Oct. 31, 1950 D. GONDA 2,528,049

ACOUSTIC PANEL

Filed June 11, 1948

FIG. 1

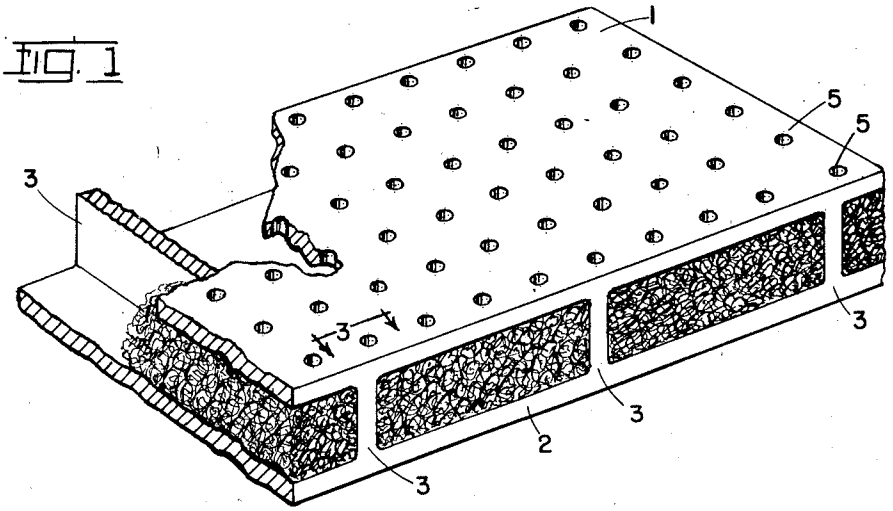


FIG. 2

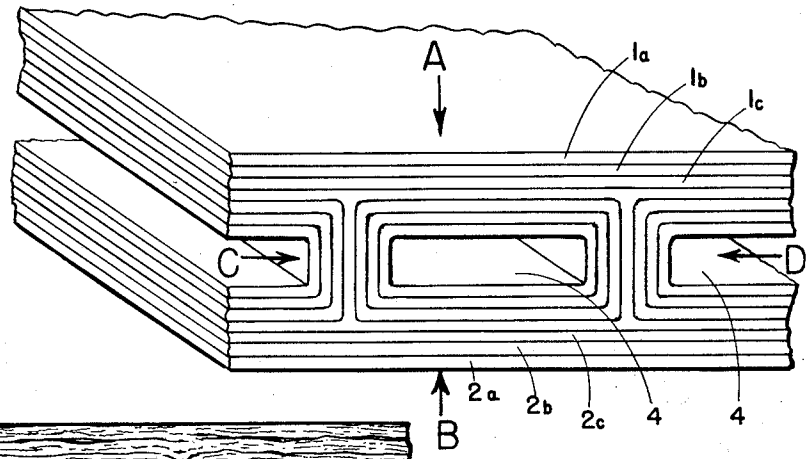
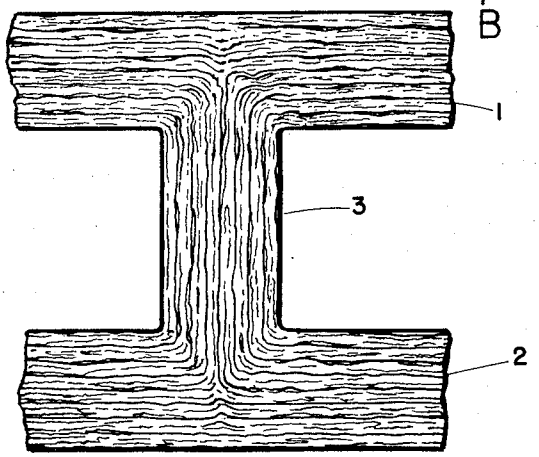


FIG. 3



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2,528,049

ACOUSTIC PANEL

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1 Claim. (Cl. 154—45)

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The present invention relates to acoustic materials and, more particularly, to sound absorbing and sound insulating panel-like structures.

This application is a continuation-in-part application of my co-pending applications, Serial Nos. 579,429 and 687,809, filed on February 23, 1945 and August 2, 1946, respectively, of which application Serial No. 579,429 has matured into Patent Serial No. 2,445,290, while application Serial No. 687,809 has been abandoned.

Structures of this type, as heretofore known, may be divided primarily into two groups. The first group consists of panel-like structures of compacted fibers with small channels extending from the top to the bottom side of such panels. Panels of the second group are made up in the form of flat, open metal boxes with a perforated bottom, and filled with sound absorbing material.

The main drawback of these known acoustic structures consists in that they can be used only in connection with existing walls and ceilings to which they must be fastened since they are not in themselves load sustaining. A further disadvantage of these structures, immediately following from the drawback just outlined, consists in that they reduce the height and width of the room in which they are mounted.

The material of the above mentioned first group has the additional drawback that a relatively large area of compacted fibers is directly exposed to dust, smoke, etc., and that in view of the small crevices between the fibers it is extremely difficult, if not impossible, properly to clean the material involved. Panels of the second group are, furthermore, disadvantageous inasmuch as they are subject to rust and corrosion.

Therefore, it is an object of this invention to provide an acoustic panel which will overcome the above mentioned drawbacks.

It is another object of this invention to provide an acoustic panel which can easily be washed, which will be rust-proof, and can be mounted easily and quickly.

A still further object of this invention consists in the provision of an acoustic panel which is highly load-sustaining and thus does not require any ceiling or wall to which it has to be fastened, but will itself form the desired ceiling or wall.

It is also an object of this invention to provide an acoustic panel according to the preceding paragraphs, which has high acoustic qualities, can easily be mass produced in large sizes, such as 8' x 4' and larger, and can be coated, for instance by spraying, without previous special treatment.

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These and other objects and advantages of the present invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

Figure 1 is a perspective view of an embodiment of the panel according to the present invention, with one portion broken away to show some details;

Figure 2 illustrates on a scale somewhat larger than that used in Figure 1, a step in the manufacture of the panel according to the present invention;

Figure 3 represents a section along the line 3—3 of Figure 1, however, on a larger scale, and represents a view of this section as it would appear when observed through a microscope.

Referring now to the drawings in detail, the acoustic panel as illustrated in Figure 1 consists of a practically completely homogeneous and integral structure, comprising a top plate or flange 1 and a bottom plate or flange 2, and a plurality of webs 3 extending transverse to the major surfaces of the plates or flanges 1 and 2. These webs 3 are completely fused to the top and bottom plates or flanges 1 and 2 so as to form a rigid, integral, and homogeneous structure therewith.

As will be clear from Figure 1, the acoustic panel according to the present invention has one side thereof, namely the plate or flange 1, provided with a plurality of bores 5 passing through the plate or flange 1. While these bores 5 may be of any suitable size, highly favorable results have been obtained with bores having a diameter of $\frac{1}{8}$ or $\frac{3}{32}$ of an inch, and a distance of $\frac{1}{2}$'' from center to center of adjacent bores. The panel is so mounted in the room to be provided therewith that that flange which contains the bores 5 is exposed to the sound waves to be absorbed.

The channels formed between the webs 3 and the top and bottom plates or flanges 1 and 2 may be filled with any sound absorbing material, as for instance slag wool, mineral wool, asbestos fibers, kapok, etc.

An acoustic panel according to the present invention is highly load sustaining, while its weight is relatively low. Thus, for instance, an 8' x 4' panel, having a standard thickness of 1'', with the webs and flanges of the panel of approximately $\frac{1}{8}$'' in thickness and the webs running in the 8' direction at 2'' centers, has an approximate weight of 64 lbs., which would mean approximately 2 lbs. per sq. foot. Furthermore, such a panel has a compression strength of 8.8

tons per sq. inch, and flexural rigidity of 1,210,000 lbs. per sq. inch.

It should be noted that if the panel according to the present invention has its cavities empty, the panel will have a sound reduction factor of 22 decibels. When the cavities of the panel are filled with kapok enclosed in scrim cloth, a sound absorption coefficient of 0.90 at 1,000 cycles per second can be obtained.

When the acoustic panel structure according to the present invention is intended for sound insulation partitioning, the cavities of the panel may be filled with ordinary sand or other suitable fillers. On the other hand, in case of desired sound reduction, by using two panels, sound reduction equivalent to a 13'' brick wall can be obtained. The panel according to the present invention can be screwed, or similarly fastened, and will not splinter.

The panel as illustrated in the drawings is made up of thermo-setting resin impregnated fibrous sheet material, such as craft paper. Such resins are, for instance, phenol-formaldehyde, urea-formaldehyde, or cresol-formaldehyde.

As illustrated in Figure 2, a plurality of thermo-setting resin impregnated fibrous sheets *2a*, *2b* and *2c* are superimposed upon each other, whereupon channel-like elements, generally designated *4*, are placed upon the sheet *2c* with the sides of these channel members in side-to-side relationship. Each channel *4* is formed by thermo-setting resin impregnated fibrous strips of sheet material, such as craft paper, wound into a plurality of convolutions. When these channel members have been properly assembled, a plurality of thermo-setting resin impregnated sheets of fibrous material, such as paper, are placed on top of the channel members. These sheets are indicated by reference numerals *1a*, *1b*, and *1c*. Mandrels are then inserted into the channel members, whereupon the entire assembly is subjected to heat and pressure of approximately 1500 lbs. per sq. inch acting on the top and bottom sheets in the direction of the arrows A and B, and also acting in the direction of the arrows C and D. As a result of this heat and pressure treatment, the resin in the fibrous material flows and sets, and all sheets fuse to the adjacent sheets while being compressed in the direction of their thicknesses. This compression is clearly visible in Figure 3, which also indicates how the fibers of the fibrous material become interlocked so that the entire structure forms a homogeneous, integral, and densified unit. The mandrels are then withdrawn from the channel members and the panel may now be finished by

providing one flange thereof with the bores *5*. The acoustic panel may then be mounted or used as ceiling or wall in any desired and suitable manner, with or without filling in the cavities between the webs and the top and bottom flanges.

If desired, one or both flanges may be sprayed with a paint so as to adapt the color of the panel to its surroundings, or to produce the desired decorative effect. The panel is practically moisture-proof and can be washed without difficulty, so that it can be kept clean at all times. The material from which the panel is made does not support combustion, so that it greatly contributes to the fire-resistance of the room of which it forms a part. Furthermore, the material from which the panel according to the present invention has been built up is impervious to vermin, white ants, and termite attack, and is also unaffected by extreme climatic changes.

It will, of course, be understood that the present invention is by no means limited to the specific example shown in the drawings, but also comprises any modification within the scope of the appended claim.

I claim:

A sound absorbing structural panel capable of supporting substantial loads and comprising in combination, a pair of spaced parallel rigid plates of thermoset resin impregnated and laminated sheets, a plurality of spaced parallel rigid webs interposed between and integrally formed with both of said plates and also comprising thermoset resin impregnated and laminated sheets, said webs forming with portions of each of said plates a series of side-by-side uninterrupted elongated channels, one of said plates being provided with numerous sound admitting apertures at spaced points over its area and extending therethrough, and a filling of sound absorbing material in each of said channels.

DESIRÉ GONDA.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,660,745	Delaney	Feb. 28, 1928
2,363,068	Leadbetter	Nov. 21, 1944
2,445,290	Gonda	July 13, 1948

FOREIGN PATENTS

Number	Country	Date
450,524	Great Britain	Apr. 23, 1935