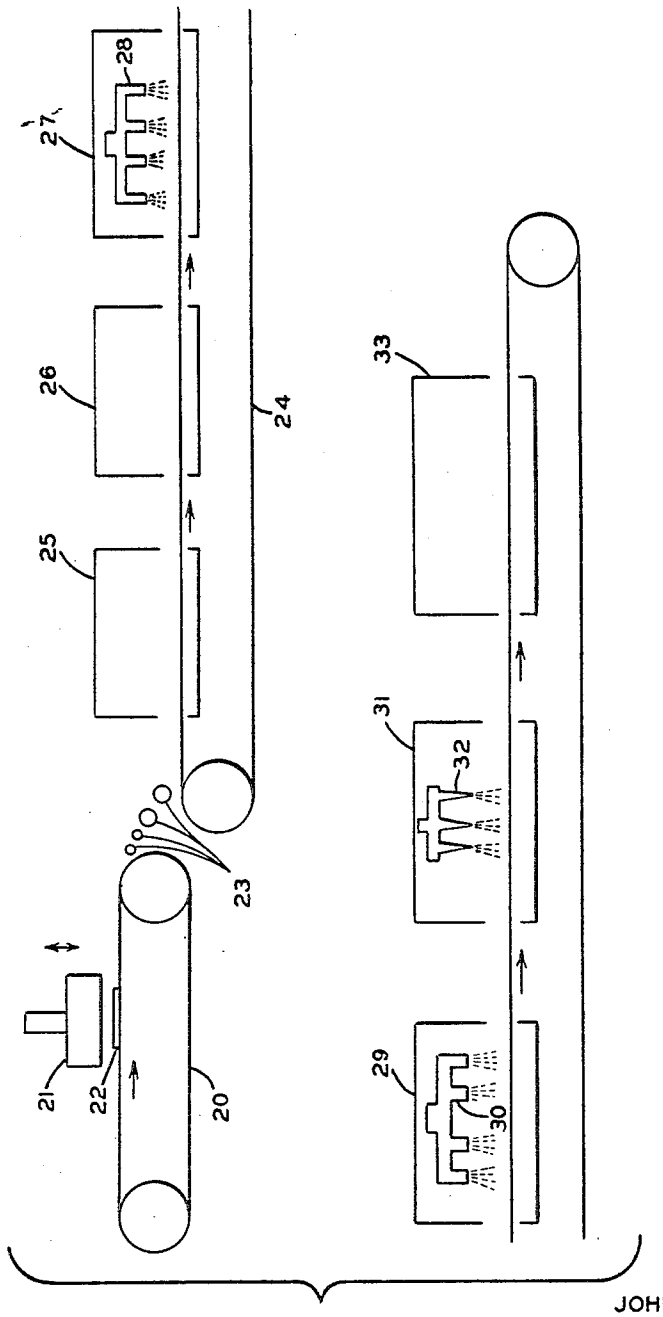
Oct. 21, 1969 J. M. HEMPHILL 3,473,941

FIBROUS PANEL AND METHOD OF TREATING A FIBROUS PANEL

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Fig. 1




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Fig. 2

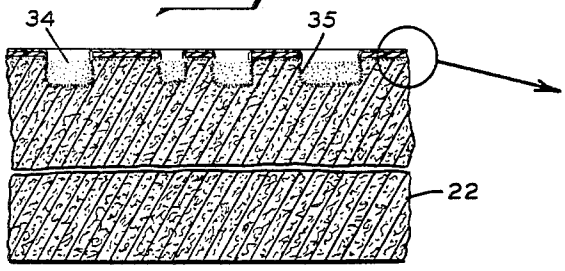



Fig. 3

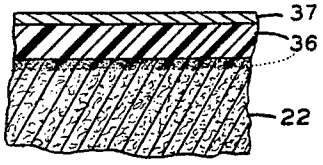
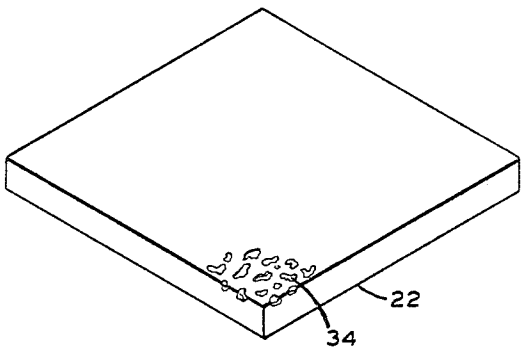



Fig. 4




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3,473,941

# FIBROUS PANEL AND METHOD OF TREATING A FIBROUS PANEL

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U.S. Cl. 117—5.5 2 Claims

## ABSTRACT OF THE DISCLOSURE

A decorative fibrous material and the method for forming the same involving the use of an abrasive resistant coating. The method involves the steps of placing a coating of an abrasion resistant on the room side of the tile in a predetermined pattern. This coating is dried and the tile is thereafter sandblasted or otherwise abrasively treated. The abrasive treatment removes portions of the tile in the uncoated areas. This method provides a decorative fibrous material which gives the appearance of being an embossed tile. The abrasive resistant coating is used in lieu of a mask structure for developing the design.

It is known to sandblast a fibrous panel or fiberboard through removable templates to create a sound absorbing, decorative panel. However, the operation of properly placing a template on a panel or board to be sandblasted, maintaining said template in proper position, and removing said template after the operation is completed pose certain disadvantages from a manufacturing standpoint. Further, templates must be periodically replaced due to a loss of pattern therein which results from erosion during repeated sandblasting operations. Many attempts have been made to extend the life of templates by providing them with coatings or shells of material which are resistant to sandblasting operations.

It has been found that the templates of the prior art impose certain design restrictions and lack of versatility with regard to patterns to be placed on fibrous panels or fiberboard. For example, where cavities or recessed areas of small dimension are required, the appropriate opening in the relatively thick templates of the prior art will not allow the abrasive material to penetrate the surface of the board to a great extent. If a particular pattern has a great variation between size of cavity or recessed area, it has been found that the depth of relief is quite varied which may not be desirable from an aesthetic point of view. Further, patterns utilizing small, closely spaced, deep cavities usually were not obtainable with the removable template technique.

In some of the eroded panels of the prior art, the sandblasted or abrasively treated areas are surrounded by unsandblasted areas which allow the removable template utilized therewith to have substantially continous webs, thus providing support for the template pattern. If it is held desirable to have a part of the tile or panel surface completely surrounded by eroded or sandblasted areas, then the template must be discontinuous. Special support means are required to hold the discontinuous template portions in position over the area to be protected from the abrasive. Such support means usually are in the form of stiff wires forming a network of supports above the plane of the template web. Because said wire support means are above the template web, they do not protect the fiberboard or panel and do not become part of the pattern. However, these support means are subject to damage from the abrasive and can be easily misaligned in routine handling during manufacture. They thus limit



considerably the range of designs which are practically obtainable.

The method and product of the present invention overcome these difficulties and disadvantages by eliminating the removable template which passes through the sandblasting operation by placing on each fiberboard or panel a pattern of material which is resistant to abrasives. In such a case, the areas of the fiberboard which may be devoid of such resist material will be cut away or eroded during a subsequent sandblasting operation, while the portions or portion of the fiberboard which are so coated will remain substantially intact. The coating of resist material in this case penetrates the upper surface and fibers of the panel or board to become a permanent part thereof. Fiberboard so treated may be rendered sound absorbent in nature.

Accordingly, an object of the present invention is to provide a method of treating a fibrous panel or fiberboard and product thereof wherein a recessed area may be imparted to a fibrous panel or board by means of an abrasive treatment of a resist material-coated panel or board.

It is a further object of the present invention to provide a method of treating a fibrous panel or fiberboard and product thereof wherein a resist material-coated fiberboard is abrasively treated, said resist material penetrating the upper surface of and forming a permanent or integral part of said fiberboard.

It is a further object to provide a method of treating fiberboard and product thereof such that a sharply defined, deep, narrow recessed area may be provided in such a product.

It is another object of the present invention to provide a method of treating fiberboard and product thereof such that said product may be simultaneously rendered sound absorbent and provided with a decorative pattern of relieved areas.

Other objects of the present invention will be readily apparent from the detailed description thereof with reference to the drawings wherein

FIGURE 1 is a two-part diagrammatic view of a method according to the present invention;

FIGURE 2 is a partial, sectional view of a fiberboard treated according to a method of the present invention;

FIGURE 3 is an enlarged, sectional view of a portion of the fiberboard shown in FIGURE 2; and

FIGURE 4 is a view in perspective of a fiberboard treated according to a method of the present invention.

Referring now to FIGURE 1, there is shown a conveyor **20** which moves in the direction indicated by the arrow. Overlying conveyor **20** is a conventional silk-screen printing device **21**. Fibrous panels **22** may be placed on conveyor **20** to be intermittently positioned under printing device **21**.

When a fibrous panel is properly positioned beneath silk-screen printing device **21**, a pattern of resist material may be silk-screened onto the upper surface thereof. The particular resist material used may be varied; however, it should be such that it may be suitably placed upon the upper surface of the fibrous panel **22** by printing or other operation. Good results have been obtained by silk-screening a polyvinyl chloride plastisol in the desired pattern onto the surface of the fibrous panel. The formulation of such a plastisol may be as follows:

| | Parts by weight |
|---|---|
| Polyvinyl chloride resin | 100 |
| Plasticizer | 100 |
| Heat stabilizer | 3 |
| Viscosity stabilizer | 5 |
| Surfactant | 3 |
| Dispersant | 4 |
| Pigment | 200 |

The plastic viscosity of this formulation was located in the range of 25,000–35,000 cp. as determined by a Brookfield viscometer using a #4 spindle at 5 r.p.m., with the midpoint of this range affording the better results.

The above-noted formulation was utilized on a conventional silk-screen printing machine having a screen of #160 "Perlon" material. It is to be understood that the formulation and viscosity thereof may be varied as desired or as required by the type of screen material used.

It is to be understood that the design versatility involved in the pattern printing operation is quite large and much greater than that known heretofore being limited only by the printing limitations of the particular printing apparatus rather than a template aperture size through which abrasives must pass in a subsequent sandblasting operation. Other examples of resist material include polyvinyl acetate latex, butyl rubber latex, etc. Desirable properties of a resist material are that it be liquid enough to be printed as for example, by means of silk-screening, that it bond well to the fibrous panel by penetrating and extending partially into the panel, and be resilient enough when in surrounding relationship to the upper layers of fiber in the panel to absorb the cutting force of the abrasive applied to the board or panel. The penetrating characteristics of the resist should be such as to give strength to the areas which said resist covers to help resist the cutting force of the abrasives. However, the resist material should not be such that it will diffuse laterally of the panel to a great extent to avoid loss of definition or contrast between recessed and unrecessed areas in the panel. When such a resist material is applied to the surface of a fibrous panel such as that utilized in the ceiling tile and panel field which usually has a density less than about 30 pounds per square foot, said resist material may penetrate on the order of .001–.006" or more, for example, and become a permanent or integral part of the board or panel. This resist material usually cannot be removed after sandblasting without damage to the surface of the panel. Thus, such a resist material should provide a relatively smooth surface and should take paint well, as the sandblasted side of the board in many cases will be the face or room side thereof, which usually necessitates a pleasing, decorative effect. The total thickness of the resist material may be on the order of .012", for example.

After the desired pattern has been placed or printed on a surface of a fibrous panel **22**, conveyor **20** will carry said panel to rollers **23** over which the panel **22** will move until being deposited on the surface of conveyor **24**. Conveyor **24** carries each fibrous panel **22** and its associated pattern of resist material through a drying device such as an oven **25**, for example, wherein the coating of resist material will be dried on the board or panel or in the case of the plastisol, fused.

It has been found that better results are obtained when the panel **22** is cooled somewhat before being abrasively treated or sandblasted. A natural cooling period may be provided. However, production speeds are increased if a conventional cooler cabinet **26** is provided such that the conveyor **24** and it supported panels **22** may be carried through said cooler cabinet **26**. This cooler cabinet **26** may be of the air circulation type.

Thereafter, conveyor **24** carries fibrous panel **22** through the sandblasting cabinet **27**, it being understood that abrasives other than sand may be utilized in such a cabinet. For example, the abrasive may consist of particles of walnut shell. As panel **22** passes through the sandblasting or abrasive treating cabinet **27**, the portions of the surface of said panel which may be devoid of resist material will be cut away or eroded by abrasive material issuing from nozzles **28** to form cavities, depressions, and/or recessed areas. The resist-covered portions of panel **22** will remain substantially intact due to the tough, resilient surface presented to the abrasives as a result of the resist material-covered surface fibers. As the panel **22** passes through the cabinet **27**, a predetermined amount of material will be eroded from those uncoated areas in the pattern. It will be apparent that the amount of such material removed is a function of the type and size of abrasive material, the length of time or duration of the sandblasting operation, and the amount and type of resist material which has been applied to the panel **22**. It has been found that good results are obtained when the maximum abrasive particle size is less than about .025" in diameter. The penetration characteristics of the resist material are important in determining the sharpness of delineation in the pattern in that the resist material-covered fibers surrounding the areas devoid of resist material will serve as lateral walls for the eroded cavity or recessed area to prevent undesirable undercutting and subsequent collapse or shredding of the peripheral surface portions of such cavity or recessed area.

Subsequent to the abrasive treating operation, each panel **22** may pass through a cleaning cabinet **29** wherein streams of compressed air from nozzles **30** impinge on the panel to remove any loose material from the surfaces thereof. This air cleaning operation should remove any abrasive material or material which has been cut away from the main body of panel **22** prior to any finishing operation. If desired, the cleaning step may be performed manually.

The now-cleaned panel **22** then passes through spray booth **31** wherein the abrasively treated panel is provided with a finish coat of material such as paint, for example, which is supplied through nozzles **32**. Thereafter, the painted panel **22** may pass through a dryer **33** wherein the finish coat will be dried. If the particular panel being painted is to be sound absorbent, care should be taken in the choice and application of finish or other decorative coatings so as to prevent the covering or blocking of the pores between the fibers in the cavities or recessed areas. Such paints and other coatings as well as the application thereof for acoustical panels are well known in the art. The thickness of the paint coating may be on the order of .003", for example. Although only a single finish coat is shown herein, the application of other well known decorative materials and effects may be applied to the panel formed according to the method of the present invention.

It was found that the design versatility using a method of the present invention was greatly broadened since the patterns which could be created on fibrous panels were no longer limited by the size of removable, template openings. Further, the disadvantages of using and removing templates of sheet material as well as the wear problem there in are eliminated by the present method since the resist material is placed on and becomes a permanent part of each panel. There need be no subsequent removal of the resist. In addition, new design areas have been opened since intricate, deeply embossed patterns in fibrous panels are now feasible and the range of designs which are practical for factory production has been extended. It is apparent that once the sandblasting operation or other abrasive treating operation is completed, the board need only be cleaned and finished.

Referring now to FIGURE 2 there is shown a sectional view of a fibrous panel **22** according to the present invention. Panel **22** has a plurality of abrasively formed cavities **34** which have lateral peripheral walls **35**. The upper layers of fibers adjacent the surface of panel **22** are covered by resist material **36** as best seen in FIGURE 3 wherein said material has penetrated or extended partially into the body of panel **22**. Overlying the surface of panel **22** is a finish coat of paint **37** as best seen in FIGURE 3. Finely filigreed patterns having depth of embossing in the area of $\frac{3}{32}$" in a fibrous panel of $\frac{3}{4}$" nominal thickness have been produced.

Therefore, it is seen that the method and product of the present invention provide greatly improved design effects in fibrous panels while eliminating many of the production disadvantages heretofore known.

It is to be understood that the method of the present

invention and product thereof are not limited to the specific embodiment shown and described herein. The particular compositions, dimensions, relative sizes and locations, steps, etc., may be varied.

Various modifications may occur to those skilled in the art without departing from the spirit and scope of the invention as defined in the claims.

I claim:

1. A method of treating a fibrous panel having at least one surface comprising the steps of placing a pattern on the surface of the panel by using a liquid abrasive resistant, which will extend at least partly into said panel in contacting relationship with the fibers of said panel, drying the liquid abrasive resistant, and abrasively treating said surface to erod an area in the panel which is not treated with the abrasive resistant, and maintaining the pattern defining surface formed by the abrasive resistant and fibers as an integral part of the fibrous panel.



2. A product made according to the method of claim 1.


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