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PANEL WITH CELLULAR INSIDE STRUCTURE

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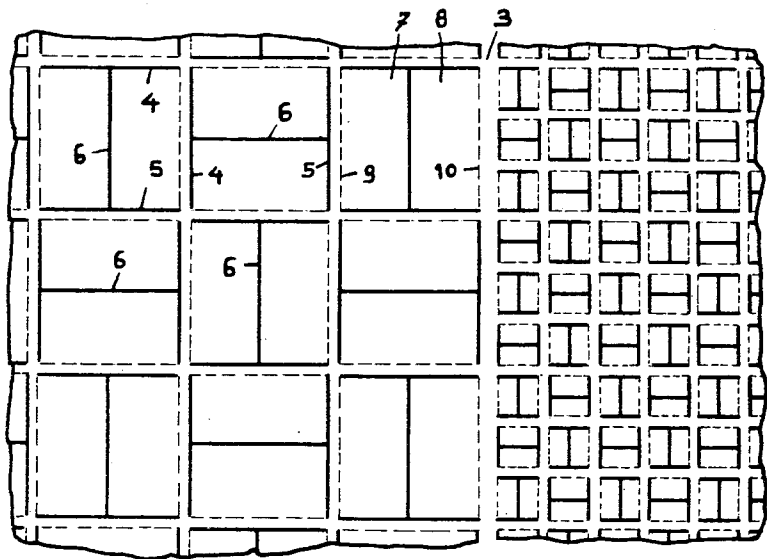


Fig 1

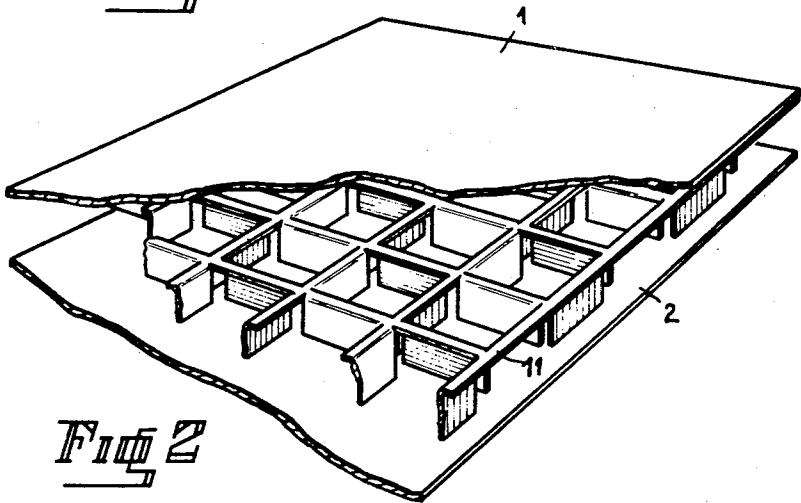


Fig 2

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PANEL WITH CELLULAR INSIDE STRUCTURE
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6 Claims. (Cl. 154—45.9)

The invention relates to a panel with cellular inside structure, consisting of two outer plates which are spaced by an inside work sandwiched between and attached to these outer plates.

Such panels may be used for the manufacture of containers for insulation purposes and the like. The best known kind is the corrugated cardboard which is provided with two outer plates having between them a third plate bent according to an undulating line. This material is extremely suitable for package because in relation to the weight of the material it is relatively solid and therefore relatively cheap. Also the wave acts more or less shock-absorbing. The solidity of corrugated cardboard, however, transverse of the longitudinal direction of the waves is much larger than in the direction of the waves.

Owing to the waves the inner plate has a much greater length than the outer plates and hence requires relatively much material.

Besides by the mechanical production of the undulation relatively high requirements have to be put to the flexibility and the thickness of the material.

It is also known to manufacture panels, in which between two plates zigzag strips are placed on edge, so that honey-comb-like cells are produced. This method is not very feasible, because it is very laborious and cannot be applied continuously on a machine. The purpose of the invention is to provide a panel in which the above mentioned drawbacks do not occur and larger possibilities are present in which:

(a) No more material is required than the surface of the outer sheets or plates.

(b) The inner plate may be made of material, which makes less demand with regard to the flexibility and thickness and therefore may be readily made of cheap straw board.

According to the invention this is possible in that the walls of the cells are cut from a flat inner plate and bent to tongues, the ends of the tongues being glued to one of the outer sheets or plates and the face of the inner plate from which the tongues are bent being glued to the other outer plate.

Moreover, this has the advantage that the solidity is equal vertically as well as horizontally and that it is possible to bring about an air circulation in the packed material by perforating the outer sheets or plates, which is of importance when packing perishable goods.

It is preferred to make the length of the tongues larger than the width of the remaining part of the inner plate at the place of the root of the tongue. The lips are formed by H-like incisions which are so arranged that the connecting beams of the H-shape are perpendicular to the connecting beams of the adjacent H-shapes and that the ends of the adjacent H-like incisions at the root of the tongues are spaced.

Owing to this the air circulation becomes possible, because the tongues do not meet and thus allow the passage of an air stream and consequently the perforations in the outer plates need not be opposed.

The invention will be elucidated by an embodiment shown in the drawing.

FIG. 1 is a plan view of the innerplate provided with incisions.

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FIG. 2 is a diagrammatic view of the panel according to the invention, a part of an outer sheet or plate being removed.

The panel consists of two outer sheets or plates 1 and 2 as well as an inner plate 3. In the inner plate H-like incisions with two side-legs 4 and 5 and a central beam 6 are made. The H-like incisions are so arranged that the central beams 6 are perpendicular to each other. Dependent on the thickness of the panel larger or smaller incisions may be applied, as shown in FIG. 1.

By the H-like incisions two tongues 7 and 8 are produced which are bent along a bending-line 9 and 10 respectively, as shown with dotted lines. As appears from FIG. 1 the incisions 4 and 5 are spaced from the bending-line 9 of the adjacent H-like incisions. By this after bending the tongues outwardly flat portions are obtained in the shape of a square, as shown by 11 in FIG. 2. The tongues are bent outwardly in pairs and bear with their ends on the lower sheet or plate 2, the upper sheet or plate 1 lying on the parts 11.

The incisions and the bent tongues may be made entirely automatically. As appears from FIG. 2 relatively large thickness of panels can be employed without using more material than for the surface of the outer sheets or plates. The tongues 7 and 8 are glued with their ends to the lower sheet 2, whilst thereupon the upper sheet 1 is glued to the inner plate. Also the glueing may be done continuously, the three sheets or plates being unwound from rolls. It is possible to first bend the ends of the tongues and then glue them to the sheet or plate 12 if cells with large width are desired with a comparative thickness of the panel. It is possible to fill the cells with sound-proof and heat-insulating material before the application of the upper sheet or plate 1.

The panels may be used for the same purpose as corrugated cardboard, e.g. for packing purposes, insulation and the like.

We claim:

1. A method of forming a cardboard panel structure comprising the steps of: making H-shaped incisions each forming two tongues in a first flat sheet of cardboard, each said H-shaped incision being oriented such that the connecting beam of said H-shaped incision is always substantially perpendicular to connecting beams of adjacent H-shaped incisions; bending said tongues in a first direction to project in substantially perpendicular positions with respect to said first sheet of cardboard; fastening a second sheet of cardboard to the side of said first sheet opposite said projecting tongues; and adhesively securing a third sheet of cardboard to the extremities of said projecting tongues.

2. A method of forming a cardboard panel structure comprising the steps of: making a pattern of H-shaped incisions each forming two tongues in a first flat sheet of cardboard, each said H-shaped incision being oriented in said pattern such that the connecting beam of said H-shaped incision is always substantially perpendicular to connecting beams of adjacent H-shaped incisions, and laterally and longitudinally extending parallel uncut strips remain; bending said tongues in a first direction to project in substantially perpendicular positions with respect to said first sheet of cardboard; fastening a second sheet of cardboard to the side of said first sheet opposite said projecting tongues; and adhesively securing a third sheet of cardboard to the extremities of said projecting tongues.

3. A method of forming a cardboard panel structure comprising the steps of: making a pattern of H-shaped incisions each forming two tongues in a first flat sheet of cardboard, each said H-shaped incision being oriented in said pattern such that the connecting beam of said H-shaped incision is always substantially perpendicular to

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connecting beams of adjacent H-shaped incisions, and laterally and longitudinally extending parallel uncut strips remain; forming said H-shaped incisions such that said tongues are longer than the remaining strips; bending said tongues in a first direction to project in substantially perpendicular positions with respect to said first sheet of cardboard; fastening a second sheet of cardboard to the side of said first sheet opposite said projecting tongues; and adhesively securing a third sheet of cardboard to the extremities of said projecting tongues.

4. A panel structure comprising three sandwiched cardboard sheets; a middle sheet of said sandwich having a plurality of tongues projecting substantially perpendicularly therefrom; said tongues being formed from a plurality of H-shaped incisions in said middle sheet and oriented in a pattern such that the connecting beam of any H-shaped incision is always substantially perpendicular to connecting beams of adjacent H-shaped incisions; a first outside sheet of said sandwich being adhesively secured to the ends of said projecting tongues; and a second outside sheet of said sandwich being secured to a side of said middle sheet opposite said projecting tongues.

5. A panel structure comprising three sandwiched cardboard sheets; a middle sheet of said sandwich having a plurality of tongues projecting substantially perpendicularly therefrom; said tongues being formed from a plurality of H-shaped incisions in said middle sheet and oriented in a pattern such that the connecting beam of any H-shaped incision is always substantially perpendicular to connecting beams of adjacent H-shaped incisions, and laterally and longitudinally extending parallel uncut strips remain after said tongues are bent to their projecting position; a first outside sheet of said sandwich

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being adhesively secured to the ends of said projecting tongues; and a second outside sheet of said sandwich being secured to a side of said middle sheet opposite said projecting tongues.

6. A panel structure comprising three sandwiched cardboard sheets; a middle sheet of said sandwich having a plurality of tongues projecting substantially perpendicularly therefrom; said tongues being formed from a plurality of H-shaped incisions in said middle sheet and oriented in a pattern such that the connecting beam of any H-shaped incision is always substantially perpendicular to connecting beams of adjacent H-shaped incisions, and laterally and longitudinally extending parallel uncut strips remain after said tongues are bent to their projecting position; said H-shaped incisions being formed such that said tongues are longer than said remaining strips thus providing spacing in excess of the thickness of said middle sheet; a first outside sheet of said sandwich being adhesively secured to the ends of said projecting tongues; and a second outside sheet of said sandwich being secured to a side of said middle sheet opposite said projecting tongues.

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