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(54) Improved bed

(57) Improved bed, **characterised in that** it is at least partly made of a sound-absorbing material (6) and in that it is provided with an air cavity (7) working in conjunction with the latter.

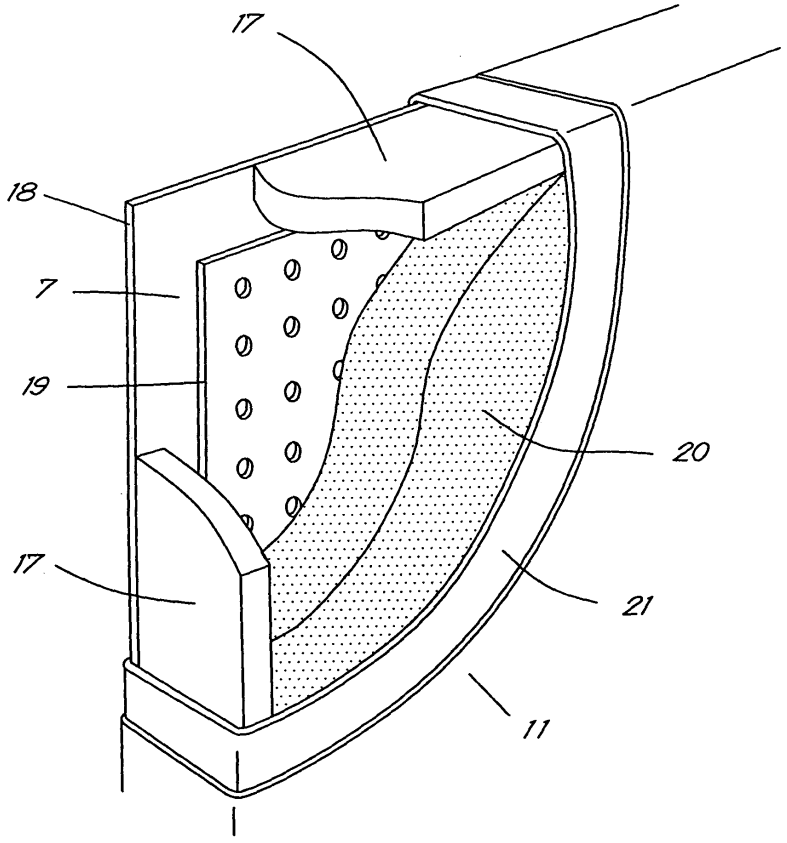

Fig.11

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Description

[0001] The present invention concerns an improved bed.

[0002] It is known that numerous parameters have to be taken into account when manufacturing a bed, such as comfort, hardness, ventilation, stability, heat insulating power, dimensions and the like.

[0003] Moreover, in order to get a good night's sleep, one must pay attention to external factors such as ambient temperature, brightness, dimensions of the bedroom and the like.

[0004] Up to now, the major factor sound has not been taken into account when designing beds.

[0005] Sounds in the bedroom may disturb the sleep, however, and thus lead to a short or bad sleep.

[0006] It is known to use earplugs so as not to be disturbed during the sleep by noise nuisance.

[0007] The use of such earplugs is disadvantageous, however, in that they can come out of the ears during the sleep, as a result of which the sleeper is nevertheless exposed to ambient noise, and which may lead to unhygienic situations as the earplugs, soiled by earwax, may get lost in the bed or in the room.

[0008] Another disadvantage of such earplugs is that they may feel uncomfortable to the user.

[0009] Yet another disadvantage of the use of earplugs is that they plug up the user's auditory duct entirely, so that practically no sound whatsoever can be heard, not even in case of emergency, which may lead to dangerous situations as the user cannot hear an alarm signal for example.

[0010] Yet another disadvantage is that re-using earplugs is not hygienic, and plugging up the auditory duct entirely for longer periods may lead to irritation or infections.

[0011] On the other hand, the use of one way earplugs increases the amount of household refuse which is impossible or difficult to recycle.

[0012] It is also known, in order to dampen ambient sounds, to entirely or partly cover the walls of the bedroom with sound-absorbing material.

[0013] This is disadvantageous in that the application of such a sound-absorbing coating on the walls of the bedroom is relatively expensive and time-consuming.

[0014] Moreover, when the bed is moved to another room, it is not easy to remove said sound-absorbing coating and to apply it in the other room.

[0015] The present invention aims to remedy one or several of the above-mentioned and/or other disadvantages.

[0016] To this end, the invention concerns an improved bed having as a specific characteristic that it is at least partly made of a sound-absorbing material and that it is provided with an air cavity working in conjunction with the latter.

[0017] In this context, the term air cavity is used in the broadest sense, and it also comprises an air slot, a hollow space filled with air, etc., unlike those that are formed for example by the open cells of a sound-absorbing foam filled with air.

[0018] An advantage of the co-operation between sound-absorbing material and an air cavity is that the sound-damping capacity of a bed according to the invention is strongly increased compared to conventional beds in which only sound-absorbing material of the same thickness is used, without any air cavities.

[0019] A further advantage is that a bed according to the invention is simple and easy to make, such that its manufacturing price, its energy and material consumption, its environmental impact and its greenhouse effect are considerably reduced.

[0020] An advantage thereof is that, by providing the bed with one or several parts of sound-absorbing material and an air cavity working in conjunction therewith, the noise nuisance for a person lying in such an improved bed is reduced, leading to a better sleep quality, so that naps and sleeps have a more refreshing effect than in a conventional bed.

[0021] Another advantage of such an improved bed according to the invention is that it provides a very simple and cheap solution to the existing problems of noise nuisance when sleeping and/or resting.

[0022] Another advantage of such an improved bed according to the invention is that, since the sound-absorbing material and the air cavity working in conjunction with it are an inherent part of the bed, when the bed is moved to another room, the sound-absorbing system is moved as well in a simple manner.

[0023] According to a preferred embodiment, the air cavity is formed of one or several air slots.

[0024] According to a further preferred embodiment, the air cavity is formed of hollow spaces filled with air.

[0025] In a further preferred embodiment, the sound-absorbing material is made of a natural material, such as for example coconut fibre or cork, or pleated felt.

[0026] According to yet a further preferred embodiment, the sound-absorbing material is made of a plastic foam with an open cell structure, for example polyether polyurethane, or polyimide, or melamine formaldehyde sodium bisulphite copolymer.

[0027] In a further preferred embodiment, the plastic foam is Akomine or Basotect.

[0028] In another preferred embodiment, the plastic foam is a polyether polyurethane, such as for example BMX, with accoustic qualities and a flame spread according to MVSS 302 smaller than 100 mm/min.

[0029] In another preferred embodiment, the plastic foam is free of chlorinated and/or fluorinated components as well as of formaldehyde.

[0030] In a preferred variant, at least the sound-absorbing material has fire-resistant or fire-retardant qualities, which are obtained by filling said material or impregnating it with conventional fire-resistant or fire-extinguishing components, or also thanks to the specific composition of said material, for example in the case of polyimide

foam.

[0031] In yet a further preferred embodiment, said plastic foam is fibre-free.

[0032] In a further preferred embodiment, the sound-absorbing material is selected from materials of the group which, when exposed to high temperatures, have a low smoke development and low toxic gas production, as is for example the case with the polyimide foams as mentioned above.

[0033] In a further preferred embodiment, fine non-woven polyester fibres that have been made fire-retardant are used as a sound-absorbing material, for example in the form of "Safe-T-Sound" from the Libeltex company.

[0034] In a further preferred variant, the sound-absorbing material is composed of different layers which each have different sound-absorbing and/or sound-reverberating qualities and which co-operate with one another so as to cover a sound-absorbing and/or sound-reverberating spectrum that is as large as possible.

The part of the bed that is made of a sound-absorbing material is preferably provided at the head and/or at the foot of the bed.

[0035] In this way is made sure that a sound-damping effect is particularly obtained near the head of the person lying in the bed, thus further improving the sleep quality.

[0036] In order to better explain the characteristics of the present invention, the following preferred embodiments of an improved bed according to the invention are described by way of example only without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 schematically represents an improved bed according to the invention, seen in perspective;
figure 2 represents the part indicated by F2 in figure 1 to a larger scale and with a partial omission;
figure 3 shows a variant according to figure 2;
figures 4, 5 and 6 show variants of a bed according to figure 1;
figures 7 and 8 schematically represent the practical application of the invention to the head and foot of a bed;
figures 9 and 10 schematically represent the practical application of the invention to a bedstead;
figure 11 schematically represents a variant of the application in figure 11;
figure 12 schematically represents the working principle of the invention.

[0037] Figure 1 shows an improved bed 1 according to the invention which is in this case provided with a bedstead 2 provided with a headboard 4 at the head 3 of the bed 1 extending in height above the part 5 of the bedstead 2 on which can be put a mattress (not represented in the figure).

[0038] The width B of the headboard 4 is thereby larger than the width b of the bedstead 2 and also higher than the aforesaid part 5, such that the headboard 4 extends on either side and at the top of the bed 1, past the edges of the aforesaid part 5 and the width b of the bedstead 2.

[0039] According to the invention, the bed 1 is at least partly made of a sound-absorbing material, and it is provided with an air cavity working in conjunction with the latter,(neither of which are represented in figure 1, but which are represented in detail in figure 2), whereby said part is preferably provided at the head 3 of the bed 1.

[0040] As is represented in more detail in figure 2, which represents the part indicated by F2 in figure 1, the headboard 4 is in this case at least partly made of a sound-absorbing material 6 and provided with an air cavity 7, in the form of air slots, working in conjunction with the latter.

[0041] In order to obtain the sound-damping effect according to the invention, the headboard 4 represented in figure 1 is in this case provided with a layer of parallel strips of felt 8 with the air cavity 7 in between, this time in the shape of air slots, whereby sound waves 9 hitting the headboard 4 are partly absorbed and are partly reverberated in different directions between the strips 8, as a result of which a considerable sound damping is obtained at the head 3 of the bed 1.

[0042] As a consequence, a person lying in an improved bed 1 according to the invention will sleep better than in conventional beds which are not provided with a sound-absorbing part, since the noise level will be more than one decibel lower, preferably even less than three decibels lower and better still at least six decibels lower than in conventional beds by adding said sound-absorbing material 6 and an air cavity 7 working in conjunction with the latter.

[0043] Figure 3 shows a variant of a bed 1 according to figure 2, whereby the aforesaid sound-damping material 6 in this case consists of an acoustic foam in the form of a layer 10 with an open cell structure, which foam layer 10 is in this case, but not necessarily, coated with a sound-permeable fabric 11.

[0044] Sound waves 9 can move through the sound-permeable fabric 11 and are then absorbed in the foam layer 10, such that a first sound damping is obtained.

[0045] A further sound damping is obtained thanks to the air cavity 7 working in conjunction with the acoustic foam 10, as will be further illustrated in detail when discussing figure 12.

[0046] Figures 4 and 5 represent a variant of a bed 1 according to the invention, whereby the headboard 4 is provided with at least one crosswise directed part 12 situated next to (see figure 4) or above (see figure 5) the head 3 of the bedstead 2 and which is at least partly made of a sound-absorbing material working in conjunction with an air cavity.

[0047] In the embodiment represented in figure 4, the bed 1 is moreover provided with a footboard 13 at the foot 14 of the bed 1.

[0048] In the embodiment represented in figure 5, the crosswise directed part 12 of the bed 1 is made as an overhanging part above the head 3.

[0049] Thanks to these specific embodiments represented in figures 4 and 5, an additional sound-damping effect is obtained.

[0050] On the contrary, figure 6 shows another variant of an improved bed 1 according to the invention, in which the bed 1 is made as a four-poster bed 15, whereby the canopy 16, situated above the part 5, is at least partly made of a sound-absorbing material (not represented) and is provided with an air cavity (not represented) working in conjunction with the latter.

[0051] It is perfectly possible within the scope of the invention to make other parts than the headboard 4, (see figure 1), the footboard 13 (see figure 4), or the canopy 16 (see figure 6) out of a sound-damping material, such as for example a bottom (not represented) or a side wall (not represented) of the bed 1.

[0052] Figure 7 schematically shows a practical embodiment of the invention, for example applied to a headboard (see 4 in figure 1) or to a footboard (see 13 in figure 4).

[0053] The headboard 4 or footboard 13 is hereby built of a wooden frame 17, sealed on the back by means of a rear panel 18, for example formed of a fibre board with an average density.

[0054] Inside the frame 17, at some distance from the rear panel 18 and parallel with the latter is provided a centre panel 19, for example formed of a perforated fibreboard with an average density.

[0055] This centre panel divides the frame 17 in two parts, whereby the rear panel 18 and the centre panel 19 enclose a hollow space forming the actual air cavity 7 (not represented).

[0056] Above the centre panel 19, inside the frame 17, is provided a sound-absorbing foam 20.

[0057] This construction makes it possible to efficiently absorb and dampen the sound waves represented by 9.

[0058] Figure 8 schematically represents a variant of the embodiment represented in figure 7, seen in perspective.

[0059] In principle, the same structural elements are found here as in figure 7, i.e. the wooden frame 17, the rear panel 18, the perforated centre panel 19, the sound-absorbing foam 20, but this time surrounded by a sound-absorbing layer 21 and a sound permeable fabric 11 so as to make the aesthetic aspect and design of the bed 1 come out.

[0060] This construction not only makes it possible to efficiently absorb and dampen the sound waves represented by 9, but also to provide an adapted and aesthetic design to the sound-absorbing part of the bed 1 according to the invention, as well as to provide for external protection.

[0061] Figure 9 schematically represents a preferred, practical embodiment of a bedstead 2 made according to the invention, seen in perspective.

[0062] We find the same structural elements here as in the preceding figures, i.e. a wooden frame 17, provided with a rear panel (not represented), and a perforated centre panel 19, whereby an air cavity is formed between the rear panel and the perforated centre panel 19 inside the frame 17 (not represented for clarity's sake).

[0063] On top of the perforated centre panel 19 is provided a sound-absorbing foam layer 20, in turn covered by a second perforated intermediate panel 23, which in principle has the same shape as the first centre panel 19 and is made of the same material, namely fibreboard with an average density.

[0064] On top of this second intermediate panel 23, the springs 24 are provided which are insulated in relation to one another by air cavities 7 and which also have a hollow structure on the inside filled with air which also functions as an additional air cavity (not represented in detail).

[0065] The whole is covered with a second foam layer 27, and further surrounded by a sound-absorbing foam layer 21 which envelopes the whole, together with a sound-permeable fabric 11 which has a more protective and decorative function.

[0066] Such a construction not only makes it possible to efficiently absorb and dampen sound waves, but also to provide the sound-absorbing part of the bed 1 according to the invention with an adapted shape and with external protection.

[0067] Figure 10 schematically shows a bottom view of the bedstead 2 represented in figure 9, seen in perspective.

[0068] In this figure we see the frame 17, the air cavity 7, a perforated centre panel 19, a sound-absorbing foam 20 and the rear panel 18 which, as opposed to in the above-described embodiments and figures, is also perforated here.

[0069] Figure 11 represents a more detailed section of a sound-absorbing part of a bed 1 according to the invention.

[0070] The principle of a bed 1 according to the invention is once more represented here in a simplified manner.

[0071] A wooden frame 17 is covered at the bottom by a rear panel 18 which is made for example of fibreboard with an average density.

[0072] At some height from the bottom plate, a perforated centre panel 19 is provided in the frame 17 over the entire surface on which rests a sound-absorbing foam 20.

[0073] The latter foam 20 is in turn covered with a sound-absorbing foam layer 21 and a sound-permeable fabric layer 11 enveloping the front of the sound-absorbing structure on the outside, such that, apart from an efficient sound absorption also an aesthetic design and protection are obtained.

[0074] Figure 12 schematically represents a cross section according to line XII-XII in figure 8 of a sound-absorbing part of a bed 1 according to the invention so as to better illustrate the sound-absorbing principle of a sound-absorbing part of a bed 1 according to the invention which makes use of a sound-absorbing material 20

and an air cavity 7.

[0075] The structural elements as described in the preceding preferred embodiments and as represented in the figures are again represented here, in particular the frame 17, the perforated centre panel 19, this time provided with the openings 26, the sound-absorbing foam 20, the air cavity 7, the surrounding sound-absorbing foam layer 21, and the surrounding protective and embellishing fabric 11.

[0076] In this preferred embodiment, however, parallel and at some distance from the bottom panel 18, a second air cavity 25 is formed between the surrounding sound-permeable fabric 11 and the bottom plate 18.

[0077] The practical working principle of a sound-absorbing part of a bed 1 according to the invention whereby sound-absorbing material, in this case sound-absorbing foam 20, a sound-absorbing foam layer 21 and an air cavity 7, a second air cavity 25 respectively, work in conjunction with one another so as to obtain the desired sound-absorbing and/or sound-damping effect, is as follows.

[0078] The sound waves coming from a sound source and represented by 9 penetrate through the sound permeable fabric 11 into the sound-absorbing foam layer 21 and the sound-absorbing foam 20.

[0079] The sound waves are partly absorbed here and their energy is transformed into heat.

[0080] The sound-absorbing foam layer 21 and the sound-absorbing foam 20, mainly depending on their respective composition and thickness, hereby in particular absorb the sound waves having a higher frequency.

[0081] Part of the sound waves which penetrate through the sound-absorbing foam 20 hereby hit the solid parts of the perforated centre panel 19 and are reverberated in the sound-absorbing foam 20, whereby their energy is again transformed into heat.

[0082] Another part of the sound waves which can penetrate further through the perforations 26 of the perforated centre panel 19 finally end up in the air cavity 7.

[0083] This air cavity 7, together with the rear panel 18, provides for a further absorption of the remaining sound waves.

[0084] This is realised as the energy of the sound waves is to a large extent conversed into heat in the air cavity, or as the sound waves 9 hit the rear panel 18.

[0085] According to the invention, the air cavity 7 is extremely well fit for absorbing sound waves 9 with a low frequency.

[0086] A part of the sound waves 9 which hit the rear panel 18 are reverberated back into the sound-absorbing foam 20, whereby also these reverberated sound waves are efficiently absorbed in the sound-absorbing foam 20.

[0087] Should a final part of the sound waves 9 nevertheless penetrate through the rear panel 18, they would then be attenuated in the second air cavity 25 formed by the rear panel 18 and the fabric 11, whereby the energy, as mentioned above, is transformed into heat.

[0088] In practice, it was shown that preferred embodiments according to the invention, based on the aforesaid principle, indeed have a maximal sound absorption over a bandwidth that is as wide as possible.

[0089] The sound-absorbing material that can be used is not restricted to the use of felt or an accoustic foam with an open cell structure according to the invention, but, as mentioned above, any material whatsoever or a composition of any material whatsoever having sound-absorbing qualities and thereby co-operating with an air cavity can be used according to the invention.

[0090] The present invention is by no means restricted to the embodiments described above and represented in the accompanying drawings; on the contrary, an improved bed 1 according to the invention can be made in all sorts of shapes and dimensions while still remaining within the scope of the invention.

Claims

1. Improved bed, **characterised in that** it is at least partly made of a sound-absorbing material (6) and **in that** it is provided with an air cavity (7) working in conjunction with the latter.

2. Improved bed according to claim 1, **characterised in that** the air cavity (7) is formed of one or several air slots.

3. Improved bed according to claim 1, **characterised in that** the air cavity (7) is formed of hollow spaces filled with air.

4. Improved bed according to claim 1, **characterised in that** the sound-absorbing material (6) is formed of a natural material.

5. Improved bed according to claim 4, **characterised in that** said natural material has a fibre structure.

6. Improved bed according to claim 4, **characterised in that** the natural material has an open cell structure.

7. Improved bed according to claim 1, **characterised in that** the sound-absorbing material (6) is formed of a plastic.

8. Improved bed according to claim 7, **characterised in that** the plastic is formed of non-woven polyester fibres with fire-retardant qualities and a fine fibre structure.

9. Improved bed according to claim 8, **characterised in that** the plastic is Safe-T-Sound from the Libeltex company.

10. Improved bed according to claim 7, **characterised**

in that the plastic is a foam (20,21) with an open cell structure.

11. Improved bed according to claim 10, **characterised in that** the foam (20,21) is a polyether polyurethane foam.

12. Improved bed according to claim 10, **characterised in that** the foam (20,21) is a polyimide foam.

13. Improved bed according to claim 10, **characterised in that** the foam (20,21) is formed of a melamine formaldehyde sodium bisulphite copolymer.

14. Improved bed according to claim 1, **characterised in that** at least the sound-absorbing material (6) has fire-resistant and/or fire-retardant qualities.

15. Improved bed according to claim 1, **characterised in that** the sound-absorbing material (6), when exposed to high temperatures, has a low smoke development and low toxic gas production.

16. Improved bed according to claim 1, **characterised in that** the sound-absorbing material (6) is composed of different layers.

17. Improved bed according to claim 16, **characterised in that** the different constituent layers have different sound-absorbing and/or sound-reverberating qualities which complete one another.

18. Improved bed according to claim 1, **characterised in that** the part of the bed (1) which is made of a sound-absorbing material (6) is provided at the head (3) and/or at the foot (14) of the bed (1).

19. Improved bed according to claim 16, **characterised in that** it comprises a bedstead (2) which is provided with a headboard (4), footboard (13) respectively at the head (3) of the bed (1), foot (14) of the bed (1) respectively, which is at least partly made of a sound-absorbing material (6).

20. Improved bed according to claim 19, **characterised in that** the headboard (4) and/or footboard (13) is provided with at least one crosswise directed part (10) situated above and/or next to the head (3), foot (14) of the bed (1) respectively.

21. Improved bed according to any one of the preceding claims, **characterised in that** it is made as a four-poster bed (15) whose canopy (16) is at least partly made of a sound-absorbing material (6) and works in conjunction with an air cavity (7).

22. Improved bed according to any one of the preceding claims, **characterised in that** the sound-absorbing material (6) is at least partly made of an accoustic foam (20,21) with an open cell structure.

23. Improved bed according to claim 1, **characterised in that** the sound-absorbing material (6) is at least partly made of felt.

24. Improved bed according to claim 23, **characterised in that** the felt is lamellated and thus is formed of parallel strips (8) in between which is provided an air cavity (7) in the form of an air slot.

25. Improved bed according to any one of the preceding claims, **characterised in that** the sound-absorbing material (6) is such that, in co-operation with the air cavity (7), it reduces the noise level with more than one decibel, better still with at least three decibels, preferably with at least six decibels.

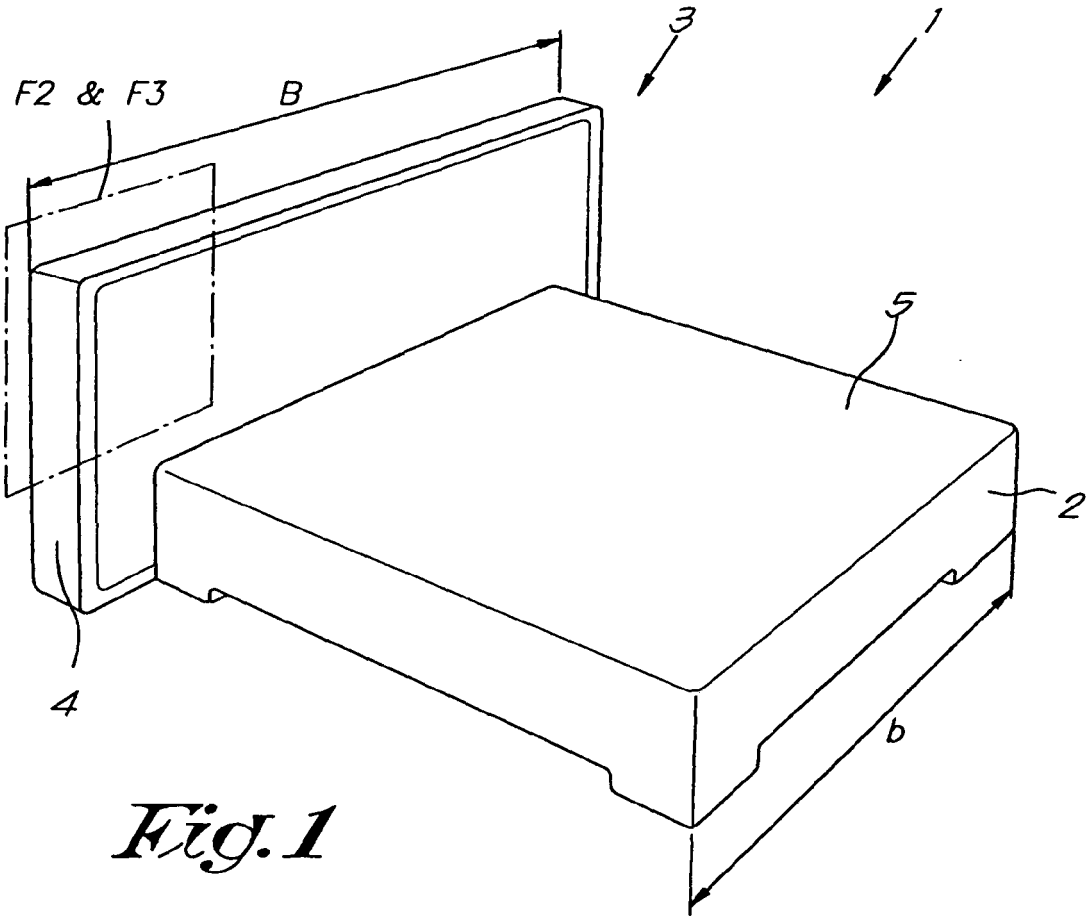

Fig.1

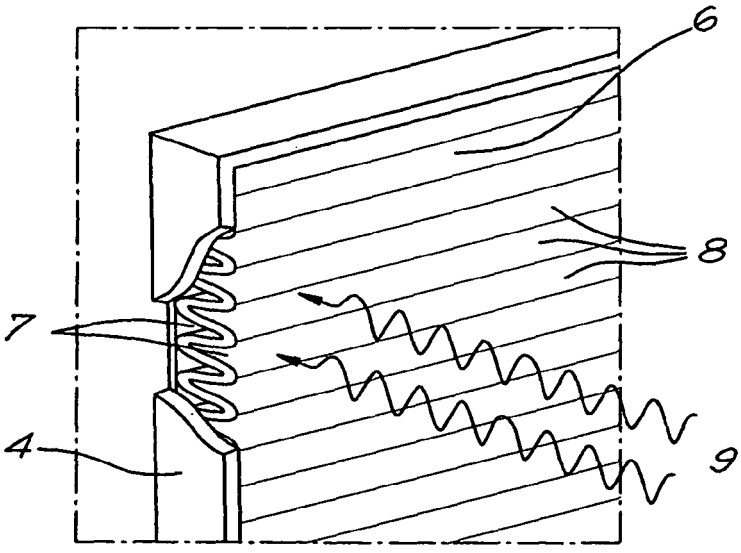

Fig.2

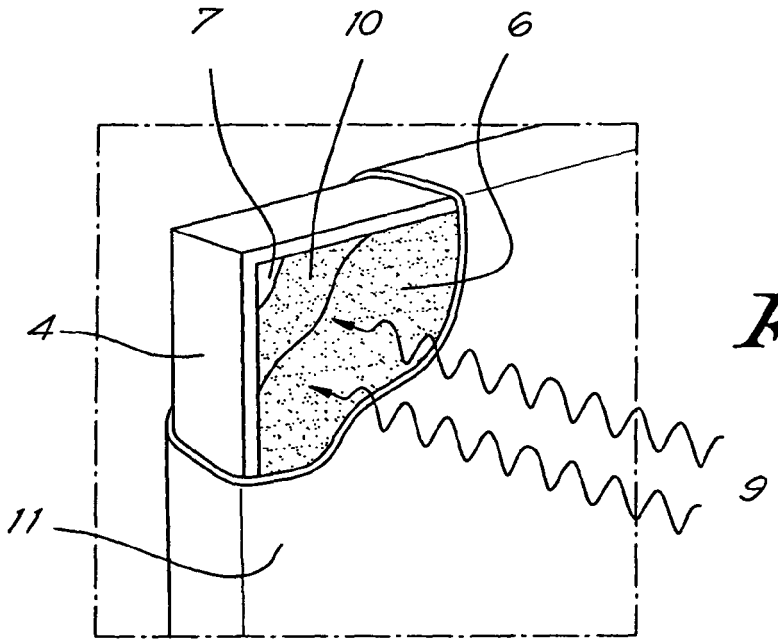

Fig.3

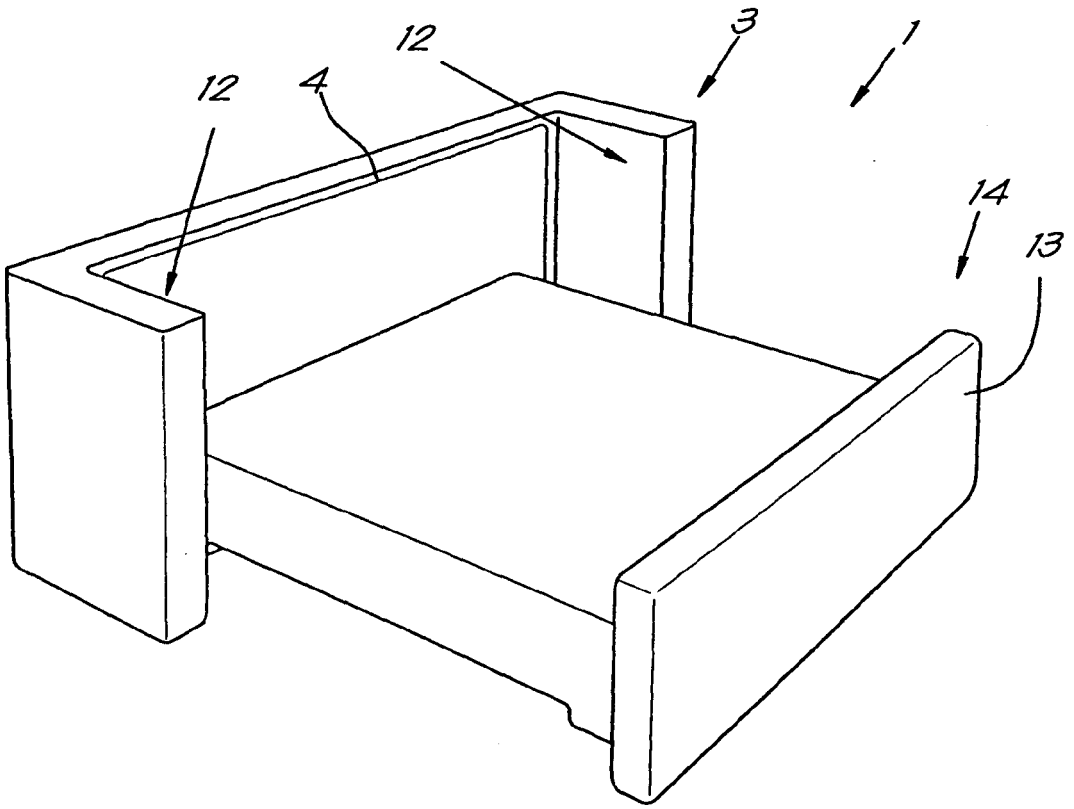

Fig.4

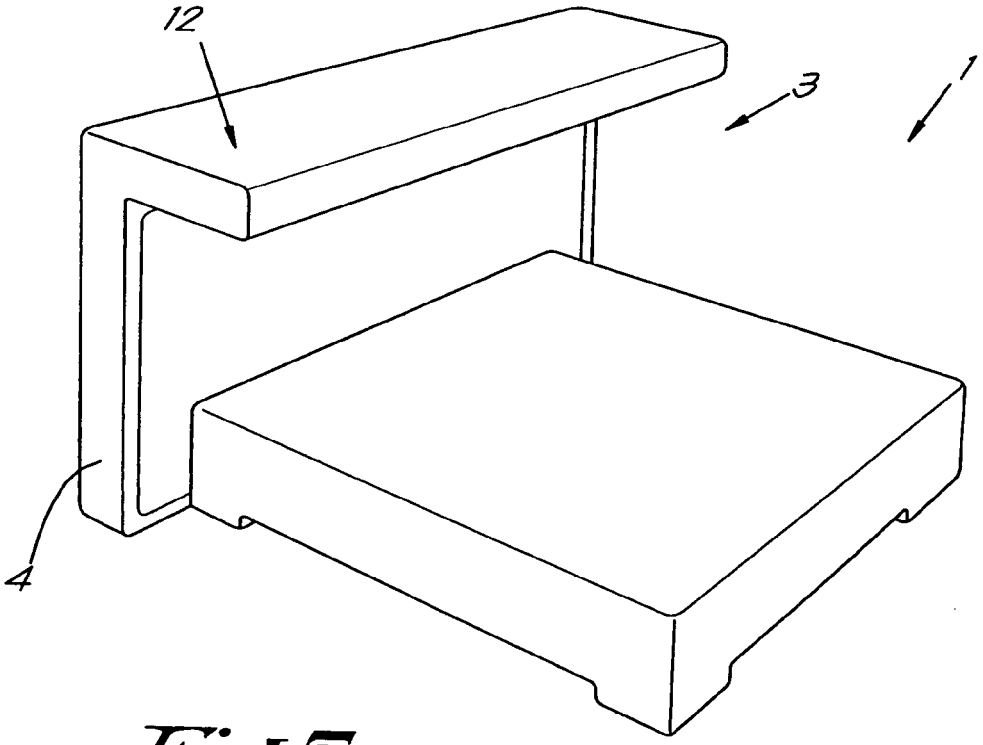

Fig.5

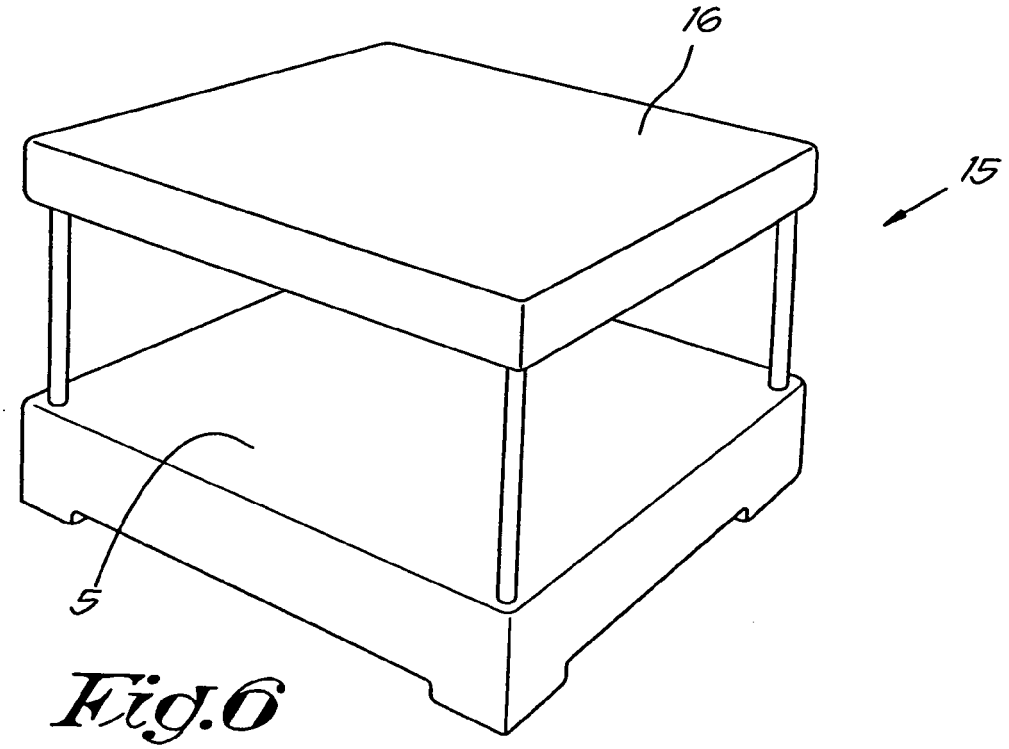

Fig.6

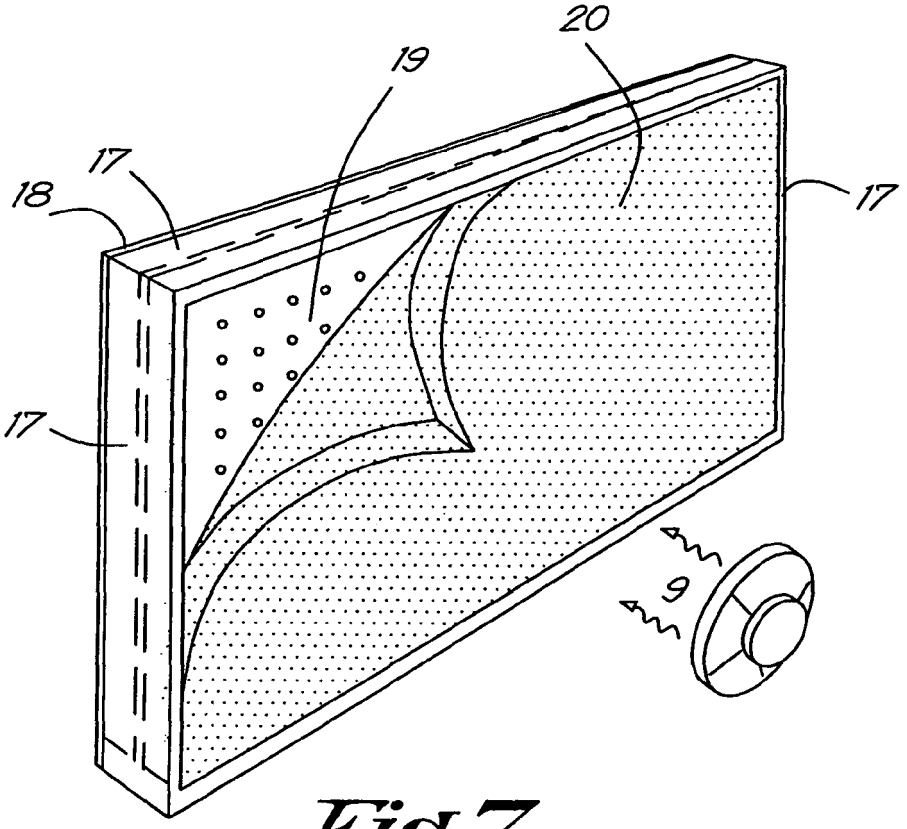

Fig.7

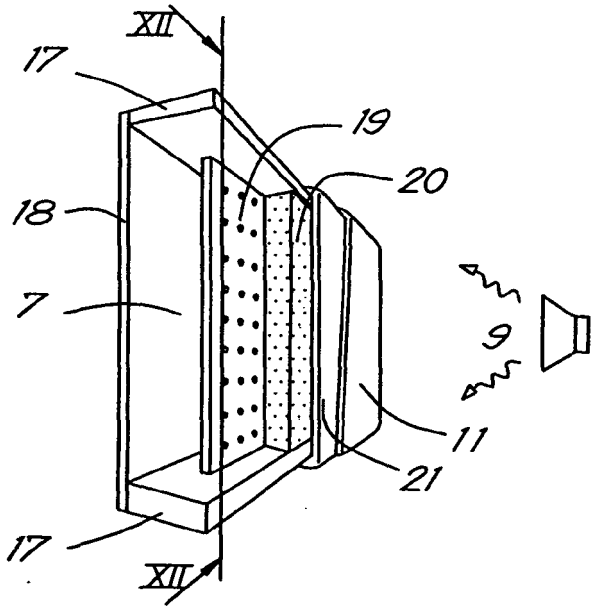

Fig.8

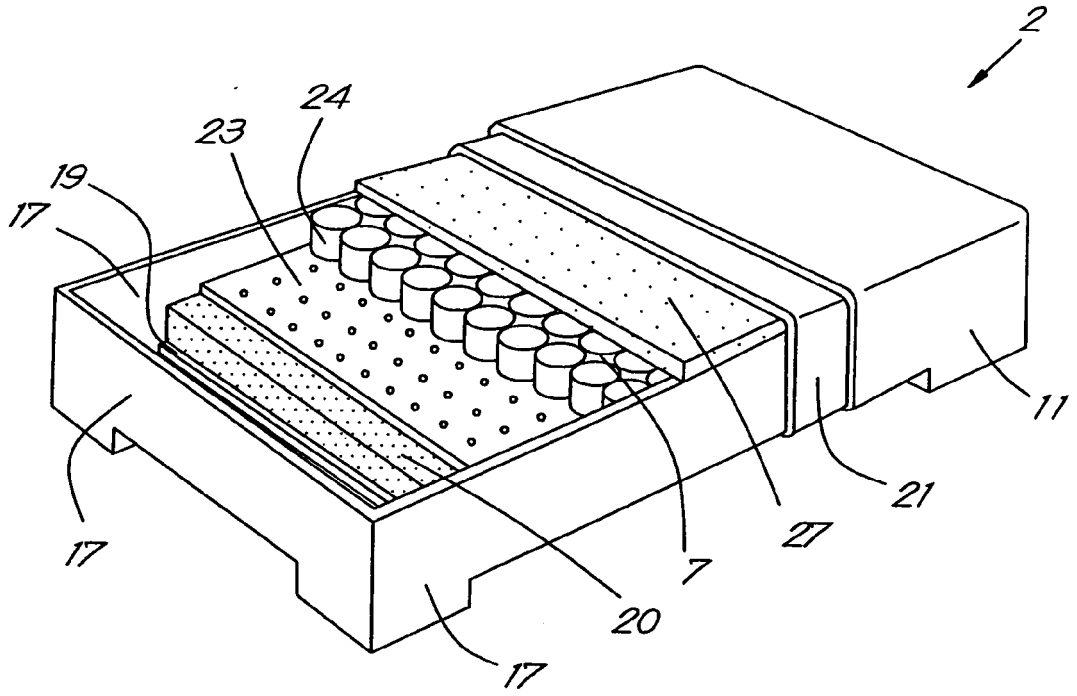

Fig.9

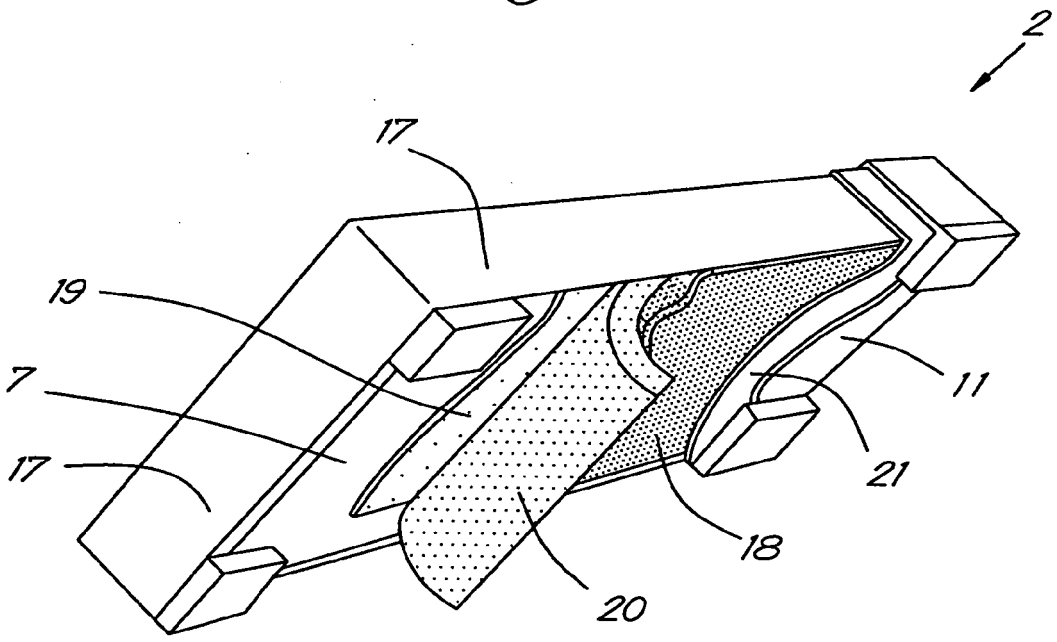

Fig.10

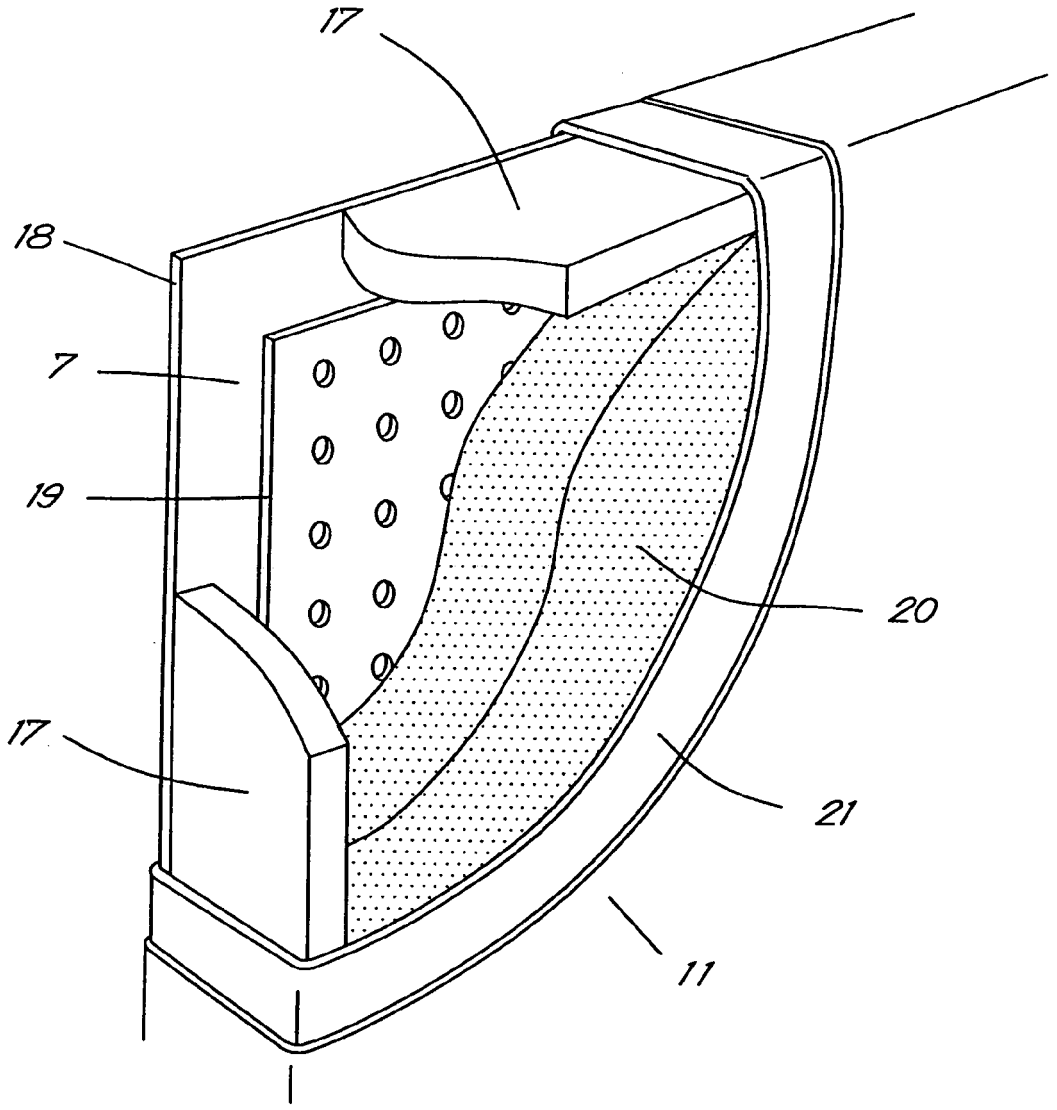

Fig.11

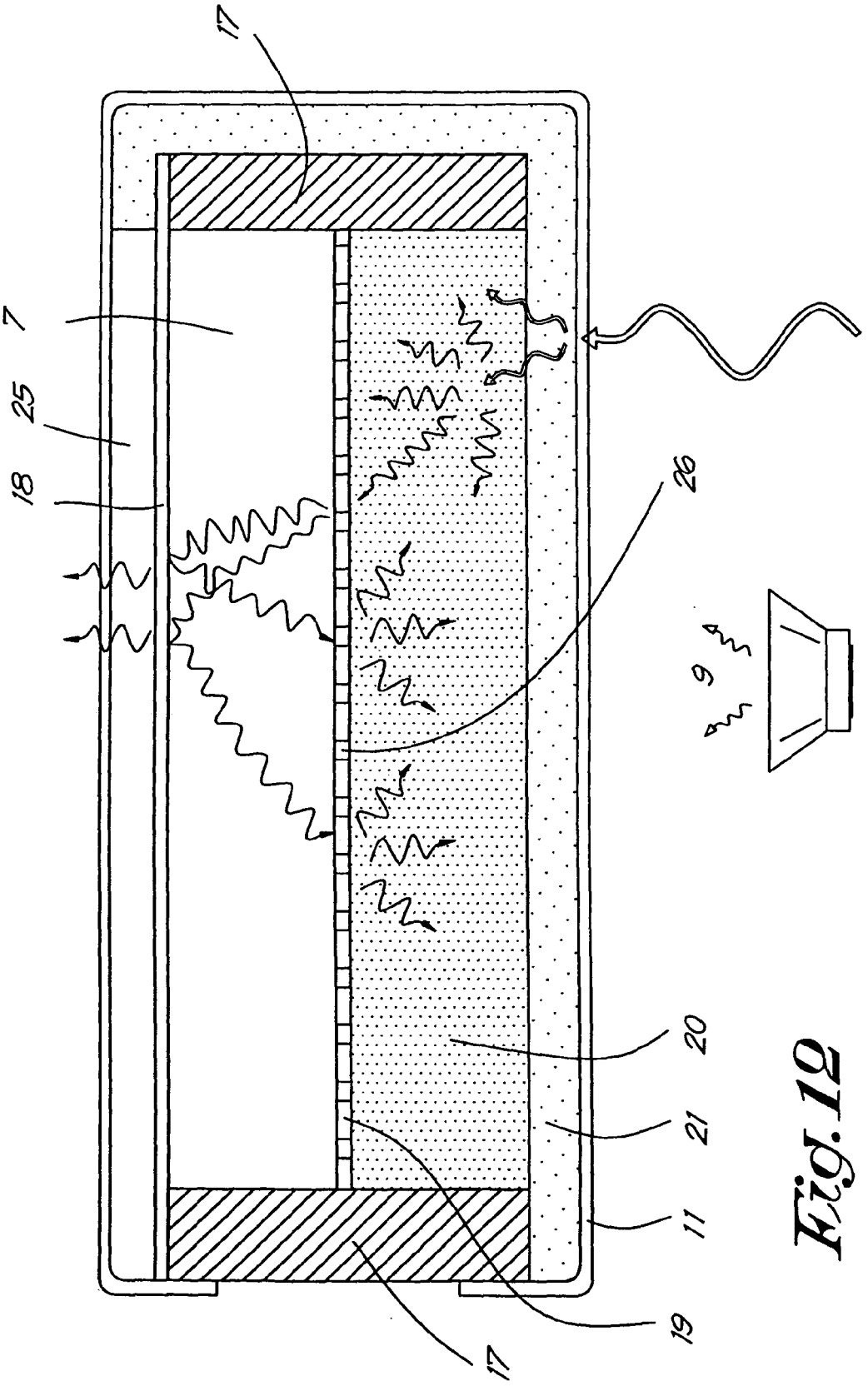

Fig. 10