Jan. 11, 1949. G. S. WILLEY ET AL 2,459,121

ACOUSTICAL TILE

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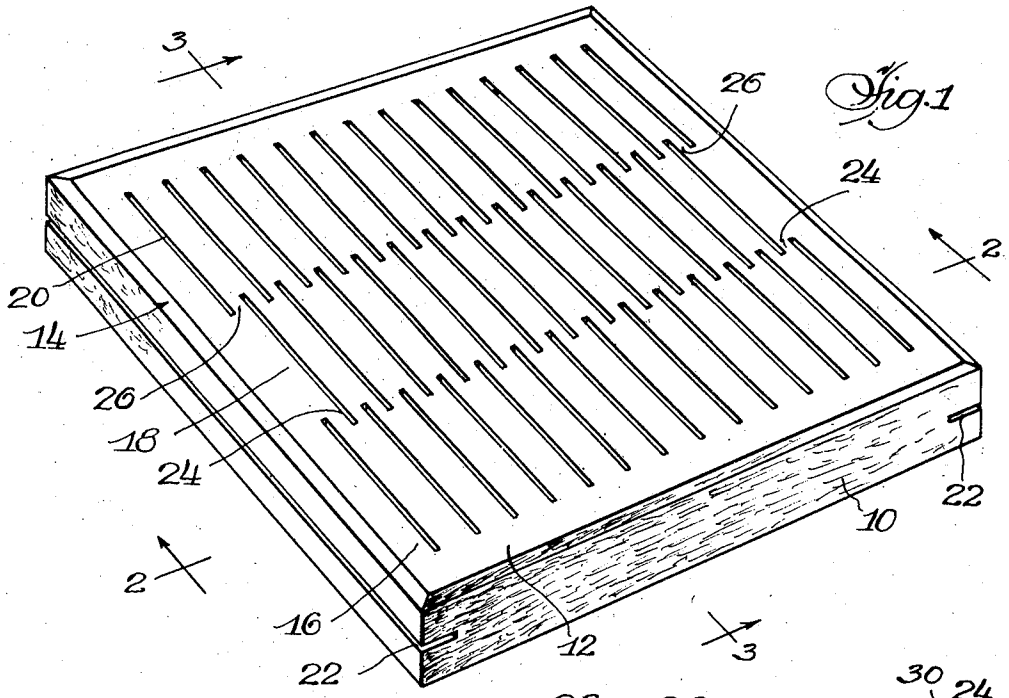


Fig. 1

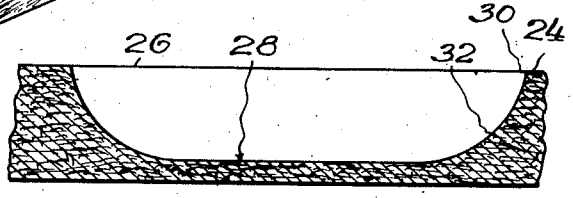
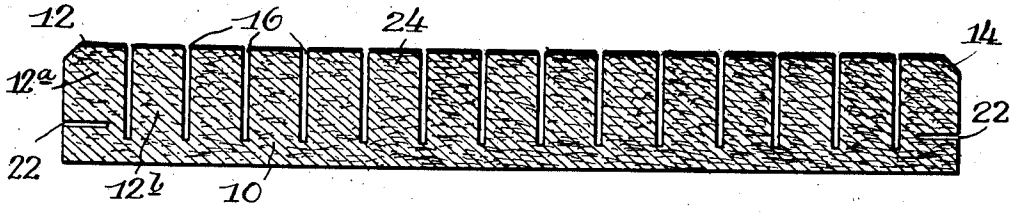


Fig. 3

Fig. 2



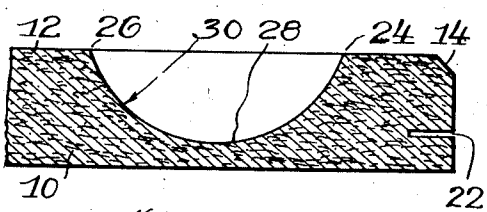


Fig. 4

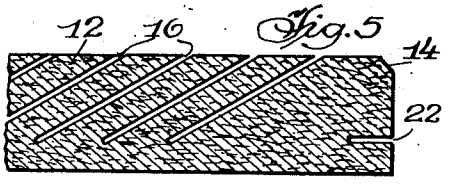


Fig. 5

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ACOUSTICAL TILE

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4 Claims. (Cl. 181—33)

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This invention pertains to an acoustical construction. More particularly it is directed to a fibrous acoustical base having a decorative coating receptive surface and the process of making the same.

Though the principles underlying this invention are adapted to the preferred type of an acoustical base comprising fibrillated ligno cellulosic materials felted in a sheet form in accordance with conventional methods of formation, it is not the intention to limit the same to the preferred embodiment, since obviously, with slight changes and modification, the principles underlying this invention can be adapted with equal facility to other inorganic and organic fibrous acoustical bases.

For a more complete understanding of the principles underlying this invention reference should be had to the accompanying drawings forming a part hereof, in which

Figure 1 is a perspective view of an acoustical tile made in accordance with the principles of this invention.

Figure 2 is a transverse section taken along line 2—2 of Figure 1 showing as one preferred embodiment the depth to which the grooves are cut in the acoustical tile body.

Figure 3 is taken along lines 3—3 of Figure 1, partly broken away to show a section through one of the grooves and indicate but one type of periphery or arc impressed within the acoustical base.

Figure 4 shows in a partly broken away section another type of arc of a semicircular nature, that may be also impressed depending on other relative conditions inherently present in the acoustical base.

Figure 5 illustrates in a transverse section another modification of this invention.

An acoustical base 10, preferably comprising felted ligno cellulose fibrous materials, such as used in conventional insulation board is treated to a simultaneous application of heat and pressure to develop in the surface thereof an autogeneously formed thermo plastic resin that not only binds the fibrous material on the surface 12 to form a more dense, and decorative medium receptive plane but also maintains the contiguous area 12a at a greater density in comparison with interior 12b. The development and formation of this autogeneously created thermo plastic ligno cellulosic resin is highly desirable, since it provides a smooth surface for the subsequent application of paint, lacquer and other decorative finishes without undue difficulty. A surface of

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this nature though it is somewhat impervious to sound, it is, however, more protective, resistant to scuffing and denting, and more easily adapted to use under erection conditions.

To form this surface it is desirable that the ligno cellulosic blanks be placed in contact with a heated surface maintained under very slight pressure to prevent undue compression in the interior 12b of the acoustical base 10. If great pressure is applied the interior 12b has a tendency to densify as the heat from the surface penetrates the depth of the acoustical base 10. In practice it was found desirable to use a temperature of about 485° F. to catalyse and aid in the formation of the autogeneously created ligno cellulosic resins on the surface 12, and the surface contiguously underlying area 12a. The length of heat and pressure application will vary with the nature of the base. Though it is desirable to pre-dry the acoustical blanks, it is not essential since the open, cellular structure permits the ready escape of gases and water generated during the autogeneous formation of the thermo plastic ligno cellulosic resin.

A series 16a, b, c, d, etc. of parallel slots or grooves 16 are impressed upon and through the surface 12 into the interior 12b of the acoustical base 10. In order to obtain the maximum benefit, it is desirable to form the grooves 16 as deeply as possible to provide the maximum surface area capable of absorbing sound. In any event it is desirable that the depth of the cut or groove 16 be at least one half of the thickness of the acoustical base 10.

In practice the parallel grooves are formed in the acoustical base 10, and extend approximately one third of the way across the face 12 of the acoustical base 10. At this point 24, another series 18a, b, c, d, etc. set off or staggered in relationship to the previous series 16a, b, c, d, etc. is started across another approximate third of the way of the face to the point 26. The ends of the series 18, a, b, c, d, etc. is slightly overlapped but not joined by ends of the series 16a, b, c, d, etc. at point 24, and by the ends of the series 20, a, b, c, d, etc. at point 26. This type of construction provides for more acoustical base material between the grooves 16 and 18 and prevents a transverse plane of cleavage or weakness along successive grooves at this junction. Obviously other patterns employing these principles can also be made.

To aid and reinforce this junction as well as for other reasons given below, the end sides 30 of the grooves 16 near the points 24 and 26, as well as at the edges of the acoustical base 10,

gradually slope 32 in a form of an arc to the bottom 28 of the groove. The substantially elliptical type arc of the groove (as shown in Figure 3) is obtained by impressing the cutting means (not shown) into the interior 12b and then moving the cutting means longitudinally the desired distance. This particular type of groove construction is particularly useful in slotting acoustical bases having a thickness of less than one inch.

Obviously another type is the circular arc as shown in Figure 4. If relatively small diameter cutting saws are used, the proper depth can be readily reached without cutting longitudinally.

To finish the tile a bevel 14 can be formed on all edges either during the pressing operations or at subsequent stages of operation before the application of coating compositions to the formed surface.

A slot 22 is also formed in at least two of the sides of the acoustical base 10 to provide a means for insertion of a bridgeclip (not shown) or other suitable retaining means, to attach the tile mechanically to the surface, such as a wall or a ceiling. In practice, it frequently is desirable to use an adhesive backing on the tile, which is then erected and retained in place by the adhesive.

The slope 32 curves gradually to the bottom 28 of the groove. Though the interior 12b of the acoustical base 10, is generally darker in color, it is, however, not noticeable at the distance normally encountered between the eyes and the ceiling or wall upon which it is installed. In the course of applying the paint, there is a tendency for the excess amount to gradually flow down the slope and come to the surface 12 at points 24 and 26. It should be noted that an acoustical tile when in use as for instance on a ceiling is inverted and the slots or grooves 16 face the source of sound. Under those conditions, as well as when it is used on the wall the excess of the coating composition will obviously under influence of gravity flow down the slope 32 to the surface 12. This flow not only decorates the visible part of the groove and thereby blending it into the foreground to decrease its visibility, but also prevents excessive accumulation of the coating composition within the groove itself and thereby destroy or impair its sound absorbing characteristics.

At times it may be desirable to increase still further the sound absorption and decrease the effect of the depth shadow of the groove. This can be readily accomplished by slotting the grooves 16, diagonally from the surface 12, into the body 12b as shown in Figure 5. Of course, when this particular modification is erected on the wall it is desirable that the grooves point downwardly to eliminate collection of dirt and facilitate future redecoration.

In making acoustical tile according to the principles underlying this invention, the surface of a fibrous base such as ligno cellulose felted sheets

is simultaneously treated with heat and pressure under conditions mentioned previously. In practice it is preferred to mold simultaneously the bevel 14 while heat and pressure are applied to the surface. This process provides a smooth, suitable coating receptive surface. In the preferred mode of operation, the whole series of grooves are simultaneously cut by means of the desired number of high speed saws. Each series of saws is mounted on a common shaft or spindle which in turn is driven by a high speed electric motor. The slotted or grooved acustical tile is then decorated in the customary manner, allowed to dry; and packaged for further disposition.

Though the above description describes in considerable detail the outstanding features and characteristics of the principles underlying this invention, it is obvious that many adaptations, extensions, modifications and uses can readily be discerned by a person skilled in this art, and it is not intended to be limited to the specific embodiments described herein but only by the spirit of principles of this invention as indicated in the attached clams.

It is claimed:

1. A sound absorbent consisting essentially of interlaced fibrillated lignocellusic fibers formed into a rigid cellular porous mat, the said mat having on one surface therein a series of discontinuous, parallel slots, the said slots sloping within the body of said mat to within the other surface thereof.

2. The product of claim 1 wherein the said slots are substantially circular.

3. The product of claim 1 wherein the said slots are elliptical.

4. The product of claim 1 wherein the said grooves have a depth of not less than one-half of the thickness of said base.

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