall tile for use in place of ceramic wall tile has been manufactured and used for some time. Such material was originally made by applying to a suitable base or substrate, such as sheet metal, a suitable paint composition either in single or multiple colors. For special decorative effects or designs the sheet metal was often embossed before the paint composition was applied. Later developments included the manufacture of a product which more nearly simulated ceramic tile in appearance and further the use of various types of pressed fibrous base material or substrate. With the commercial development of improved coating compositions such as those of a synthetic resin or semi-synthetic resin type wall board tile of improved appearance and service life was obtained. However, the manufacture of wall board tile with such compositions involved a complicated system of coating and the results were not uniformly reproducible. The extended use of wall board tile having a satisfactory appearance and service life is highly desirable principally because of ease of installation and general economic features involved.

This invention has as the principal object the provision of compositions and a coating system for applying such compositions to produce wall board tile.

Another object is the provision of wall tile board having improved gloss and having a harder, tougher and highly mar resistant surface.

Still another object is the provision of wall board tile having a surface which is highly resistant to conditions of high humidity, to soap and soapy materials and to grease.

A further object is the provision of such wall board tile with a minimum number of coatings which eliminates extensive sanding and buffing operations and results in ready production of a first quality product.

Other objects will appear hereinafter as the description of the invention proceeds.

These objects are accomplished in the present invention by the application to a suitable substrate as wall board a knife coat of surfacer, a spray coat of primer composition and a spray topcoat or finishing composition, the surfacer compositions being of a new and improved type as hereinafter described.

The invention will be more fully understood

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by the following examples which are given by way of illustration and not by limitation except insofar as defined in the appended claim. The parts are by weight.

Example I

Composition A—Knife coating composition or surfacing composition

	Parts
Surface treated whiting [1]	66.0
Titanium dioxide pigment	7.4
China-wood oil varnish (60% solids)	20.0
Mineral spirits	6.6

[1] This material may be prepared in accordance with U. S. Patent 2,034,797. The term is intended to include the usual fillers, such as whiting, barytes or similar alkaline earth carbonates, magnesium silicate, and the like which have been subjected to severe attrition in the presence of an anti-compactant and interbonding agent, such as rosin and stearic acid as set forth in the patent referred to.

The China-wood oil varnish is a 25-gallon China-wood oil-phenol-formaldehyde varnish prepared in a conventional manner.

The composition may be conveniently prepared by charging the ingredients into a ball mill and dispersing the Surfex and titanium dioxide in the varnish vehicle in the usual manner. If desired or convenient a roller mill, stone mill or other suitable so-called grinding equipment may be used.

This composition is applied to a suitable wall board base by means of a suitable doctor knife. A spring steel knife approximately 0.02 inch in thickness set at an angle of approximately 10° to the flow of the board and at an angle of approximately 30° to the perpendicular with the boards smoothly driven under the knife by a suitable arrangement of rollers has been found to be a suitable and convenient means of applying the composition. The wall boards used are normally 4 feet by 8 feet in size and may be of various types a highly compressed board with relatively smooth surfaces being a commonly used type. The composition applied as above gives an excellent filling of the surface, which is satisfactorily smooth. While a single knifing coat yields a satisfactory finished product, a double coating yields preferred results. After the application of the surfacing composition, the coating is baked at approximately 225° F. for approximately 1 hour or it may be air dried if desired. Various arrangements may be used for the baking operations, a convenient means being to place the coated boards suitably separated on a truck or stand and then place the truck or stand in an indirectly heated oven. Such variations are well known to those

skilled in the art and modifications may be made without departing from the spirit or scope of the invention since they do not per se form a part of the present invention.

While the viscosity or consistency of compositions prepared as described above is usually satisfactory, adjustments therein may be made by the further addition of solvent or thinner.

The knife coated boards are next scored by means of suitable cutters usually set 4 inches apart, the scoring being in both directions of the board. The purpose of the score marks, after being striped with contrasting colored composition as hereinafter described, is to simulate the appearance of a wall actually covered by ceramic tile individually set in a cement and spaced from each other by cement lines located below the plane of the top of the tile. Various types of scoring particularly with respect to the shoulder or edge of the score may be used as e. g. sharp or angular, curved or bevelled edge, the latter being preferred.

Composition B—Non-sanding primer

	Parts
Titanium dioxide pigment dispersed in alkyd resin	68.0
43% dehydrated castor oil modified glycerol phthalate (60% solids)	14.6
6 gallon linseed oil-phenol formaldehyde resin varnish	6.5
Manganese naphthenate drier	0.5
Cobalt naphthenate drier	1.0
Hydrocarbon solvent	9.4

The titanium dioxide pigment dispersion is prepared as follows:

	Parts
Titanium dioxide pigment	71.5
43% soya bean oil modified glycerol phthalate (45% solids)	21.8
Hydrocarbon solvent	6.7

the ingredients being suitably mixed, to disperse the titanium dioxide pigment, in a ball or pebble mill.

The manganese and cobalt naphthenate driers were solutions in hydrocarbon solvent, the former container 3% metallic manganese and the latter 2% metallic cobalt.

To the knife coated and scored wallboard is applied one spray coat (1.5–2 mils in thickness) of the above primer composition. A convenient and satisfactory fluid pressure in the spray gun was found to be 20 pounds with an air pressure of 85 pounds. Other pressures may be used, variations being governed by the viscosity of the composition and other conditions and also by the skill of the operator. Mechanical spray equipment may also be used, such equipment being particularly adaptable in straight line production.

The primer coating is then baked as previously described for one hour at 225° F.

The baked primer coated surface was then spray coated with the following Composition C.

Composition C—Finish or topcoat

Mill base:	Parts
Titanium dioxide pigment	73.1
Urea-formaldehyde-butanol resin solution (60% solids)	3.7
43% dehydrated castor oil modified glycerol phthalate	12.1
N-butanol	7.4
Hi-flash naphtha	3.7

The pigment is suitably dispersed in the vehicle together with the other ingredients in a ball or pebble mill or by other convenient means.

Enamel:	Parts
Mill base	24.5
43% dehydrated castor oil modified glycerol phthalate	40.0
Urea-formaldehyde-butyl alcohol resin (60% solids)	16.7
Melamine-formaldehyde-butyl alcohol resin	9.4
Xylol	9.4

This composition may be conveniently prepared by suitably mixing the ingredients in any conventional manner or by other means known to those skilled in the art of preparing such compositions.

A satisfactory thickness of coating applied has been found to be between 1.5 and 2.0 mils. Suitable fluid pressures and air pressure in applying this coating are as previously described.

The coated board is then baked for approximately one hour at approximately 225° F. and the score marks striped with a suitable air drying oil-modified alkyd resin enamel, usually of a contrasting color. Other enamels may be used if desired. After the striping enamel has dried the wall tile board is ready for use.

The finished product is a smooth, hard surfaced product, in every way resembling the more costly ceramic tile which it simulates to a remarkable degree. The surface is waterproof, grease, soap and alkali resistant, easily cleanable and is also highly resistant to steam and prolonged exposure to conditions of high humidity.

Using the system of three coatings as described above, additional knife coating or surfacing compositions made with other film-forming vehicles may be used. Examples of such are as follows:

EXAMPLE II

Knife coating or surfacing composition

	Parts
Surface treated whiting	66.7
Titanium dioxide pigment	7.4
52% soya bean modified glycerol phthalate (55% solids)	22.5
Mineral spirits	3.4

This composition and subsequent similar compositions may be prepared as previously described or by any other convenient means.

When used as described under Example I together with the priming and finishing compositions a wall board tile is obtained possessing the desirable and necessary properties in such a product as previously discussed.

EXAMPLE III

Knife coating or surfacing composition

	Parts
Surface treated $CaCO_3$	66.7
Titanium dioxide pigment	7.4
Amberol varnish (60% solids)	20.8
Mineral spirits	5.1

The Amberol varnish used in this composition is a 5 gallon rosin modified phenol-formaldehyde resin-linseed oil varnish which is prepared in the conventional manner of preparing such varnishes.

EXAMPLE IV

	Parts
Surface treated filler	65.0
Titanium dioxide pigment	7.2
Urea-formaldehyde-butyl alcohol resin (60% solids)	20.0
Mineral spirits	7.8

In addition to the vehicles for the knife coating or surfacing compositions given in the examples, other vehicles may be used, the particular selection of which will be apparent to those skilled in the art.

It will be apparent from the above that a smooth tile-like product depends largely upon the specific type of surfacing composition used which because of its superior filling properties resulting in a smooth surface allows the use of non-sanding primers as are ordinarily used on metal substrate. This surfacing composition is characterized by (1) the specific filler used, (2) ratio of vehicle to filler and pigment and (3) the hydrocarbon solvent used viz. mineral spirits or material of comparable type. The specific filler for this composition has been previously described. In the present invention the commonly used calcium carbonate filler or whiting is not satisfactory as might be expected nor are the other commonly used fillers satisfactory. While the preferred ratio of filler plus pigment to the non-volatile components of the vehicle is approximately 6:1, it may range between 5:1 and 9:1. Below a ratio of 5:1 is not satisfactory and above a ratio of 9:1 working difficulties are introduced and the economics are affected.

Where optimum quality is not required or desired and the cost factor is of prime consideration the finishing composition may be applied directly to the surfacing composition coat without the use of an intermediate primer coating. A smooth, high gloss finish is obtained with the desirable properties previously described but to a somewhat lesser degree.

The product as described herein is applicable for use in bathrooms, shower stalls, store fronts, kitchen walls, refrigerator cabinets, kitchen cabinets, etc. Because of the desirable initial and service properties possessed by the product, many other uses will be readily suggested to those familiar with the general needs of such a product.

The herein described invention presents a marked advance in the art of wall board tile manufacture with particular respect to economy of manufacture. There is not only a practical elimination of the extensive sanding and buffing required in the present state of the art, but two or three coatings produce a first quality product which is uniformly reproducible in contrast to five or six now commonly used. The product further possesses markedly improved service with respect to moisture, grease, soap, alkali and mar resistance. Other advantages will be readily apparent to those familiar with the manufacture of wall board tile.

It is apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof, and therefore, it is not intended to be limited except as indicated in the appended claim.

I claim:

As a new article of manufacture, an imitation of ceramic tile comprising a pressed wood fiber board base having applied thereto a composition comprising approximately 66 parts of whiting which has been subjected to severe attrition in the presence of rosin, about 7.4 parts of titanium dioxide, about 20 parts of a China-wood oil-modified phenol-formaldehyde varnish, a priming coat comprising a pigment and a castor-oil modified glycerol phthalate resin and a linseed oil phenol-formaldehyde resin and a surface enamel containing a urea-formaldehyde-butanol resin and a dehydrated castor oil-modified glycerol phthalate resin.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,912,372	Jacobson et al.	June 6, 1933
2,008,063	Cruikshank	July 16, 1935
2,292,468	Oeffinger et al.	Aug. 11, 1942
1,606,735	Lines et al.	Nov. 9, 1926
2,034,797	Church et al.	Mar. 24, 1936

OTHER REFERENCES

Mattiello, Protective and Decorative Coatings, vol. 1, page 214 (1941).