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DESCRIPTION

TECHNICAL FIELD

[0001] The present invention relates to a panelboard (or board panel) for use in furniture components or partition walls.

BACKGROUND TECHNOLOGY

[0002] A person sometimes wants to have a curved shape on furniture or partition walls. For example, in furniture, a person wants to have a human friendly shape in which the chair seat is fitted to the body, or wants to change the seat shape freely to accommodate the sitting posture. In partition walls, a person wants to have a curved shape, not a flat shape, to reduce acoustic reflections, or for a design friendly to young children and old people (to protect them from injuries from the unexpected wall impact).

[0003] Wall boards made of plywood or plaster boards cannot have curved surfaces. For this reason, panelboards have been bent to provide curved surfaces. Nevertheless, to create a desired shape by bending panelboard craftsmanship was required.

[0004] In order to solve the problem, Patent Document 1 discloses a panelboard on which a curved surface can be formed easily by installing slits that go through the panel in the side direction on the front and back side surfaces of the board panel body made from a foamed resin, and placing the tips of the front side-slit and the back side-slit more toward the inner part than the center of the board thickness.

[0005] However, the board panel disclosed in Patent Document 1 had the following problems: (1) The board panel material is limited only to a foamed resin which provides insufficient strength by itself alone as a construction structure when pressed from the outside; therefore, bent veneers and so on also need to be laminated. (2) Doing so requires much expense in time and effort and craftsmanship. Since the lamination is performed by fixing the outside with bent veneers, the board panel cannot be removed, which is uneconomical. (3) Since slits go through the board panel in the side direction of the board panel, the surface part is a divided rectangle; therefore, even if the front face is made of a hard material such as wood and so on, enough strength cannot be obtained. Patent Document 1: Unexamined Patent Application Publication No. 2009-041302.

[0006] JP 7 119239 A teaches an aerated light-weight concrete panel (ALC panel) consisting of ALC having a metallic net-like core material is integrately arranged in the middle part in the direction of plate thickness. The ALC panel comprises a first slitting group of lines of slittings from one face of the ALC panel reaching the core material and being parallel with each other.

On the opposite face of the ALC panel a second slitting group is correspondingly formed such that the ALC panel is subdivided in elongated portions that extend along the slittings such that the ALC panel can be flexibly bent around the net-like core material. Board panels relevant to the present invention are also known from US 6,148,867 A1 or US 2,397,415 A1.

DISCLOSURE OF THE INVENTION

PROBLEMS THE INVENTION INTENDS TO SOLVE

[0007] The present invention provides a board panel (or panelboard) which is transportable economically in a flat state, and easy to attach and detach, and can provide a curved surface simply while maintaining decoration and strength without craftsmanship.

MEANS TO SOLVE THE PROBLEM

[0008] The present invention is a board panel according to claim 1.

[0009] Here, the "hard material" means the material for which it is difficult to obtain a desired curvature by pressure deformation. Many hard materials such as wood, metal, plastic, and so on are included in the hard materials.

[0010] The "soft material" means the material for which it is easy to obtain a desired curvature by pressure deformation. The soft material includes rubber, many soft synthetic resins and so on. Further, the soft material has elasticity to absorb the pressure (the pressure generated by the weight of a person, for instance, for use in a chair-seat) applied to the surface of the panelboard.

[0011] The "slit" means a band (a line having a width) of groove toward the inside the panelboard when viewed from the outside of the panelboard.

[0012] Slits go through the hard material. Further, since slits have a length of 1/2 to 3/4 of the vertical side and are in the form of upper slits and lower slits, the rectangle has slits on any lines that are in parallel with the horizontal sides of the rectangle; therefore, a curvature can be formed easily in the horizontal direction of the rectangle in the similar manner as Patent Document 1.

[0013] The slits have a length of 1/2 to 3/4 of the vertical side. Any line having a length of 1/2 or more that is in parallel with the horizontal side intercepts with slits. A curvature can be formed in the direction of the horizontal side of the panelboard. The length is 3/4 or less and does not go through the vertical side. As a result, the panelboard of the present invention does

not face the drawback of sacrificing strength of the panelboard disclosed in Patent Document 1. Depending on the application, partial strength enhancement can be made by laminating materials such as veneer, etc. on the stretched surface of plywood, etc. For instance, when used in a chair, considering that the maximum pressure is applied to the seat part, the strength enhancement specific to the seat section may be considered. This may provide different elasticity, sensation, and so on for the sitting person. There is no need for reinforcing the externality, which makes attachment and detachment thereof easy.

[0014] Since the panelboard is not separated by slits, they may be formed to pass through the panelboard. Naturally, slits may have the depth up to the middle point of the panelboard rather than passing therethrough.

[0015] Anything may be used for the hard material of the front face layer as long as slits pass through the front face of the layer. Any materials including wood, metal, and so on may be selected optionally to render a decorative panelboard.

[0016] The panelboard of the present invention is characterized in that said upper slits and said lower slits are arranged alternately.

[0017] By alternating the upper slits and lower slits, gaps between slits are made smaller also near the upper side or lower side, thereby making the formation of a curvature easy.

[0018] Furthermore, the smaller gaps between slits separate the hard material on the front face to a slim shape. The hard material on the front face deforms in such a way that each separate slim shape deforms to disperse and absorb the pressure in response to the pressure applied to the front face of the panelboard. Even if the pressure applied to one slim part is transmitted to adjacent slim parts as stress, it will be a small stress. This makes the probability of damaging the hard material on the front face due to the pressure applied thereto become small.

[0019] The panelboard of the present invention is characterized in that said slits are spaced 5mm or more on the straight line connecting the middle points of said vertical sides while said slits are spaced 40mm or less on said horizontal sides.

[0020] In order to strengthen each of the slim parts, it is preferable that slits be spaced 5mm or more on the straight line connecting the middle points of the vertical side. In order to reduce the probability of damaging the slim shape due to the internal stress, it is preferable that said slits be spaced 40mm or less on said horizontal side.

[0021] The panelboard of the present invention is characterized in that said front face layer is a wood layer and said vertical side is in the direction of wood grain of the wood.

[0022] The use of wood for the front face layer provides the wood texture-based decorativeness.

[0023] When a piece of wood is given a slim shape, the wood grain kept in the elongated direction reduces the probability of damaging it due to deformation. Since slits are formed in parallel with the vertical sides, when the vertical sides become the sides in the direction of wood grain, the parts having a slim shape are elongated in the direction of wood grain. However, there is no need for the "side in the direction of wood grain" to be strictly in parallel with wood grain. In the vertical direction or the horizontal direction of the rectangular board, the side closer to wood grain may be selected.

[0024] The present invention is also a panelboard with a rectangular top characterized in that it has more than three stacked layers comprising a hard material and a soft material; wherein said panelboard comprises the first hard material layer on the front face, a soft material layer (middle soft material layer) which touches said first hard material layer; and the second hard material layer which is more toward the rear face side than said middle soft material layer; layers other than said first hard material layer and the second hard material layer are soft material layers; slits (front face-side slits) are formed in parallel with the vertical side of said rectangle on said first hard material layer of said panelboard; said front face-side slits have a length of $1/2$ to $3/4$ of the length of said vertical side, and one end thereof touches the horizontal side of said rectangle while the depth thereof reaches said middle soft material layer but does not reach said second hard material layer; said two or more front face-side slits include the type in which one end thereof touches the upper horizontal side of said rectangle (upper front face slits) and the other type in which one end thereof touches the lower horizontal side of said rectangle (lower front face slits); two or more slits (rear face-side slits) that are in parallel with the vertical side of said rectangle are provided on the rear face-side of said panelboard; said rear face-side slits have a length of $1/2$ to $3/4$ of that of said vertical side, and one end thereof touches the horizontal side of said rectangle while the depth thereof goes through said second hard material layer but does not reach said first hard material layer; said two or more rear face-side slits include the type in which one end thereof touches the upper horizontal side of said rectangle (upper rear face slits) and the other type in which one end thereof touches the lower horizontal side of said rectangle (lower rear face slits); and said front face-side slits and said rear face-side slits are arranged alternately.

[0025] The slits formed on each of the front and rear faces and arranged alternately prevent themselves from overlapping in the thickness direction of the panelboard, thereby enhancing the overall strength thereof.

[0026] Furthermore, the overall strength of the panelboard can also be enhanced by introducing a thin material such as a fabric and so on containing a lattice of fibers for the middle soft material layer.

[0027] Depending on the application, partial strength enhancement can be made by laminating materials such as veneer, etc. on the stretched surface of plywood, etc. For instance, when used in a chair, considering that the maximum pressure is applied to the seat part, the strength enhancement specific to the seat section may be considered. This may provide different

elasticity, sensation, and so on for the sitting person.

[0028] The shape of slits on the front face side and the rear face side viewed from the outside the panelboard is the same as that of the above.

[0029] Since the front face-side slits go through the layer of the first hard material, and the rear face-side slits go through the layer of the second material, both of the hard material layers can form a curvature, thereby enabling the entire panelboard to be curved.

[0030] The panelboard of the present invention is characterized in that said upper front face slits and said lower front face slits are arranged alternately, and said upper rear face slits and said lower rear face slits are arranged alternately.

[0031] The panelboard of the present invention is characterized in that said front face-side slits and said rear face side-slits are spaced 5mm or more on the straight line connecting the middle points of said vertical sides, and said front face side-slits and said rear face side-slits are spaced 40mm or less on said horizontal side.

[0032] The panelboard of the present invention is characterized in that said first hard material layer and said second hard material layer are wood layers, and said vertical side thereof is in the direction of wood grain.

[0033] The panelboard of the present invention is characterized in that said second hard material layer is the rear face layer.

[0034] Both layers on the front face and the rear face become hard material layers. In the application in which both the front and rear faces are exposed, the hard material layers alone are exposed, and, for instance, decoration stemming from the hard material layer of wood can be attained.

[0035] The panelboard of the present invention is characterized in that it comprises a face (middle plane) between the front face and the rear face of said panelboard wherein it does not contain any of said front face side-slits and said rear face side-slits between the tip of said front face side-slits and the tip of said rear face side-slits.

[0036] The overall strength of the panelboard can also be enhanced by the use of the slit-free middle plane. There is no hindrance for the panelboard to form a curved surface even if slits are not formed, as long as the middle plane is a soft material.

EFFECTS OF THE INVENTION

[0037] Since the present invention is a panelboard which can provide a curved surface easily and maintains decorativeness and strength, it can be utilized for wall surfaces, furniture, and

so on.

[0038] Furthermore, as a raw material to make furniture having curved surfaces of various shapes such as chairs, one type of standardized panelboard can be used to form curved surfaces of various shapes, thereby saving time required for selecting panelboard.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039]

[Figure 1] Figure 1 is a perspective view illustrating an example of the panelboard of the present invention.

[Figure 2] Figure 2 is a diagram illustrating the side view of the panelboard.

[Figure 3] Figure 3 is a plan view illustrating the panelboard.

[Figure 4] Figure 4 is a bottom view of the panelboard.

[Figure 5] Figure 5 is a diagram showing one half of the panelboard.

[Figure 6] Figure 6 is a cross-sectional view of the panelboard.

[Figure 7] Figure 7 is a diagram illustrating an example of the state in which a curved surface is formed.

BEST MODE OF PRACTICING THE INVENTION

[0040] The present invention is described herein with reference to working examples.

WORKING EXAMPLE 1

[0041] Figure 1 is a perspective view illustrating an example of the panelboard of the present invention.

[0042] As illustrated in Figure 2, in panelboard 1, front face hard material layer 2, rear face hard layer 3 and soft material layer 4 are adhered and laminated. Front face hard material layer 2 and rear face hard layer 3 are made of plywood, and soft material layer 4 is made of a synthetic resin (PE 30).

[0043] Figure 3 is a plan view of the panelboard. Figure 4 is a bottom face view of the

panelboard.

[0044] The plywood that constitutes hard material layer 2 and rear face hard layer 3 has wood grain in the vertical direction of Figures 3 and 4. Furthermore, in the external rectangle of Figures 3 and 4, the side drawn vertically in the figure is the vertical side, and the side drawn horizontally is the horizontal side.

[0045] As illustrated in Figure 3, equally-spaced upper slits 5a, 5b, ... and the equally spaced lower slits 6a, 6b, ... are provided alternately. The space of slits (referred to as "v") of the area in which both upper slits and lower slits exist is 6mm, and the space of slits (referred to as "w") of the area in which only upper slits exist and the area in which only upper slits exist is 12mm.

[0046] As illustrated in Figure 2, the front face is provided with slits at different locations from those of the rear face of panelboard 1, and slits in Figure 3 are provided at different locations from those in Figure 4. Slits of the panelboard do not overlap with each other in the thickness direction, and the overall strength of the panelboard can be reinforced.

[0047] Figure 5 is a diagram illustrating a half of the panelboard. It shows only one half of the inner part in Figure 1. Figure 6 is a cross-sectional view of the panelboard. It shows the side view thereof in Figure 5, and the cross-sectional view cut out in the center section in Figure 1.

[0048] As illustrated in Figures 2 and 6, panelboard 1 has slits having a depth which does not reach the center thereof, and has middle plane 7 which does not have slits between the front face and rear face. Middle plane 7 enhances the strength of the panelboard. Moreover, the middle plane is shown with one-dotted line in Figure 6; however, this does not mean that there is an article in reality. Middle plane 7 is a part of soft material layer 4.

[0049] Figure 7 is a diagram showing an example of a state in which a curved surface is formed. Figure (a) illustrates the flat state. By the use of slits, curved surfaces having the shapes as illustrated in Figures (b) and (c) can be formed. The middle plane section has no slit but deforms along the curved surface because it is a soft material.

INDUSTRIAL APPLICABILITY

[0050] Since the present invention is a panelboard which can provide a curved surface simply while maintaining decoration and strength, and one type of standardized panelboard can be used to form curved surfaces of various shapes, it can expect utilization by furniture manufacturers, construction companies, and so on.

REFERENCES CITED IN THE DESCRIPTION

Cited references

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- JP7119239A [0006]
- US6148867A1 [0006]
- US2397415A1 [0006]

Patentkrav

1. Panelbræt (1) med en rektangulær overside, hvilket panelbræt i anvendelse har en øvre horisontal side, en nedre horisontal side, en forside, en bagside og vertikale sider, hvor panelbrættet har tre stablede lag, der omfatter et hårdt materiale (2, 3) og et blødt materiale (4); hvor

forsidelaget er et lag af et hårdt materiale (2, 3), i hvilket der er anbragt slidser parallelt med den vertikale side af panelbrættet med rektangulær overside;

hvor slidserne har en længde på $1/2$ til $3/4$ af længden på den vertikale side, og den ene ende af slidserne berører en horisontal side af panelbrættet med rektangulær overside;

og

hvor slidserne indbefatter en type af øvre slidser (5a, 5b...), i hvilke den ene ende af de øvre slidser berører den øvre horisontale side af panelbrættet, og en anden type af nedre slidser (6a, 6b...), i hvilke den ene ende af de nedre slidser berører den nedre horisontale side af panelbrættet med rektangulær overside.

2. Panelbræt (1) ifølge krav 1, **kendetegnet ved, at** de øvre slidser (5a, 5b...) og de nedre slidser (6a, 6b...) er anbragt skiftevis.

3. Panelbræt (1) ifølge krav 1 eller 2, **kendetegnet ved, at** slidserne er anbragt med en afstand på 5 mm eller derover på den lige linje, der forbinder de midterste punkter af de vertikale sider, mens slidserne er anbragt med en afstand på 40 mm eller derunder på de horisontale sider.

4. Panelbræt (1) ifølge et af kravene 1 til 3, **kendetegnet ved, at** forsidelaget er et trælag, og den vertikale side ligger i retningen af træets træfiberretning.

5. Panelbræt (1) med en rektangulær overside, hvilket panelbræt i anvendelse har en øvre horisontal side, en nedre horisontal side, en forside, en bagside og vertikale sider, hvor panelbrættet har mere end tre stablede lag, der omfatter et hårdt materiale (2, 3) og et blødt materiale (4); hvor

panelbrættet omfatter det første hårdmaterialelag (2) på forsiden, et midterste blødmaterialelag (4), der berører det første hårdmaterialelag; og det andet hårdmaterialelag (3), som ligger mere hen imod bagsiden end det midterste blødmaterialelag;

andre lag end det første hårdmaterialelag og det andet hårdmaterialelag er blødmaterialelag;

der er dannet sideslidser i forsiden parallelt med den vertikale side af panelbrættet med rektangulær overside på det første hårdmaterialelag af panelbrættet;

sideslidserne i forsiden har en længde på 1/2 til 3/4 af længden på den vertikale side, og den ene ende af slidserne berører en horisontal side af panelbrættet med rektangulær overside, mens dybden deraf kan nå det midterste blødmaterialelag, men er ikke i kontakt med det andet hårdmaterialelag;

de to eller flere sideslidser i forsiden indbefatter en type af øvre forsideslidser (5a, 5b...), i hvilke den ene ende af slidserne berører den øvre horisontale side af panelbrættet med rektangulær overside, og en anden type af nedre forsideslidser (6a, 6b...), i hvilke den ene ende af slidserne berører den nedre horisontale side af panelbrættet med rektangulær overside;

der er anbragt to eller flere sideslidser i bagsiden, som er parallelle med den vertikale side, på bagsiden af panelbrættet;

sideslidserne i bagsiden har en længde på 1/2 til 3/4 af længden på den vertikale side, og den ene ende af slidserne berører den horisontale side, mens dybden deraf går gennem det andet hårdmaterialelag, men er ikke i kontakt med det første hårdmaterialelag;

de to eller flere sideslidser i bagsiden indbefatter en type af øvre bagsideslidser (5a, 5b...), i hvilke den ene ende af slidserne berører den øvre horisontale side, og en anden type af nedre bagsideslidser (6a, 6b...), i hvilke den ene ende af slidserne berører den nedre horisontale side; og

sideslidserne i forsiden og sideslidserne i bagsiden er anbragt skiftevis.

6. Panelbræt (1) ifølge krav 5, **kendetegnet ved**, at de øvre forsideslidser (5a, 5b...) og de nedre forsideslidser (6a, 6b...) er anbragt skiftevis, og de øvre bagsideslidser (5a, 5b...) og de nedre bagsideslidser (6a, 6b...) er anbragt skiftevis.

7. Panelbræt (1) ifølge krav 5 eller 6, **kendetegnet ved**, at sideslidserne i forsiden og sideslidserne i bagsiden er anbragt med en afstand på 5 mm eller derover på den lige linje, der forbinder de midterste punkter af de vertikale sider og sideslidserne i forsiden, og sideslidserne i bagsiden er anbragt med en afstand på 40 mm eller derunder på den horisontale side.

8. Panelbræt (1) ifølge et af kravene 5 til 7, **kendetegnet ved, at** det første hårdmaterialelag (2) og det andet hårdmaterialelag (3) er trælag, og den vertikale side deraf er i træfiberretningen.

9. Panelbræt (1) ifølge et af kravene 5 til 8, **kendetegnet ved, at** det andet hårdmaterialelag (3) er bagsidelaget.

10. Panelbræt (1) ifølge et af kravene 5 til 9, **kendetegnet ved, at** det omfatter en flade (7) mellem forsiden og bagsiden af panelbrættet, hvor det ikke indeholder nogen af sideslidserne i forsiden og sideslidserne i bagsiden mellem spidsen af sideslidserne i forsiden og spidsen af sideslidserne i bagsiden.

DRAWINGS

FIGURE 1

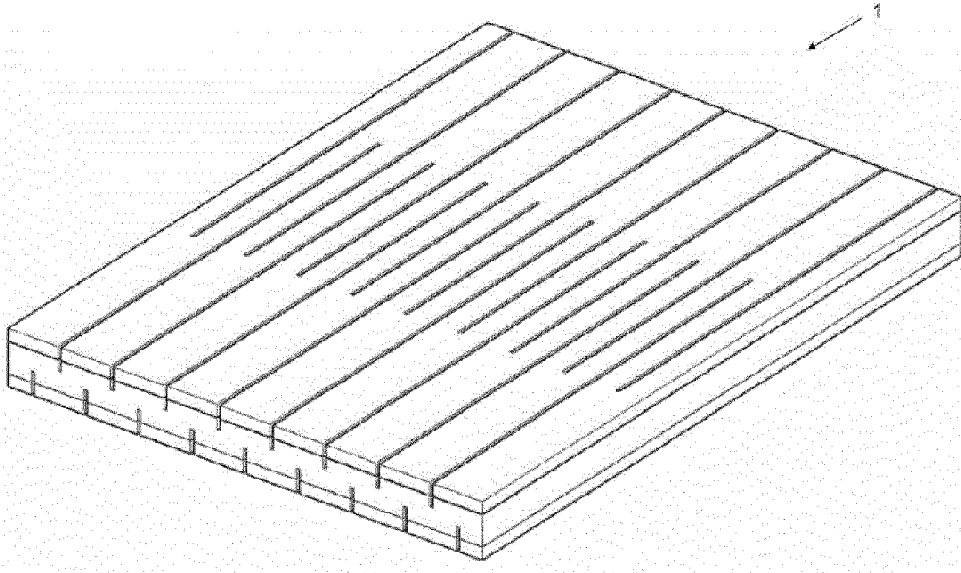


FIGURE 2

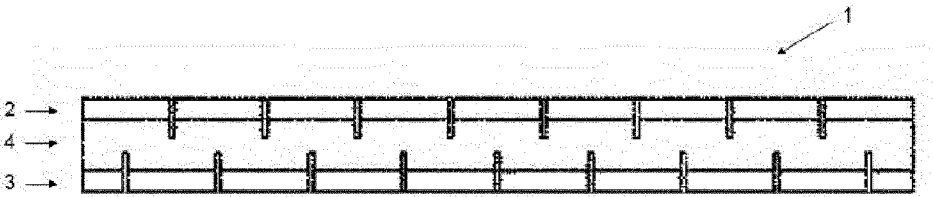


FIGURE 3

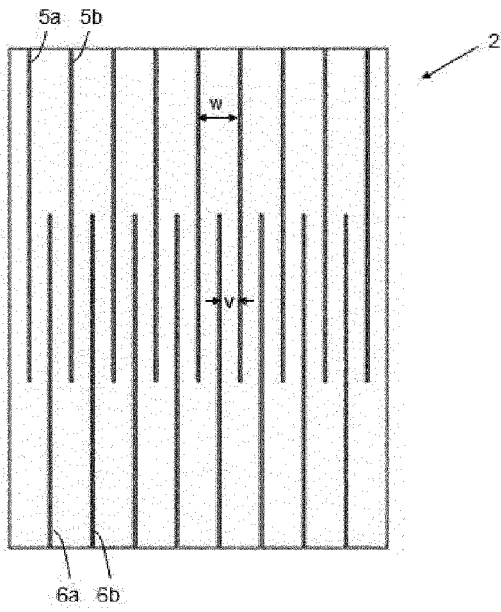


FIGURE 4

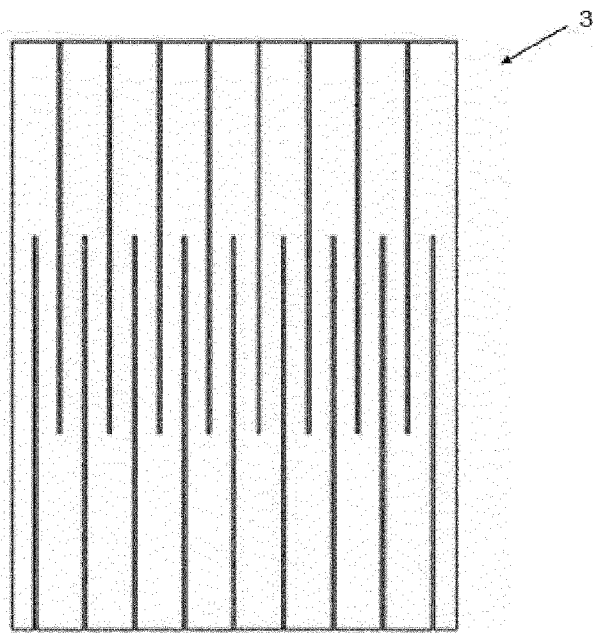


FIGURE 5

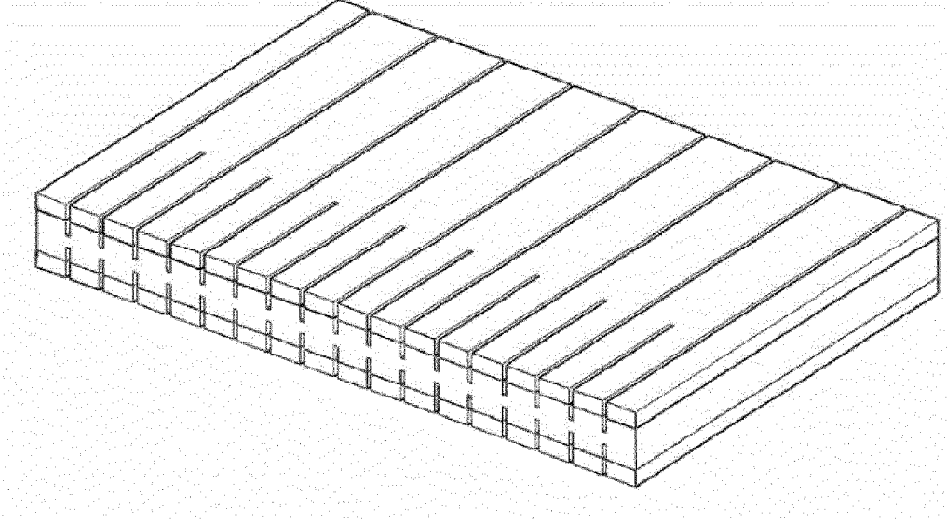


FIGURE 6

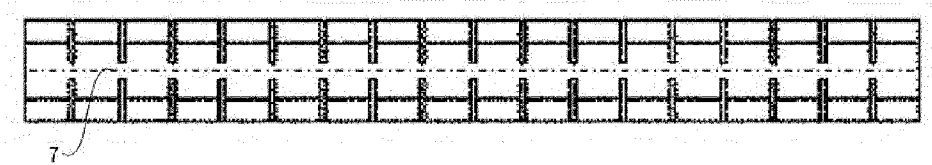
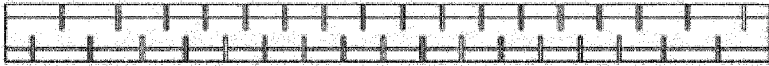
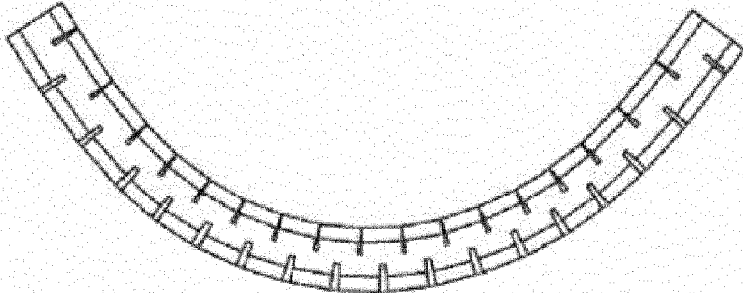


FIGURE 7

(a)



(b)



(c)

