US 20030102184A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2003/0102184 A1**

Brisson et al. (43) **Pub. Date: Jun. 5, 2003**

(54) **ACOUSTICAL SUPPORT PANEL**

(75) Inventors: **Mario Brisson**, Maskinonge (CA); **Sebastien Gagnon**, Louiseville (CA); **Michel Smith**, Louiseville (CA); **Berthier Roy**, Louiseville (CA)

Correspondence Address:
Carter & Schnedler, P.A.
56 Central Avenue, Suite 101
P.O. Box 2985
Asheville, NC 28802 (US)

(73) Assignee: **Materiaux Cascades Inc.**

(21) Appl. No.: **09/999,259**

(22) Filed: **Nov. 26, 2001**

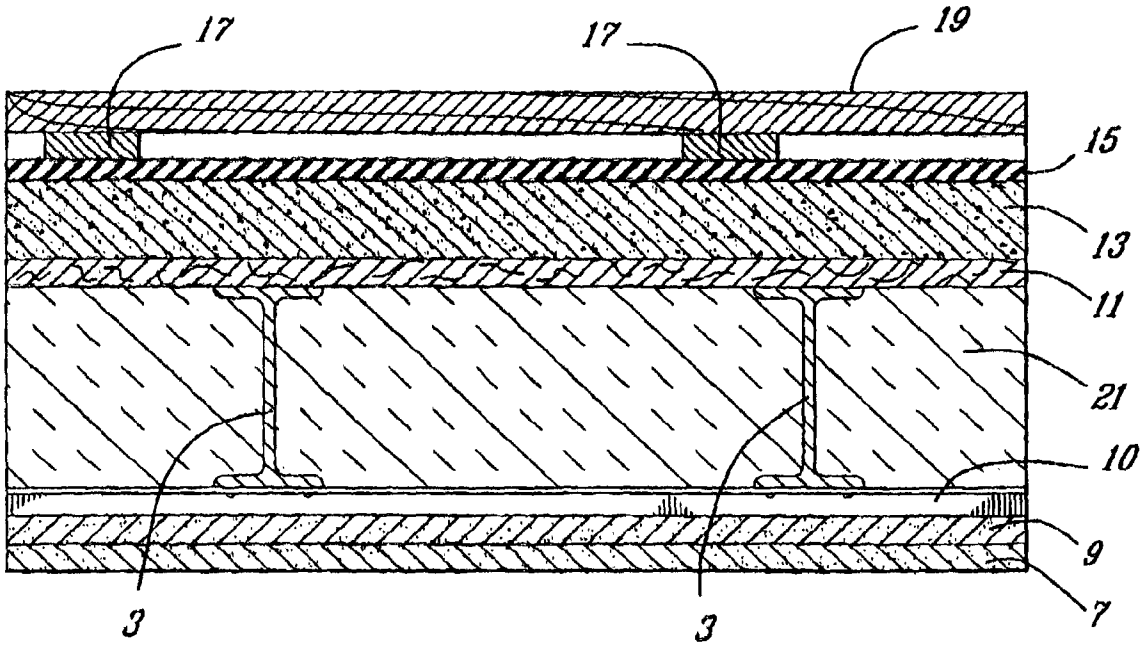
Publication Classification

(51) **Int. Cl.**[7] **E04B 1/82**

(52) **U.S. Cl.** **181/290**

(57) **ABSTRACT**

The acoustical support panel according to the invention comprises a membrane of resilient material, such as one obtained with shredded used tires, which is laminated on a base of compression resistant cellulose fibers. This panel has shown a noted increase of insulation from impact and aerial noises. It has an excellent dimensional stability and high resistance to compression.



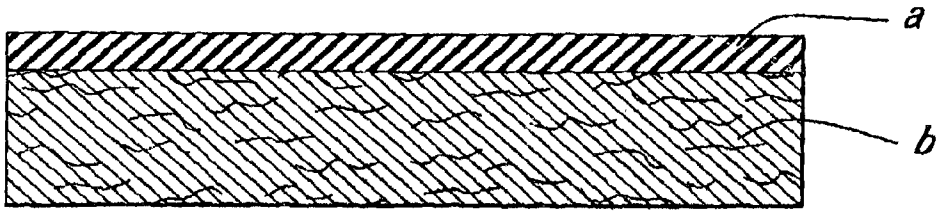


Fig. 1

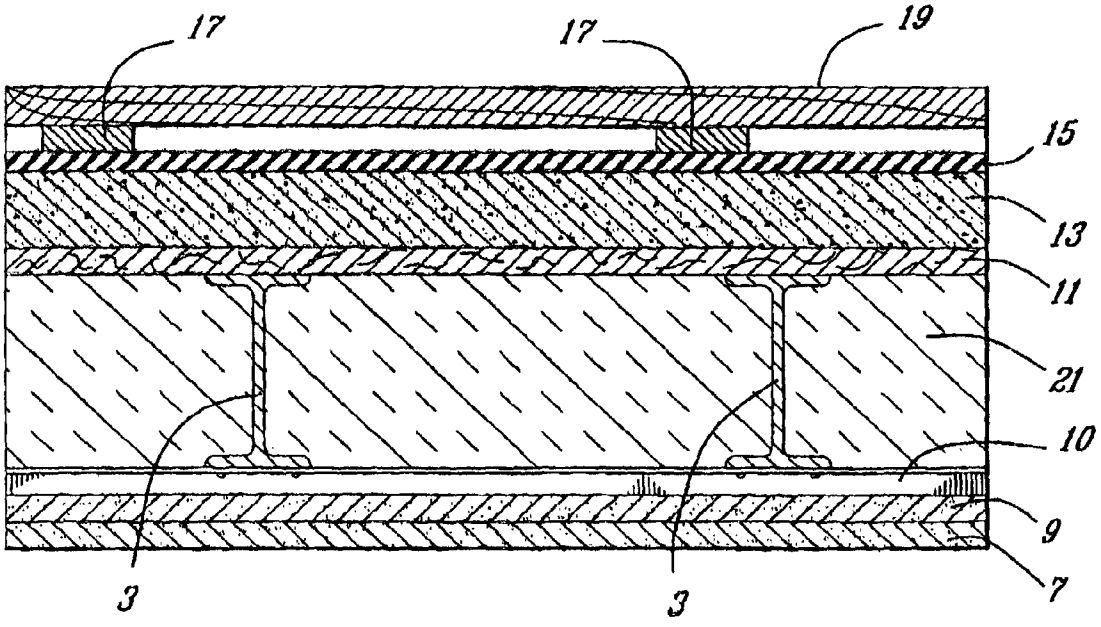


Fig. 2

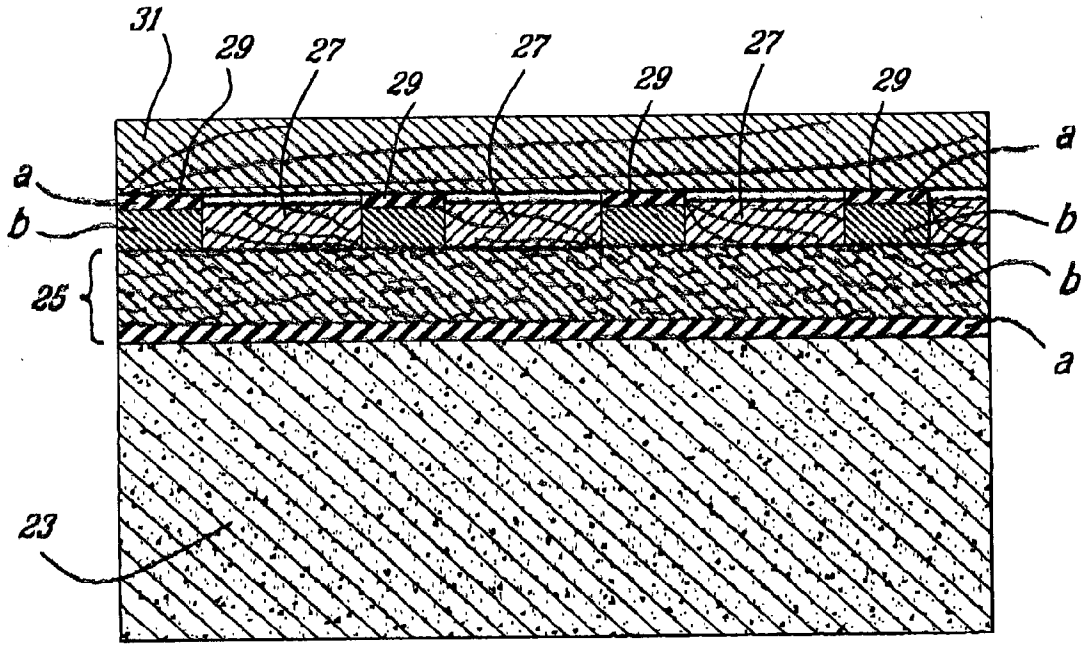


Fig. 3

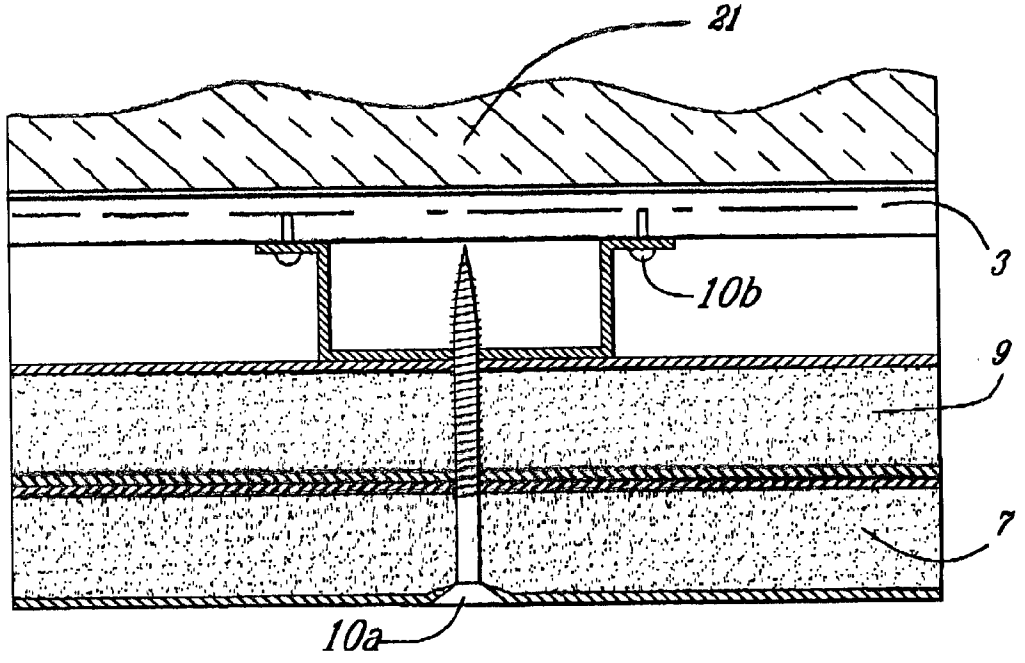


Fig. 4

ACOUSTICAL SUPPORT PANEL

BACKGROUND OF THE INVENTION

[0001] (a) Field of the Invention

[0002] The present invention relates to a panel, and more particularly to an acoustical support panel and a process for manufacturing same. More specifically, the present invention is concerned with an acoustical support panel which can be obtained by laminating a membrane of resilient material such as rubber, on a base of compression resistant cellulose fibers, and the use of said panel to provide a specific support for the mounting of a wood flooring, tile, vinyl, carpet or installing a rug, for example.

[0003] (b) Description of Prior Art

[0004] In modern construction, especially in homes and apartment buildings as well as in office buildings, no efforts should be spared to ensure that the floors and ceilings are acoustically insulated. In practice, a slab of concrete with a substantial thickness can provide some acoustical insulation, however this is far from being satisfactory and economical.

[0005] A number of U.S. patents describe acoustical materials which are capable of absorbing sounds, however to Applicants knowledge none of them teach an acoustical support panel which absorbs sounds with a high degree of satisfaction and at a reasonable cost.

[0006] U.S. Pat. No. 2,542,428 describes a sound-deadening structure including a sheet of rubber material formed with projections on one face thereof, and a layer of flowable setting material having the projections embedded therein.

[0007] U.S. Pat. No. 2,802,764 is concerned with an acoustical material consisting of a slab of glass fibers covered with an impervious resinous membrane which shrinks when subjected to heat.

[0008] U.S. Pat. No. 2,874,796 describes a method of fabricating a sound absorbing unit having artificial openings therein, by applying a boric acid solution to a surface of the formed body.

[0009] U.S. Pat. No. 3,961,682 describes a sound-absorbing wall element including a plurality of layers, one of them being made from shredded used tires. The other layer may include a sound absorbing material such as mineral wool.

[0010] U.S. Pat. No. 4,253,543 describes a device for the absorption of airborne sound which includes an air permeable base layer and an impervious membrane applied to the base layer. This patent does not disclose a rubber membrane laminated on a cellulose base.

[0011] U.S. Pat. No. 4,570,748 discloses a volume-changing resonator in the form of a sound silencer which has a surface made of rubber.

[0012] U.S. Pat. No. 4,709,781 concerns a sound-damping and heat-insulating composite plate which includes a porous core made of rubber granules or scrap, which is disposed between two layers of metals.

[0013] U.S. Pat. No. 4,989,688 describes an acoustical panel consisting of a rigid frame in which there is an insulation medium, such as fiberglass, cellulose, and the like. The outer surfaces of the cell grid are covered with a skin or screen mesh for confining the loose discrete insulation.

[0014] It will therefore be seen that the prior art does not teach an acoustical support panel which is easy and inexpensive to produce, and which at the same time is highly efficient.

[0015] It is an object of the present invention to provide an acoustical support panel which is specifically designed for mounting wood floorings, ceramic, tile, carpet and the like.

[0016] It is another object of the present invention to provide an acoustical support panel which shows a noted increase of insulation from impact noises and aerial noises.

[0017] It is another object of the present invention to provide a simple method for preparing acoustical support panels which can be used in the construction of homes, office buildings and the like.

SUMMARY OF THE INVENTION

[0018] These and other objects of the present invention may be achieved by providing an acoustical support panel which comprises a membrane of resilient material, and a base of compression resistant cellulose fibers, the membrane being laminated on the base under conditions to constitute the panel.

[0019] The membrane is preferably made of resilient rubber material. In practice, it has been found that a membrane consisting of shredded used tires is entirely satisfactory.

[0020] The membrane may be of any suitable thickness as will be appreciated by one skilled in the art. However, in practice it has been found that the membrane may be between about 0.1 and 0.25 inch, preferably 0.14 inch, it being understood that any value outside the above range would be acceptable, without departing from the scope and spirit of the present invention, provided the desired insulation can be obtained.

[0021] Another property of the membrane is its density. It has been found that it is highly desirable, although not essential, that the density be between about 18 and 30 lbs./ft^3, preferably about 22 lbs./ft^3.

[0022] In accordance with another embodiment, the membrane of resilient material should preferably have a retention (50 Kpa load) according to ASTMD-1055 of about 50% and a retention (100 Kpa load) according to ASTMD-1055 of about 40%.

[0023] The base of compression resistant cellulose fibers is preferably made of wood fibers. Although its thickness may vary to a large extent as will be appreciated by one skilled in the art, it is normally between about 0.3 and about 1.0 inch thick, preferably about 0.4 inch.

[0024] A preferred property of the base is a compression strength at 10% deformation of about 45 lbs./in^2, although this value may vary to a large extent again as will be appreciated by one skilled in the art.

[0025] Another property is the water absorption of the base which may be set at about 5% P/V although any other suitable value below 10% P/V is within the scope of the present invention.

[0026] Another preferred property is the linear expansion of the base which may be set at about 0.08% although any other suitable value is within the scope of the present invention.

[0027] Finally, another preferred property of the acoustical support panel according to the invention is a transverse load rupture which should be about 12 lbs.

[0028] In accordance with another embodiment, the acoustical support panel according to the invention may be manufactured by providing a membrane of resilient material, providing a base of compression resistant cellulose fibers, and laminating the membrane on the base under conditions to constitute the panel.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The invention is illustrated by means of the annexed drawings in which:

[0030] **FIG. 1** is a cross-section view of an acoustical support panel according to the invention;

[0031] **FIG. 2** is a schematic illustration of the mounting of a hardwood flooring utilizing an acoustical support panel according to the invention;

[0032] **FIG. 3** is a schematic illustration of another possible arrangement for a hardwood flooring provided with an acoustical support panel according to the invention; and

[0033] **FIG. 4** is an enlarged view of a resilient channel to mount the I-beams illustrated in **FIG. 2**.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0034] As shown in **FIG. 1**, an acoustical support panel according to the invention comprises a membrane a of shredded used tires which is laminated on a base b of compression resistant wood fibers. Lamination is of course achieved by using a glue, the choice of which is entirely left to one skilled in the art.

[0035] With reference more particularly to **FIG. 2**, which illustrates a hardwood floor mounting according to the invention, it will be seen that there is first provided a plurality of I-beams 3 or other joists type, two of which are shown in the drawings, and each is 14 inch high. Of course, the structure and size of the I-beams or other joists type can vary depending on the choice of the designer of the floor structure.

[0036] Underneath the beams, there are mounted two sheets of gypsum **7**, **9**, ⅝ inch thick each. These two sheets may constitute the ceiling of a room below. Between the base of I-beams **3** and the two sheets of gypsum **7**,**9**, there are provided resilient channel bars **10** which are fixed by means of a screwing device **10***a* extending through gypsum sheets **7**,**9** into I-beams **3** at the base thereof. These channel bars **10** are used to hold I-beams **3** and to absorb shocks produced by sonic vibrations.

[0037] Above beams **3**, there is first provided a board **11** of Aspenite® for example, or tongue and groove plywood, ⅝ inch thick, a layer of concrete **13**, 1½ inch thick, an acoustical support panel **15** according to the invention, bearing joist **17** and finally floorboards **19**. Finally, it will be realized that a cellulose, glass, or rock wool or the like insulating material **21** well known to those skilled in the art, fills the space between I-beams **3** above sheets of gypsum **7**,**9** and below the board of Aspenite®. This arrangement is of course mounted in a manner well known to those skilled in the art.

[0038] It was found that with the insertion of an acoustical support panel **15** according to the present invention, there is a noted increase of the insulation capacity from impact and aerial noises to FIIC=55, as compared to known insulation techniques.

[0039] Turning now to **FIG. 3**, it will be seen that the acoustical panel according to this embodiment is intended to be mounted on a base **23** of light concrete, preferably 8 inches thick. The acoustical panel **25** is the same as the one illustrated in **FIG. 1**, except that the order is reversed in that membrane a of shredded used tires is at the bottom and is placed directly on light concrete base **23**, while layer b of wood fibers is at the top as shown. Laths **27**, preferably 7/16 inch thick (slightly less thick than panel **25**) are placed 6 inches apart over panel **25** as shown. Then pieces of panel **25**, 6 inches wide, referred to as members **29**, with layer a oriented at the top, are glued in known manner over panel **25** between laths **27**, as shown. This arrangement gives a FIIC of 56. The same results have been noted as in the arrangement of **FIG. 2**, with respect to impact and aerial noises.

[0040] A typical acoustical panel according to the invention is described in the following table, wherein the panel is 4'×8'×1 1/32".

PHYSICAL PROPERTIES

	Method norm	Value
Rubber Composition: recycled tires		
Thickness	ASTM D-1037	0.138"
Density	ASTM D-1037	22 lbs./ft^3
Retention		
(load of 50 Kpa)	ASTM D-1055	50%
(load of 100 Kpa)	ASTM D-1055	40%
Wood fiber panel Composition: wood fiber		
Thickness	ASTM D-1037	0.409"
Water absorption	ASTM C-209	5% P/V max
Compression strength at 10% deformation	ASTM C-165	45 lbs./in^2
Linear expansion	ASTM C-209	0.08%
Transverse load at rupture	ASTM C-209	12 lbs.

[0041] The above invention is not limited to the above embodiment except as defined in the appended claims.

We claim:

1. An acoustical support panel comprising

a membrane of resilient material, and

a base of compression resistant cellulose fibers,

said membrane being laminated on said base under conditions to constitute said panel.

2. Acoustical support panel according to claim 1, wherein said membrane is made of resilient rubber material.

3. Acoustical support panel according to claim 2, wherein said resilient rubber material comprises recycled tire material.

4. Acoustical support panel according to claim 1, wherein said membrane of resilient material has a thickness between about 0.1 and 0.25 inch.

5. Acoustical support panel according to claim 4, wherein said membrane of resilient material has a thickness of about 0.14 inch.

6. Acoustical support panel according to claim 1, wherein said membrane of resilient material has a density between 18 and 30 lbs./ft^3.

7. Acoustical support panel according to claim 6, wherein said membrane of resilient material has a density of about 22 lbs./ft^3.

8. Acoustical support panel according to claim 1, wherein said membrane of resilient material has a retention (50 Kpa load) according to ASTIM D-1055 of about 50% and a retention (100 Kpa load) according to ASTM D-1055 of about 40%.

9. Acoustical support panel according to claim 1, wherein said base is made of wood fibers.

10. Acoustical support panel according to claim 1, wherein said base has a thickness between about 0.3 and about 1.0 inch.

11. Acoustical support panel according to claim 10, wherein said base has a thickness of about 0.4 inch.

12. Acoustical support panel according to claim 1, wherein said base has a compression strength at 10% deformation of about 45 lbs./in^2.

13. Acoustical support panel according to claim 1, wherein said base has a linear expansion of about 0.08%. and a water absorption of about 5% P/V.

14. Acoustical support panel according to claim 1, wherein said base has a transverse load at rupture of about 12 lbs

15. Process for the manufacture of an acoustical support panel which comprises providing a membrane of resilient material, providing a base of compression resistant cellulose fibers, and laminating said membrane on said base under conditions to constitute said panel.

16. An acoustical system for mounting a wood flooring over a structure consisting of joist means, board means over said joist means, a layer of concrete over said board means, an acoustical support panel according to claim 1 over said concrete, wooden joists over said support panel, and said wood flooring mounted over said wooden joists.

17. An acoustical system for mounting a wood flooring over a concrete base, which comprises an acoustical support panel according to claim 1 mounted with the membrane of resilient material at the bottom, wooden laths spacedly distributed in parallel fashion over said support panel, longitudinal members made of same material as said acoustical support panel and aligned over said support panel between said laths, and adapted to receive said wood flooring.

* * * * *