Jan. 14, 1964 W. A. JACK ETAL 3,117,403

METHOD OF CUTTING PATTERNS IN ACOUSTICAL TILE

Filed Aug. 16, 1957

Fig. 1.

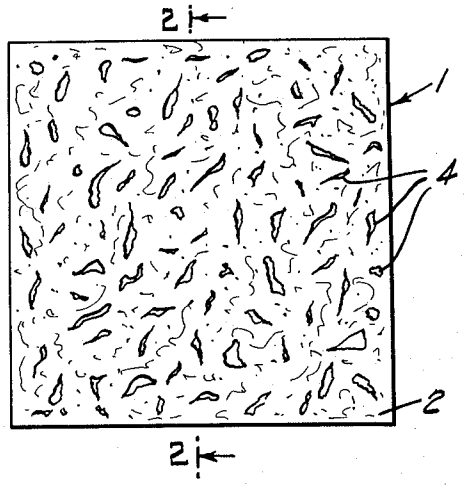


Fig. 2.

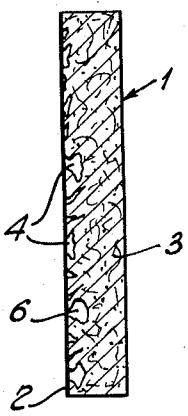


Fig. 3.

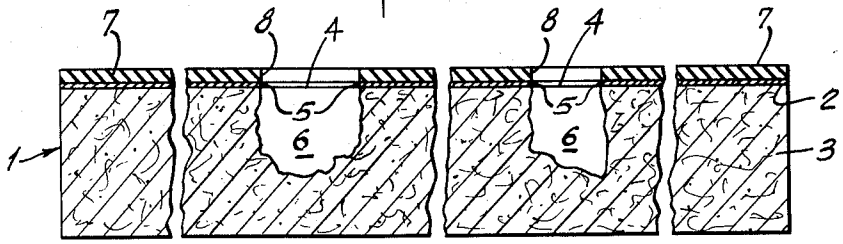
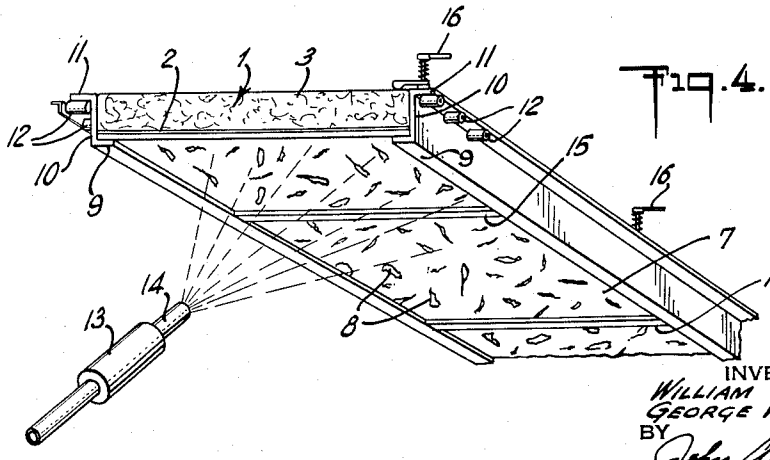


Fig. 4.



INVENTORS:
WILLIAM A. JACK
GEORGE W. LANDGRAF
BY
John A. McKinney
ATTORNEY

United States Patent Office 3,117,403 Patented Jan. 14, 1964

3,117,403
METHOD OF CUTTING PATTERNS IN ACOUSTICAL TILE

William A. Jack, Hampton, and George W. Landgraf, South Plainfield, N.J., assignors to Johns-Manville Corporation, New York, N.Y., a corporation of New York

Filed Aug. 16, 1957, Ser. No. 678,727
3 Claims. (Cl. 51—311)

This invention relates to a decorative sound absorbing board and the process of forming the decorations therein. With this invention, fine particles are blasted through apertures in a rubber mask to cut fissures, having sharply defined edges, in an acoustical board.

Acoustical boards heretofore have been mechanically punctured to provide a plurality of perforations, either regular or irregular, in the visible face of the board. These perforations appreciably increase the sound absorbing qualities of the board. To enhance the board's esthetic qualities, it is known in the art to use a fissuring process, whereby a very irregular pattern of numerous size perforations, in the nature of wormwood perforations, are formed in the face of the board. The fissuring processes, known to date, are of two kinds. The first utilizes a jet of air, steam, liquid, or a combination of these with discrete particles, directed against the board, when it is still in the wet pulp form. This method, however, is not readily adaptable to a mass production system. In the second fissuring process, the board, preferably during its wet stage, is brushed or sprayed with an aqueous solution, such as an alum aqueous solution or a borax aqueous solution, which solution acts as an embrittler of the surface fibers in the board. The board is then subjected to a perforating step, wherein a plurality of microscopic or small perforations are formed on the surface. The next step in the process involves the placing of a template, having relatively large size openings therein, on the board surface and impinging an abrasive, as for example, with the use of compressed air, against the template. A plurality of irregular fissures are thereby formed in the board surface. The board is subsequently coated with a layer of paint for decorative purposes. The disadvantages of this latter process are the numerous steps involved, the requirement of separate steps of forming the small openings and the large openings, and that the painting operation, in addition to providing a layer of paint on the imperforate areas, also provides a coating of paint on the surfaces of the holes, microscopic openings and fissures thereby decreasing the acoustical efficiency of the board. To overcome these disadvantages, the process of this invention eliminates several of the steps, as the embrittling step, reverses the painting step so that the board is painted before the abrading step, and combines the perforating and abrading steps into a single abrading step. Surprisingly, the resultant finished board is more attractive in appearance than a board finished by the fissure processes previously recited as the cavities, large or small, formed by the instant process are more sharply defined than the corresponding fissures made by the prior process and the cavities, whose walls are of unpainted fiber, sharply contrast with the finished planar surface of the board.

It is the primary object of this invention therefore to provide a process for cutting decorative patterns in acoustical boards wherein the fissures produced have extremely sharp edges to improve the appearance and sound absorbing qualities of the board.

It is an additional object of this invention to produce a fissured acoustical board whose cavities, left untreated, sharply contrast with the decorative finish on the planar surface of the board.

It is still an additional object of this invention to provide a new fissuring process of forming a decorative acoustical board which eliminates and/or combines several of the steps used in fissuring processes known heretofore, and reverses steps in the fissuring processes known heretofore.

The invention will be more fully understood and further objects and advantages thereof will become apparent when reference is made to the following detailed description of a preferred embodiment of the invention and the accompanying drawings in which:

FIG. 1 is a top plan view of a decorative acoustical board;

FIG. 2 is a section taken on the plane passing through the line 2—2 of FIG. 1;

FIG. 3 is a broken sectional view showing the rubber mask in place over the acoustical board; and

FIG. 4 is a pictorial view showing how the instant process is performed.

Referring to the drawing, there is disclosed in FIGS. 1 and 2 an acoustical board 1 having a painted surface 2 and a body 3 of sound absorbing material. Dispersed throughout the board 1, there are a plurality of fissures 4 having sharply defined edges 5 at the painted surface 2 and extending within the acoustical body to form sound absorbing cavities 6.

The process for forming the sharply defined fissures 4 in the acoustical board 1 is best illustrated in FIGS. 3 and 4. The dry board 1 is painted and the paint allowed to dry, thus forming the painted surface 2; the surface forms a coating which is more resistant to attrition than the board. A rubber mask 7 having apertures 8, whose outlines conform to the desired shape of the fissures 4, is then placed over the dry painted surface 2. The combined mask 7 and board 1 are laid on the flanges 9 of the Z-shaped bars 10 so that the mask 7 forms the lower or downwardly facing surface. The top flange 11 of the Z-bars 10 are supported for relative movement on a plurality of fixed rollers 12 which form a conveyor. A sand-blasting mechanism 13 is mounted below the conveyor and its nozzle 14 is directed upwardly toward the moving mask 7 and painted surface 2 of the board 1. Cross rods 15 hold the Z-bars in proper position. The weight of the board is generally sufficient to retain it on the flanges 9 against the blasting action. However, if desired, pivotal clamps 16 may be mounted on the flanges 11 to hold the board 1 in place.

In performing the process, the rubber mask 7 is placed over the dried painted surface 2 of the board 1, and together they are placed in the Z-bars 10 with the mask 7 resting on the flanges 9. The Z-bars 10 are then placed on the rollers 12 and passed over the abrasive-blasting mechanism 13. The sand or other abrasive particles pass through the apertures 8 in the mask 7 and cut through the painted surface 2. The remainder of surface 2 covered by the non-perforated section of the mask 7 is not affected by the abrasive-blasting and retains its planar, smooth finish. When the force of the sand has been expended, it, together with the cut-away paint and acoustical materials, falls out, under the influence of gravity, through the edges 5 and the apertures 8. Thus, fissures 4 of various sizes, irregular shapes and non-uniform depths are produced in the board 1.

As illustrated in FIG. 3, those cavities associated with the larger template openings become quite deep; furthermore, the walls of the cavities are untreated or are lined with fibers in their natural state as contrasted with the coated or painted surface 2. This combination not only increases the sound absorbing efficiency of the board but also enhances the esthetic value of the board as the color of the coat is usually different from, but in harmony with, the color of the fiber board in its untreated state.

The painted surface 2 applied to the board forms, for all practical purposes, a separate and distinct layer adhering to the contiguous planar board surface. Consequently, during the abrading stage of the instant process, the coating forms a distinct ledge at the fissure edge 5. The nature of the coating is such that it is eroded by the abrasive in fine particle form, so that the finished edge 5 is in line with the edge of template opening 8. Upon removal of the template, the resultant visible cavities are sharply demarcated adjacent the board surface. In view of the sharp ledge formed at each cavity, the relative condition of the board surface underneath the coating is immaterial as it plays no part in the type of visible cavities formed. Although paint has been recited as being the coating used to produce the sharply defined cavities, it will be readily evident from the disclosure that materials other than paint may be used as the board surface covering or layer forming substances.

Excellent results have been obtained in cutting fissures with the above process in dry boards such as wood fiber board, 10 p.c.f. rock wool resin-bonded dry process board and 20 p.c.f. wet process rock wool board. Blasting means, other than air driven sand particles, such as centrifugally thrown steel shot or apricot shells of suitable size are equally effective and are considered to be the equivalent of the sand-blasting means recited. It is impractical to cut some dry lightweight dry-process mineral and glass fiber boards in this way since the particles lodge in the boards. However, the process is effective with a wide variety of fibrous boards.

It is seen from the above disclosure that the process, producing the instant fissured board, differs sharply from prior known processes in view of its simplification and allows such simplification to occur with no interruptions to existing assembly line methods of manufacturing acoustical board and at the same time produces a more decorative acoustical board. Thus, the fissuring step may be substituted for the standard mechanical puncturing or drilling step used in the manufacture of standard commercial acoustical board. In the manufacture of ordinary unperforated board, the fissuring step need only be added on after the paint drying stage; consequently, no interruptions in the output of the board are created. It is readily evident from the above disclosure that the instant process is also readily adaptable to the assembly line processes of manufacturing acoustical panels.

Having thus described the invention in rather full detail, it will be understood that these details need not be strictly adhered to and that various changes and modifications may suggest themselves to one skilled in the art, all falling within the scope of the invention as defined by the subjoined claims.

What we claim is:

1. A process of forming a decorative pattern in a dry fibrous acoustical board having a major surface thereof approximately uniplanar, comprising the steps of applying a decorative coating of paint on said major surface of said dried, fibrous board, which paint coating, when dry, is more resistant to attrition than said board, drying said paint coating on said board surface, placing a template, having desired pattern-forming openings therein, over said dried paint coating, abrasive blasting the paint coating revealed through said openings until the portions of the coating commence to erode thereby revealing patterns of fibrous board tending to conform to the pattern of the openings, and continuing the abrasive blasting through the openings until relatively deep cavities are formed partially through the body of the board at the openings of the template.

2. A process of forming decorative patterns in a fibrous acoustical board comprising painting a major surface of the acoustical board with a paint, drying the paint on said surface, placing over said dried paint a mask having cut-out portions therein, abrasive blasting the dried paint through the cut-out portions so that the paint is eroded in fine particle form thereby forming eroded areas following relatively closely the cut-out portions of the mask, and continuing abrasive blasting the acoustical board at the eroded areas until relatively deep cavities have been formed therein outlined at the surface by the non-eroded areas of paint.

3. A process of forming decorative patterns in a fibrous acoustical board comprising coating an outer surface of said board with paint so as to provide a decorative surface covering more resistant to attrition than the fibrous structure of said board, placing over the coated surface a template having a plurality of apertures therein, holding said template and said board so that said coated surface faces downwardly, and blasting abrasive particles upwardly through the template apertures to form cavities having sharply defined edges at the surface of said board, and permitting the abrasive particles to fall back out of the cavities.

References Cited in the file of this patent

UNITED STATES PATENTS

835,541	Leisegang	Nov. 13, 1906
2,022,587	Cunningham	Nov. 26, 1935
2,388,880	Stitt	Nov. 13, 1945
2,686,461	Heritage et al.	Aug. 17, 1954
2,791,289	Proudfoot	May 7, 1957