(12) UK Patent Application (19) GB (11) 2 173 447 A

(43) Application published 15 Oct 1986

(21) Application No 8508052

(22) Date of filing 28 Mar 1985

(51) INT CL⁴
B32B 3/18 3/12

(52) Domestic classification (Edition H):
B5N 0312 0318 0322

(56) Documents cited
GB 1001115 GB 0591772

(58) Field of search
B5N
Selected US specifications from IPC sub-class B32B

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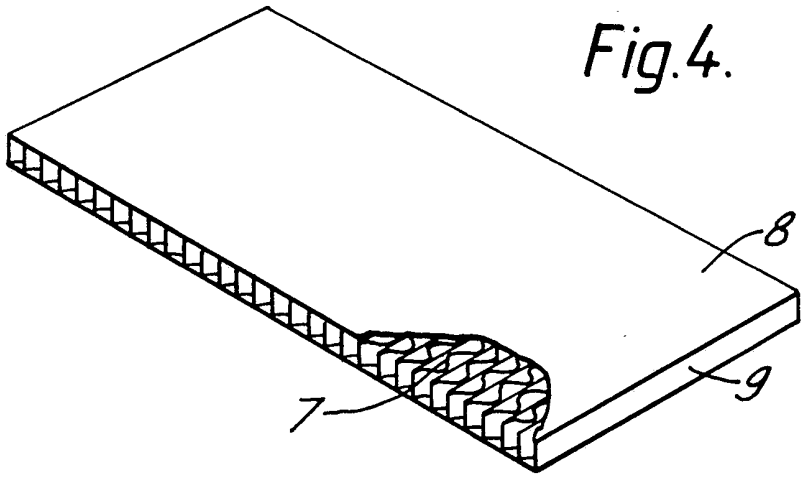
(54) Panel material

(57) Panel materials are described including a core material 7 laminated between a facing panel 8 and a backing panel 9. The core is in the form of a set of strip units with the width of each strip extending between the facing and backing panels. Each strip is a strip of corrugated card with the corrugations extending from one panel to the other. The corrugated card may have one or two paper facings.

Fig.4.



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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

Fig.1.

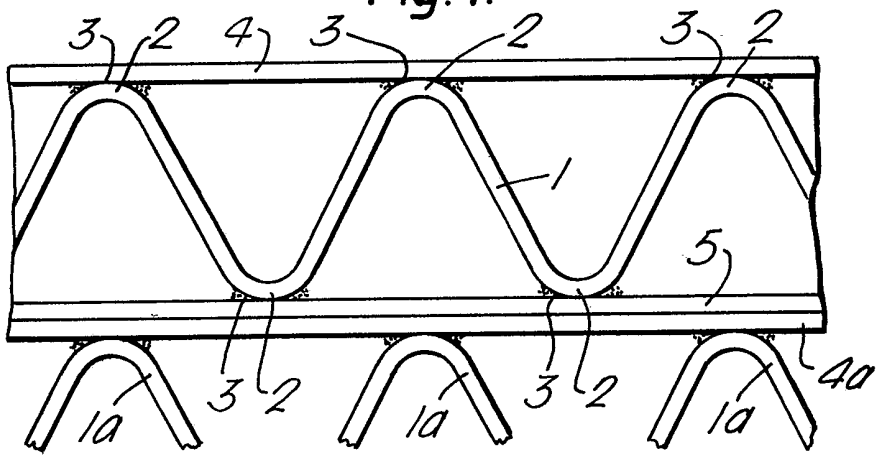


Fig.2.

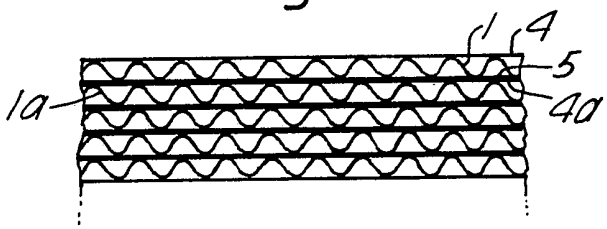


Fig.3.

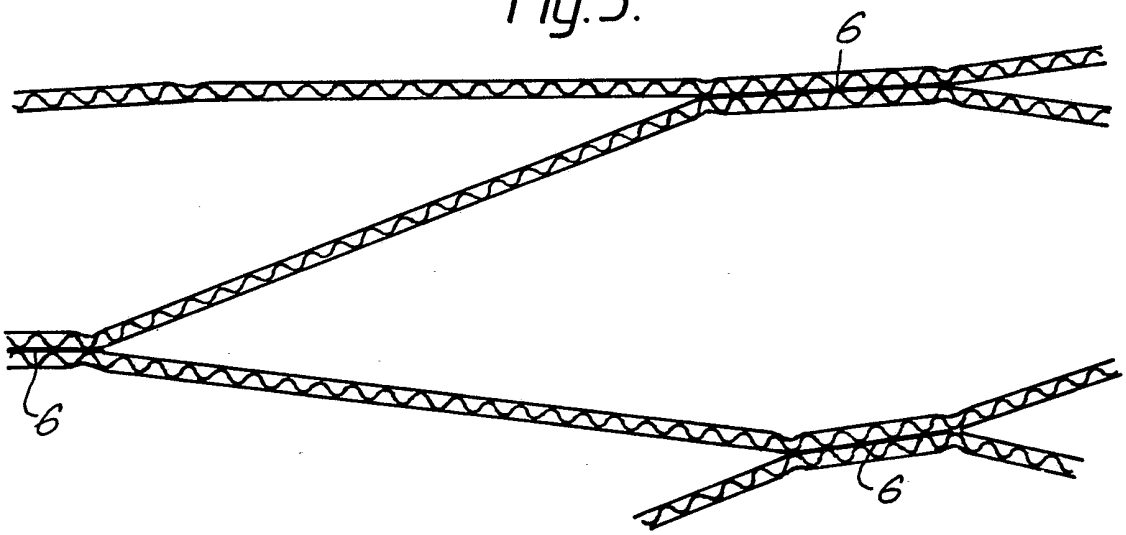


Fig.4.

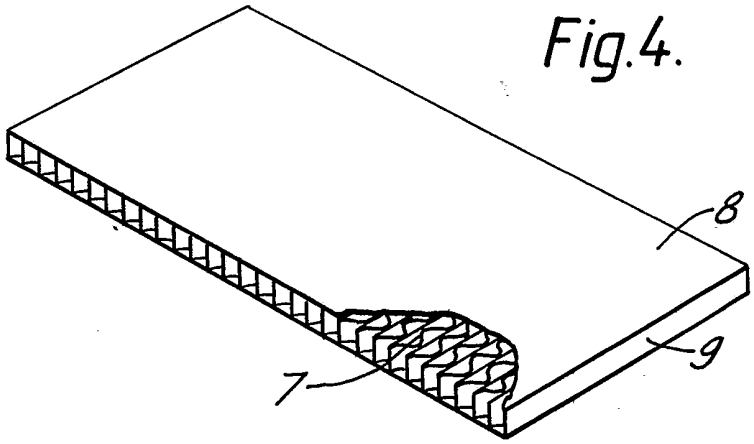
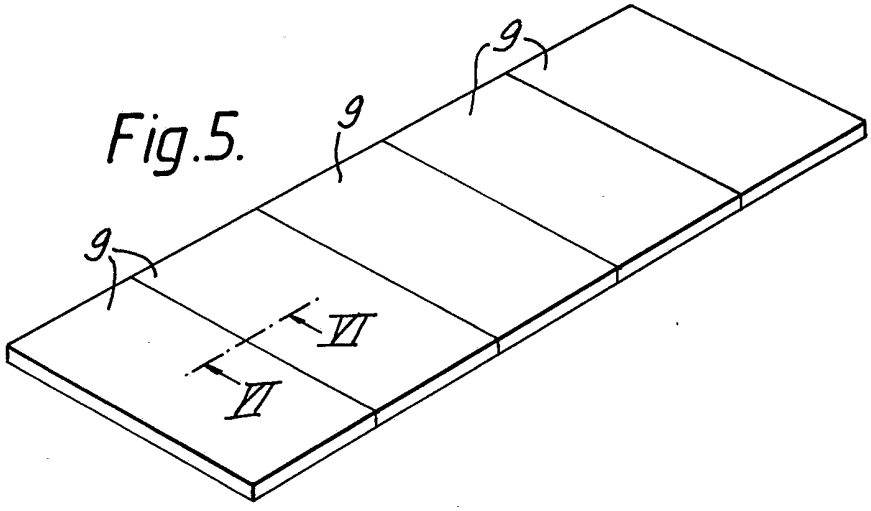


Fig.5.



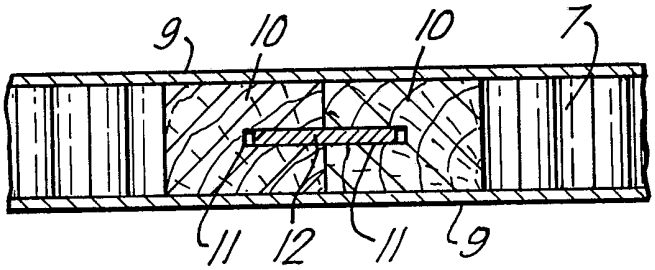


Fig.6.

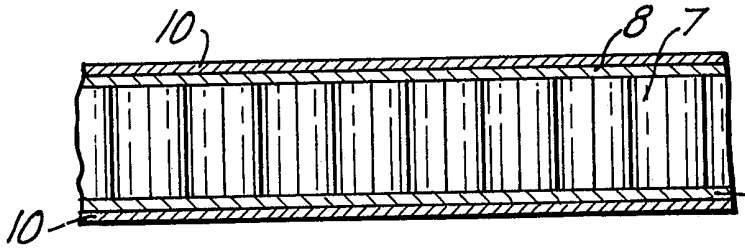


Fig.7.

SPECIFICATION

Panel material

The present invention relates to panel material and has an object the provision of a panel material of a type which has a wide range of applications attributable to its versatile form.

In accordance with the invention there is provided a panel material of the sandwich structure type which comprises a core material laminated between a facing panel and a backing panel, said core material being in the form of a set of strip units each one of which extends, in its width direction, between the facing panel and the backing panel and is formed of corrugated card in which the individual corrugations extend in said width direction, each of said strips being laminated, by the crests of its corrugations between a pair of facings of paper or other flexible planar material and the facings of those of the strips which are positioned between a pair of adjacent strips being secured to the adjacent facings of said pair by an adhesive.

The adhesive may be arranged to secure the said facings together along their length direction in a continuous manner. This arrangement may be adopted when the compressive and/or flexural-strength properties of the core material are required to be at a maximum for the panel material as a whole or in order to enable the facing panel, the backing panel or both to be relatively weak. For example one panel, or both panels may be formed of a decorative material having no significant strength, eg. materials of the wall-paper type including wall-paper having an embossed pattern which causes the paper to yield under tension. Tension is necessarily produced when distorting forces act to produce a curvature.

In another arrangement the adhesive is arranged in separate patches arranged to secure said facings together at intervals along their length direction. This arrangement in many cases depends upon the facing and/or the backing panel, to hold the core material to a required configuration. When desired, the separate patches may be so positioned that at least part of the core material may be expanded to the open cellular state of the structural honeycomb material type. The basic geometry of this type is shown, for example, in Specification No.591,772.

According to one favoured version of the material the panels are configured to provide a length direction and a width direction which is substantially less than the length direction, and the core material is oriented with the individual strips of said set extending in the length direction. This version is especially suitable for the construction of load-bearing shelves and other components of non-standard length. Jointing the facing panels is an operation which can be carried out in a simple manner without producing significant weakness. The same applies to the core material but, of course, jointings thereof should be displaced from jointings of the facings.

In the formation of the panel material of the invention, at least one of the panels may be formed *in situ*, an especially useful technique being formation by the wet lay-up method. This method is readily applied when at least one of the panels is formed of a fibrous material bound by a resinous material cured *in situ*.

Having each of the corrugated strips laminated between a pair of facings instead of to a single facing on one side only, increases the strength of the strips in compression, torsion or flexion.

Additionally the arrangement increases the area available for adhesive employed to secure the strips together in face-to-face relationship. The increase facilitates joining the strips together by separate patches of adhesive as referred to above. The patches can be made smaller, and/or spaced apart at greater intervals, than is practical with corrugated material faced on one side only. This facilitates arranging the patches to give a material of the structural honeycomb type and enables the cell-size thereof to be large with consequent economy of material. Briefly, a stronger structure is obtained for a given patch size.

Further, when the core material is laminated to a facing material the two facings as well as the corrugated material, are available for adhesion to the panel material. This facilitates the lamination. Thus, if the lamination is by an applied adhesive, discontinuities of the application can be tolerated (thereby simplifying the production of large laminates) or if the lamination is by the application of a wet lay-up composition the adhesive properties of the composition have a reduced importance and the composition can be selected mainly for its own tensile properties. The requirement for adhesion in the strict sense is minimal. It can be largely replaced by penetration of a wet lay-up material into the ends of the passages defined by the corrugations and their facings. Having these facings on both sides of the corrugated material doubles the number of these passages.

Otherwise expressed, a penetrating composition keys into the passages. The bonding of the composition to the core material bounding the passages tends to be subject to mechanical stress only in the direction of the faces of the core material and any peeling action is negligible or non-existent.

Preferred types of wet lay-up material consist of a liquid resinous material eg. of the polyester or epoxide type, a catalyst and a filler. A filler of the fibrous type is normally preferred, eg. glass fibre or asbestos. Other fibrous fillers are cotton, wool, hemp or other natural products. Steel wool may be employed

if desired. The catalyst may be of the cold-cure type. Hot-cure catalysts may be employed where speed is required, eg. for bulk production.

The facing panels do not necessarily have to provide a finish on both sides of the product. In one arrangement, at least one side of the core material is secured by an adhesive to hardboard, metal or other sheeting and the other face of the sheeting is subsequently covered with a finishing layer, eg. by the wet lay-up method. This arrangement can be very useful in the formation of panelling of large size. For example, the outer faces of a large van or freight container can be clad with a set of separate panels and finished *in situ* to provide a joint-free outer face by the wet lay-up method. This method of construction has the advantage that it enables sheet material such as hardboard, plywood or metal to be employed in readily available sizes and thicknesses. The inner faces may be clad and finished similarly to provide a clean hygenic surface.

The core provides a high fluxural strength in the finished product and, for a given amount of core material, this applies especially to a core material expanded to an open cellular state as aforesaid.

The following description in which reference is made to the accompanying drawings is given in order to illustrate the invention.

In the drawings:

Figure 1 shows part of a core material,

Figure 2 shows a larger part of the core material on a smaller scale than Fig. 1.

Figure 3 shows part of a core material in which the strip units are secured together by patches of adhesive arranged to permit expansion of the material to an open cellular state as aforesaid.

Figure 4 shows the core material of Figs. 1 and 2 laminated between facings to form a structural unit.

Figure 5 shows a set of laminates joined together in an assembly.

Figure 6 is a cross-section taken at VI---VI of Fig. 5 on an enlarged scale.

Figure 7 is a side elevation of part of a piece of finished panelling.

The core material of Fig. 1 is formed from corrugated card 1, the crests 2 on each side of which are secured by an adhesive 3 to sheets of card 4 and 5 to form a composite layer. Sheet 4 bounds one side of the material and sheet 5 is secured by an adhesive (not shown) to sheet 4*a* of an adjacent composite layer which includes corrugated card 1*a*. The number of composite layers depends upon requirements. Their relationship is shown in Fig. 2 which shows the first five layers of a core. More, usually many more, layers are involved in practice.

The cards 4 and 4*a* may be joined by a continuous layer of adhesive or by an adhesive distributed in patches or in parallel bands 6. In the arrangement shown in Fig. 3, the bands are so arranged that the core material may be expanded to an open-cellular state as shown. Thus the core material is a form of structural honeycomb material which provides a product of flexural strength, adequate for many purposes when laminated between facing panels.

For some purposes, it is useful to use the core material in an unexpanded state, for which purpose it is, of course, not necessary to arrange the adhesive to permit expansion. As an example, there may be mentioned the construction of billiards (pool) table beds. A good playing surface may be achieved by laminating the unexpanded core material, or core material with only a minor degree of expansion, with a layer of hard material—eg. hardboard—and covering the hard material with a playing cloth of the normal type. The core material and the layer laminated thereto provide a reasonable substitute for the customary slate bed, at least on tables of small size.

In Fig. 4, is shown a panel having a core material 7 according to Figs. 1 to 3, laminated between two hardboard facings 8 and 9. Core material 7 may be of the expanded type shown in Fig. 3 or it may be unexpanded. A series of the panels when mounted together as shown in Fig. 5 may be clad with a wet lay-up material as referred to hereinbefore, or with metal sheeting or foil which can be obtained in larger pieces than are available with many panel materials eg. hardboard or plywood.

To facilitate joining the panels together, wooden or other inserts 10 (Fig. 6) may be provided between the edge regions of the panels as shown in Fig. 6. An adhesive may be used to join the insets together or the inserts may be formed with grooves 11 and joined by an insert of the tongue type 12 which may be force-fitted or glued into position.

As shown in Fig. 7, the two surfaces of the panels of Figs. 4 to 6 may, after being faced with plywood, hardboard, metal or other sheeting 8 & 9, be finished with a surfacing material 10, eg. by the wet-lay up method.

It will be understood that the foregoing description of specific forms of construction is given for purposes of illustration only and that various departures may be made therefrom without departing from the scope of the invention. For example, the core material 7 of Fig. 4 may be of the expanded type shown in Fig. 3 and/or the strips may run in the length direction, the choice of direction depending upon the required load bearing performance. Where desired, at least some of the corrugated strips may be faced by a single plain strip.

CLAIMS

1. A panel material of the sandwich structure type which comprises a core material laminated between a facing panel and a backing panel, said core material being in the form of a set of strip units each one of which extends, in its width direction, between the facing panel and the backing panel and is formed of corrugated card in which the individual corrugations extend in said width direction, each of said strips being laminated, by the crests of its corrugations to a single facing or between a pair of facings of paper or other flexible planar material and the facings of those of the strips which are positioned between a pair of adjacent strips being secured to the adjacent facings or strips of said pair by an adhesive.

2. A panel material according to Claim 1 wherein the adhesive is arranged to secure the core facings together along their length direction in a continuous manner.

3. A panel material according to Claim 1 or Claim 2 wherein one of both of the facing and backing panels are formed of a decorative material having no significant strength.

4. A panel material according to any one of Claims 1 to 3 and formed into panels configured to have a length direction and a width direction substantially less than the length direction, the core material being oriented with the individual strips of the set of strip units extending in the length direction.

5. A panel material according to any one of Claims 1 to 4 and formed by a wet lay-up method.

6. A panel material according to Claim 5 wherein the wet lay-up method included the use of a wet lay-up material consisting of a liquid resinous material, a catalyst and a filler.

7. A panel material according to any one of the preceding Claims wherein at least one side of the core material is secured by an adhesive to hardboard, metal or other sheeting and the the outer face of the sheeting is covered with a finishing layer.

8. A panel material according to anyone of the preceding Claims wherein the core material is expanded to an open-cellular state.

9. A panel material substantially as hereinbefore described with reference to the accompanying drawings.

Printed in the United Kingdom for
Her Majesty's Stationery Office, Dd 8818935, 1986, 4235.
Published at The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.