

Oct. 7, 1958

A. E. GILCHRIST ET AL

2,855,327

COATED ACOUSTIC TILE AND PROCESS THEREFOR

Filed Jan. 26, 1956

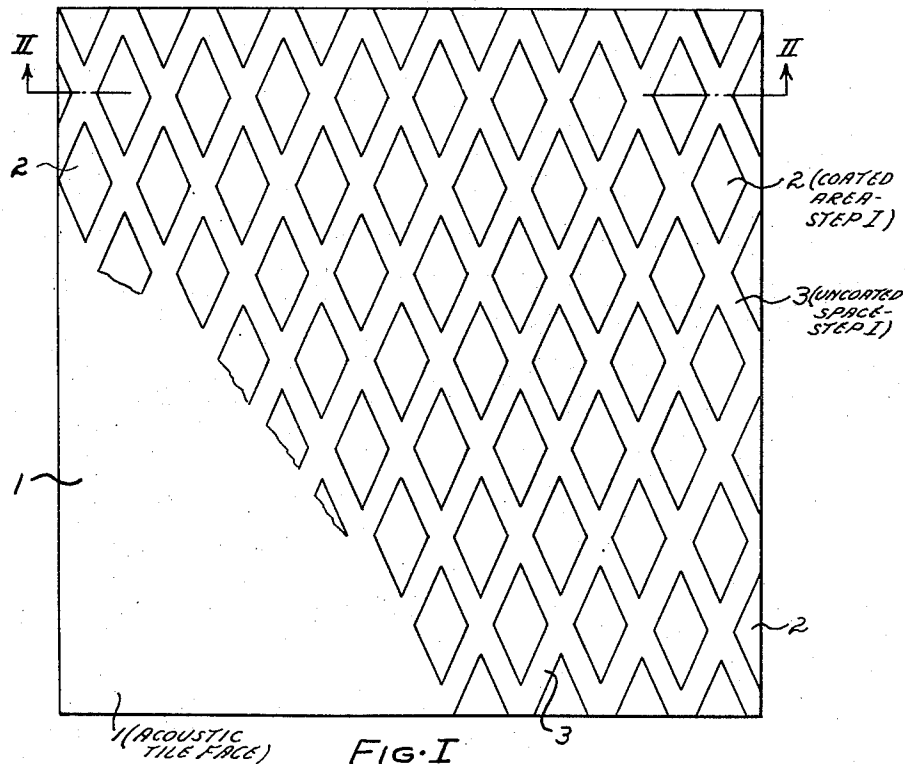


FIG. I

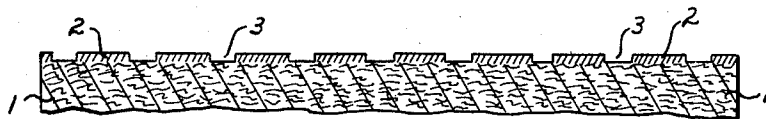


FIG. II



FIG. III

FLOW SHEET

STEP I (FIGS I & II) APPLY NON-PENETRATING
TYPE COATING TO ACOUSTIC TILE IN
DESIRED DISCONTINUOUS PATTERN.

STEP II (FIG. III) APPLY UNIFORM TOPCOAT
OF PENETRATING-TYPE COATING
COMPOSITION OVER WHOLE FACE OF TILE.

ALLAN E. GILCHRIST
DONALD T. REHOR
INVENTORS

BY *G. G. Christensen*

ATT'Y

1

2,855,327

COATED ACOUSTIC TILE AND PROCESS THEREFOR

Allan E. Gilchrist, Fairview Park, and Donald T. Rehor, Lakewood, Ohio, assignors to The Glidden Company, Cleveland, Ohio, a corporation of Ohio

Application January 26, 1956, Serial No. 561,594

6 Claims. (Cl. 117-45)

This invention relates to coated fibrous acoustic material and to a process for preparing same, and it relates more particularly to coated acoustic material prepared from low density, fibrous, open-texture material in the form of tile, board, etc.

Sound-absorbing material, commonly prepared in the form of tile is necessarily of an open-texture to allow sound waves to penetrate thereto and be absorbed. Such macroscopically-porous material is commonly prepared of fibrous materials loosely matted together by means of binders, but granular material, like granulated cork, is sometimes formed by means of adhesive binders into board and tile so as to present many pores and interstices which improve the sound absorbing qualities. The appearance, color and texture of these and like acoustic materials is frequently inappropriate in a decorative sense and is desirably concealed occasionally by a pigmented surface coat having effective hiding qualities. The application of such a hiding coat when continuous, however, tends to block the sound absorbing pores and interstices, and hence impairs the sound-absorbing qualities. In some instances this effect can be counteracted by punching or drilling holes through the coating or coated board, panel or tile, the number, size and disposition of the holes being chosen to give a regular or random pattern which has decorative appeal but which still permits the tile to function effectively as a sound absorber. Such a punching or drilling operation not only adds to the cost of preparing the acoustic material but also creates a surface on the finished article which is difficult to recoat when the original coating becomes stained or when one desires to change its color. This is because the mouths of the many holes tend to become clogged with the new coating material, and hence to be less effective for sound absorbing purposes. It is also difficult to clean the coated article (as by washing) because the holes retain some wash water which later runs back to the surface and creates a fresh ring of stain around each hole.

According to the present invention, punching can be eliminated and cleaning and/or recoating can be made easier, while yet retaining the sound absorbency substantially unimpaired. These benefits are accomplished by coating the acoustic material originally with a liquid pigmented composition which does not penetrate into the material and by applying such original coating in a discontinuous pattern so as to leave predetermined portions of the material uncoated. When a second coating is subsequently applied, if it is one designed for the purpose so as to penetrate into the uncoated areas, then the coated areas are covered but the uncoated areas remain open, i. e., still present most of the original porous structure.

Accordingly, it is an object of this invention to provide acoustic material which is originally coated discontinuously with a non-penetrating coating so as to provide a discontinuous surface coat which hides predetermined portions of the surface while leaving other portions uncoated.

Another object is to provide coated acoustic material

2

of the type just described which is additionally coated with a penetrating coating composition adapted to sink into the original uncoated areas, thereby to retain the latter areas essentially unimpaired in sound absorbency.

A further object is to provide a process for preparing coated acoustic material of the types described.

These and other objects will be understood more fully from the following description of our invention taken in conjunction with the attached drawings in which:

Fig. I is a plan-view of an acoustic tile which has been coated discontinuously with a substantially non-penetrating coating composition, a portion having been broken away to reveal the acoustic material.

Fig. II is a fragmentary vertical sectional view of the tile of Fig. I taken on the line II-II, and greatly enlarged in its vertical dimensions.

Fig. III is a fragmentary sectional view corresponding to Fig. II but showing a second coating which has been applied to the tile of Figs. I and II, said second coating being one having penetrating qualities.

Referring now to Figs. I and II, which represent a porous, open textured, fibrous material formed into a square tile 1 by conventional methods, the tile 1 is first discontinuously coated with a film 2 of composition such as A (identified below) so as to leave areas 3, 3 uncoated. The areas of applied non-penetrating coating material are here shown to have a diamond shape with the diamonds arranged on a regular checkerboard pattern. It will be understood, of course, that the pattern can be varied according to individual taste or preference as long as sufficient uncoated areas 3, 3 are left to function in a sound absorbing manner. The pattern which is selected can be applied by a screen-process, by using a patterned roller, by spraying with a stencil, or by other obvious methods. The coating composition which forms the film 2, as noted above, has been formulated so as to have substantially non-penetrating qualities; that is, when applied to the surface of tile 1, it remains on the surface without sinking into the interior. A typical formulation having this quality is represented by Composition A, the proportions being given in parts by weight:

Composition A

Starch solution.....	45.5
Composed of:	
Starch (Amioca).....	75
Water.....	1,980
Preservative (Dowicide G).....	50
	2,105
Chlorinated biphenyl (plasticizer).....	10.6
Polyvinyl acetate solution (55% NVM).....	45.0
Starch solution (same as above).....	136.5
Fine Mica (3X Mica, Mineralite Sales Co.).....	100.
Mica (325 mesh, WG).....	100.
Coating clay.....	150.
Fine Talc (3X Asbestine, International Talc Co.).....	150.
Water.....	186.9
Total.....	924.5

For application, this composition is reduced with water as required (e. g., between 10:1 and about 4:1). The applied coating has fire retardant qualities as well as being durable and resistant to washing. Because of its non-penetrating quality, when Composition A (suitably reduced) is applied to tile 1, as by a patterned roller 4 or by spraying through a mask, the film of liquid composition remaining on the surface does not encroach on the areas 3, 3 which are to be left uncoated. The so-applied, discontinuous film 2 seals the surface with which it is in contact and provides a base upon which a penetrating (usually a hiding) film 4, such as Composition B below, can be applied without sinking into the interior of tile 1. Fig. III illustrates the tile after such film 4 of penetrating-type Composition B has been applied. Thus the latter composition forms a film 4 on top of the non-penetrating film 2, but wherever it was applied to the uncoated areas

3, 3, it has penetrated into the tile and has not formed any continuous surface film. These areas consequently remain exposed to sound waves and can continue to function as sound-absorbing areas.

It will be apparent that the penetrating-type Composition B can be applied in a continuous film, as by brushing, spraying, etc., since the non-penetrating film 2 has determined the pattern which will remain when the penetrating coating has dried. It could, of course, be applied in a discontinuous film by the same method used to deposit the film 2, care being taken to keep the pattern of film 4 in register with that of film 2. This is unnecessary, however, as will be understood. It is much easier to apply a continuous film and let it sink into the uncoated areas 3, 3. The following is a typical formulation of a suitable penetrating-type coating composition, the proportions being given in parts by weight:

Composition B

Polyvinyl acetate component-----	459.5	
Composed of:		
Polyvinyl acetate (55% NVM)-----	2,420	
Water-----	595	
Starch solution-----	1,010	
Composed of:		
Starch (Amioca)-----	75	
Water-----	1,200	
Dowicide G-----	50	
Plasticizer (Santizer 8)-----	285	
Chlorinated paraffine (Chlorofin No. 42)-----	285	
Total-----	4,595	
Water-----		200
Fine Talc (8X Asbestine, supra)-----		220
Fine Mica (3X Mica, supra)-----		200
Lithopone-----		550
Pigmented starch paste (ground)-----		199
Composed of:		
Starch solution, above-----	315	
TiO ₂ pigment-----	1,100	
Water-----	335	
Water-----		199
Total-----		2,027.5

Finished composition weighs 13.3 pounds per gallon. For spray application, it is reduced with water at a rate of about 4:1. For other application methods, reduction can be as needed to secure penetration. To improve penetration, small amounts of anionic and/or non-ionic surface active agents can be added. Usually amounts up to 1% by weight are sufficient.

It will be recognized that the majority of conventional coating compositions are of the penetrating-type and hence need no extended discussion, and that the non-penetrating type represents a minor group wherein the formulation is such that non-penetrating qualities result. If there is any doubt about the type of coating which one has at hand, a simple test application on the surface of the acoustic material will reveal whether it penetrates thereinto or does not penetrate.

From what has been pointed out above, it will be apparent that the non-penetrating composition which is employed can be either pigmented or unpigmented; that is, it can deposit a clear film, or one which carries enough pigment to provide some hiding of the underlying tile. Usually a pigmented composition would be used, since hiding is sought. However, the pigments employed even then need not be of the high-hiding types like titanium dioxide, but instead can be cheaper pigments and/or fillers such as are shown in the above formulation of Composition A. High-hiding pigments can be used advantageously in Composition B, especially when the patterned material is to be recoated to change its color.

Formulations of non-penetrating compositions, analogous to Composition A, are well known to those skilled in the art and need no extended discussion. Many different film-forming materials can be used in such coatings, as protein, starches, methyl cellulose, polyvinyl alcohol, acrylic gum, natural gums, alginates, and other colloidal materials. Many film-forming materials which by themselves would be unsuitable can be used, however, if dispersed in a carrier such as water to provide an emulsion having specially adjusted surface tension and viscosity

qualities. The compositions described in U. S. Patents 2,709,689, 2,101,066, 2,591,904, 2,511,782, 2,450,534, 2,342,581, 2,337,013, 2,321,937-9 and 2,241,174 represent a few of the numerous non-penetrating materials which can be used in practicing the present invention in addition to Composition A, supra.

Likewise, formulations of penetrating compositions analogous to Composition B are well known and need no discussion, except to point out that such compositions are desirably formulated with film-forming materials which will impart some wash- and scrub-resistance since it is generally desirable to provide a film 4 which can be washed occasionally or at least sponge-cleaned.

It will be apparent that this invention makes it possible to coat acoustic material in a wide variety of functional and decorative patterns while yet widely varying the ratio of coated area to uncoated area. It also makes it possible for acoustic material to be coated without requiring the expensive operation of punching or drilling the coated material to restore its acoustic effectiveness. Moreover, it simplifies the task of recoating acoustical installations when their appearance is to be freshened, or when a different color is desired, since the acoustically-effective pattern on the tiles or board of the installation will not be impaired when a penetrating-type coating is brushed, sprayed or otherwise applied in a continuous wet film.

From what has been said hereinabove, it will be apparent that the objective is in general to provide a decorative appearance or pattern to the surface of acoustic material while yet not unduly impairing the acoustic qualities. Ordinarily at least about 25% of the surface of the acoustic material should remain uncoated with the non-penetrating-type of coating so as to retain useful sound absorbing qualities. If decorative quality is less significant than acoustic quality, then as much as 75% or more can be retained uncoated. Even when as much as 75% of the area is coated, however, the acoustic material can yet exhibit greater sound absorbency than would be expected from the 25% of uncoated area. This is because each of the individual spots or areas of non-penetrating coating can function independently as a small diaphragm, the vibration of which can absorb and dissipate energy from an impinging sound wave. Such diaphragm action is materially reduced when the coating is continuous over the surface of the acoustic material. Moreover, our discontinuous coating of non-penetrating material can be arranged in a multitude of diverse patterns some of which will have better sound-dissipating properties (due to combinations of diaphragm action, edge effects and inter-coating absorbency) than other patterns. It is therefore possible to choose and provide patterns which can be more effective for certain service situations than if a pattern were chosen solely for its decorative or esthetic merits.

Having now described the invention, what is claimed is:

1. Coated acoustic material having a macroscopically-porous, sound-absorbing, open texture adjacent to and below a surface thereof and having a solidified, discontinuous coating adhered to selected portions of said surface and having adjacent portions thereof uncoated; said coating having been deposited initially in the form of a wet film from a liquid coating composition characterized by possessing substantially non-penetrating qualities when applied to said surface, the surface of said uncoated portions being contiguous with the adjacent surface portions of the acoustic material which carry said solidified coating.

2. Coated acoustic material as claimed in claim 1 having had another layer of solidified coating material applied thereto uniformly over said coated and uncoated portions of said surface, said layer having been deposited from a liquid coating composition having penetrating qualities when applied to said uncoated portions of the surface of said acoustic material.

3. Coated acoustic material as claimed in claim 1

5

wherein the discontinuous, solidified coating which is adhered to said surface covers between about 25% and 75% of the total surface.

4. Coated acoustic material as claimed in claim 3 having had another layer of solidified coating material applied thereto uniformly over said coated and uncoated portions of said surface, said layer having been deposited from a liquid coating composition having penetrating qualities when applied to said uncoated portions of the surface of said acoustic material.

5. The method of coating acoustic material having a macroscopically porous open texture, which comprises the steps of: applying a substantially non-penetrating wet coating of film-forming material to a surface of said material in a discontinuous pattern, thereby to coat predetermined portions of said surface while leaving other portions uncoated, drying said applied coating, and then applying a liquid, penetrating-type, pigmented, hiding

6

film of film-forming material over said entire coated and uncoated surface and drying said applied coating, whereby said uncoated portions of the surface remain uncoated because the wet applied penetrating-type film sinks below the surface of said uncoated portions.

6. The method as claimed in claim 5 wherein the applied and dried, discontinuous coating of non-penetrating material covers between about 25% and 75% of the total surface.

References Cited in the file of this patent

UNITED STATES PATENTS

2,154,943 King ----- Apr. 18, 1939

FOREIGN PATENTS

1,056,450 France ----- Oct. 21, 1953