

(21) Application No: 0605415.9

(22) Date of Filing: 17.03.2006

(71) Applicant(s):
Kevin Tomes
16 Woodstock Road, Yarnton, OXFORD,
OX5 1PJ, United Kingdom

Mary Tomes
Rose Cottage, 16 Woodstock Road,
Yarnton, OXFORD, OX5 1PJ,
United Kingdom

(continued on next page)

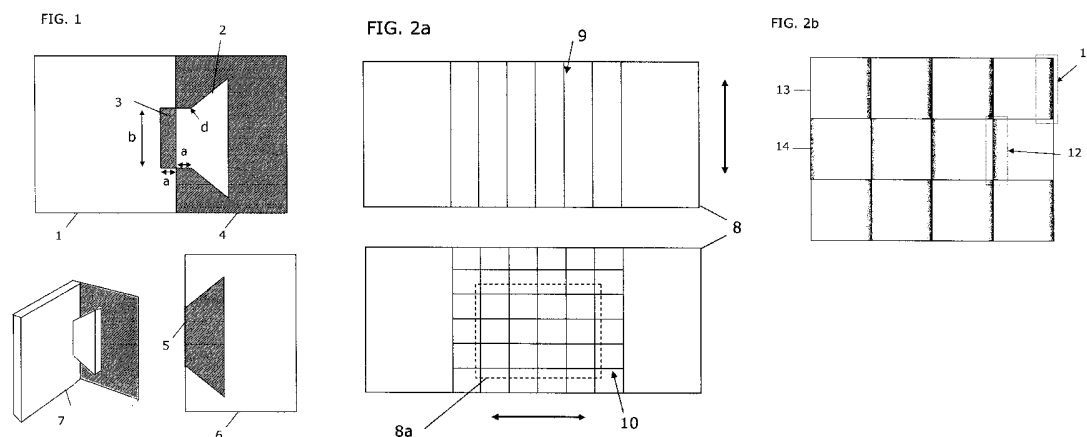
(51) INT CL:
B31F 1/08 (2006.01) **B31F 5/00** (2006.01)
B32B 3/12 (2006.01)

(52) UK CL (Edition X):
B5N N0312 N182 N186 N201 N202 N207 N3118 N3122
N491 N492 N500 N592 N595 N597 N686 N688 N689
N70X N715 N718 N72Y N724 N76A N76F N76X N760
N78A N78F N78G N78P N79J N79T N79X
A4L LSE L144
U1S S1014 S1018 S1205 S1207 S1208 S1209 S1212
S1573 S1707 S1727 S1731 S1762 S1789 S1790 S1807
S2287

(continued on next page)

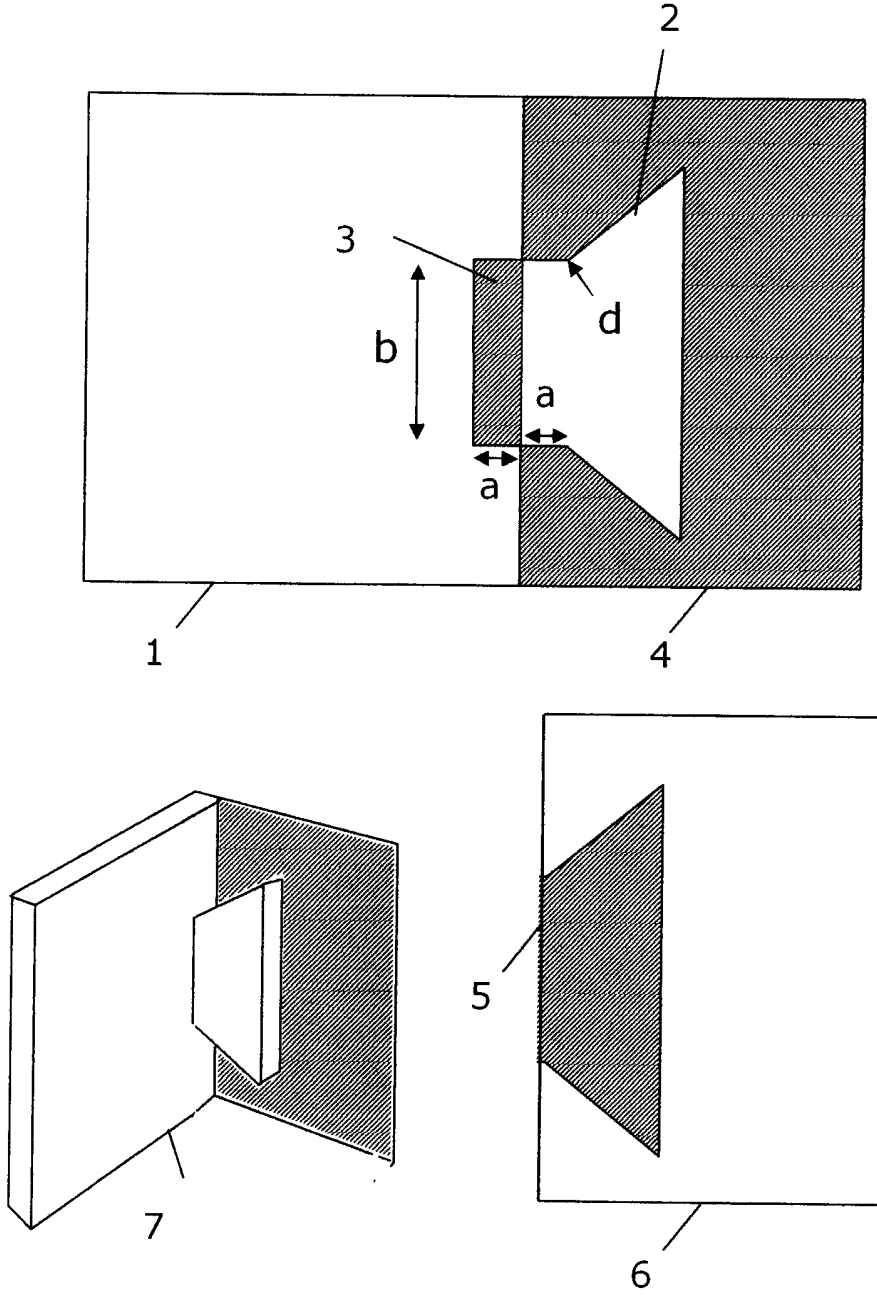
(54) Abstract Title: **Folding and joining composite boards**

(57) A flat composite board such as honeycomb cardboard comprising two outer rigid material surfaces separated by an internal filling material is folded and / or joined by cutting the board from one side to create vertical and horizontal cuts which intersect at right angles to form one or more equally spaced rectangular cuts without removing material and leaving the other surface intact, applying pressure to on or both edges of the board either side of one or a plurality of cuts and folding and/or joining the board. Various of the cuts may be depressed (see for example 11 and 12 in figure 2b). Alternatively the board comprising two sections may be folded and / or joined by removing the inner surface and internal filling material such that a dovetail section 2 of intact board is left in the centre of a first area of the second section 4, the dovetail section comprising a protruding shoulder d and removing the inner surface of the first section 1 to leave a second area of rigid material for forming at the base of the dovetail section a rectangular void 3 providing a cavity where the board is to be folded. The inner surface of rigid material and internal filling material of another section 6 of a second board or of the other end of the same board may be removed and the protruding material d with the removed material of the second board or the other end of the same board. In forming a chair 701 (see figures 7 and 8) 2 opposite ends of a composite board are symmetrically cut and curved in opposition and a single sheet of rigid board 703 is slotted through a void in the centre 702 and anchored at either end through a slot 704 and fixed by dovetail joint 705 and glued. Products such as a storage box, an office dividing system, cupboard, plant container, table, bed, children's playhouse (Wendy house), dolls house, pet box, pet home, rabbit burrowing tube, pet casket, ashes casket, coffin, bird box, bee house, exhibition stand, protective packaging materials or insulating materials for pipes, temporary shelter or lining for an excavated earth channel may also be made.



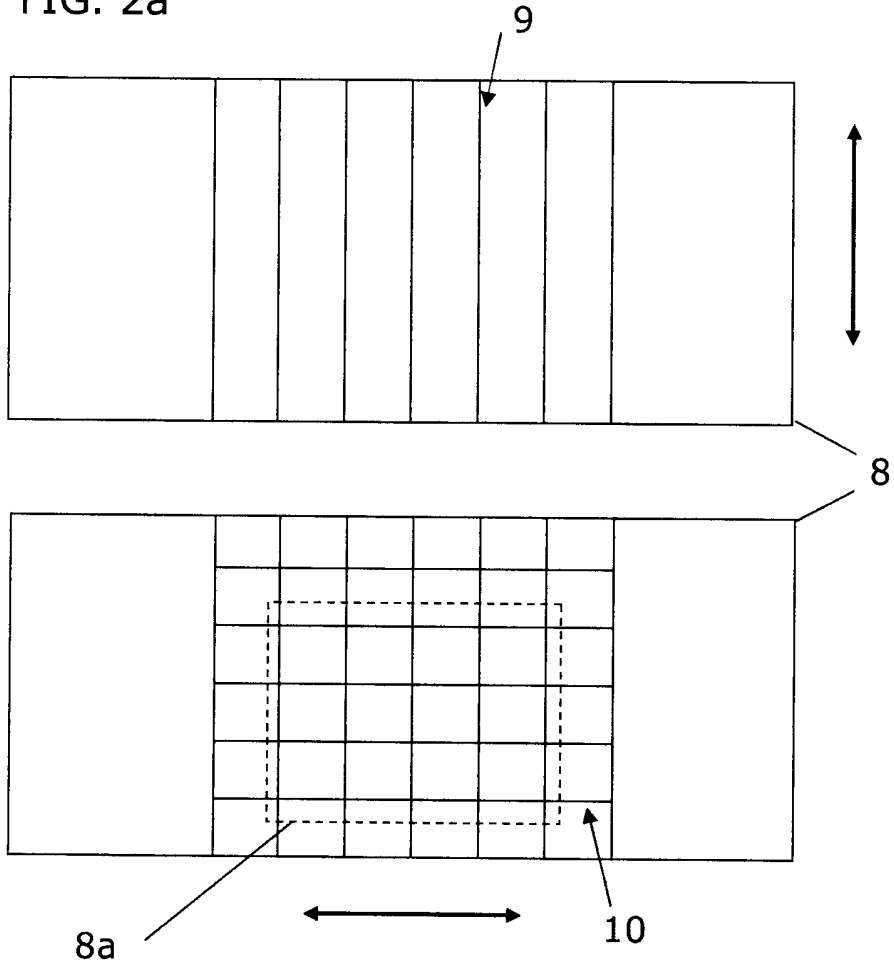
118

FIG. 1



2/8

FIG. 2a



3/8

FIG. 2b

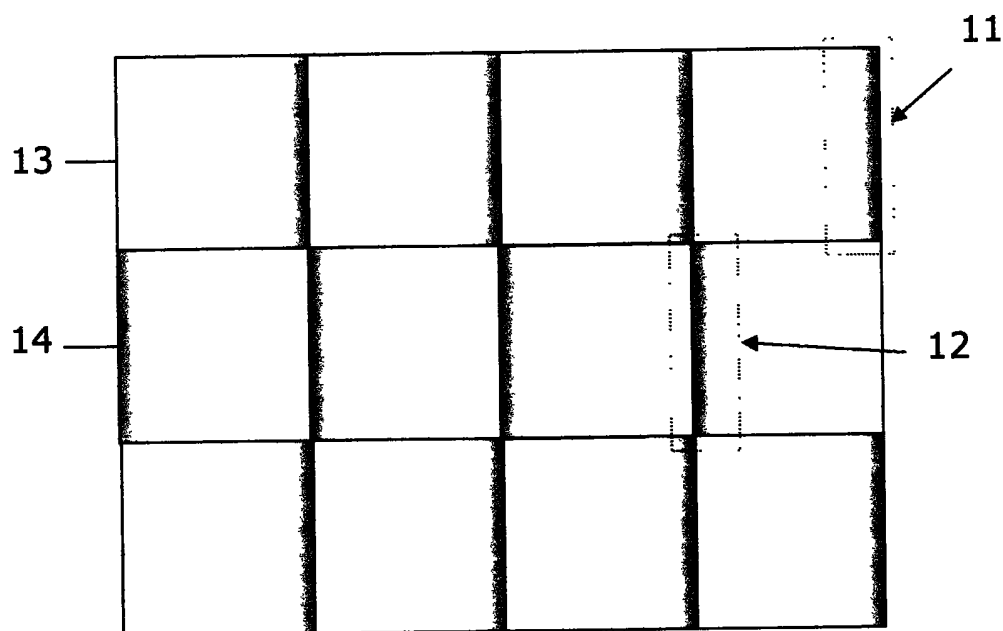
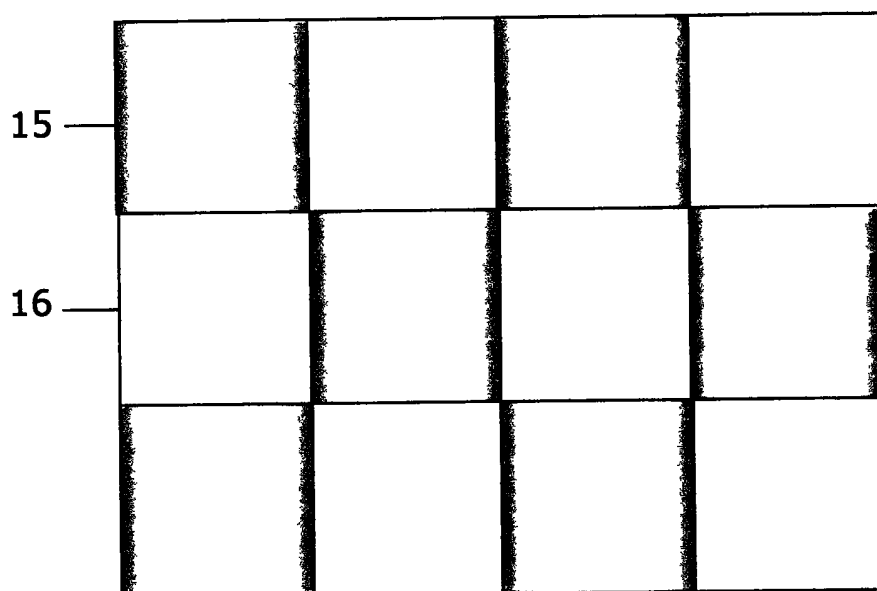
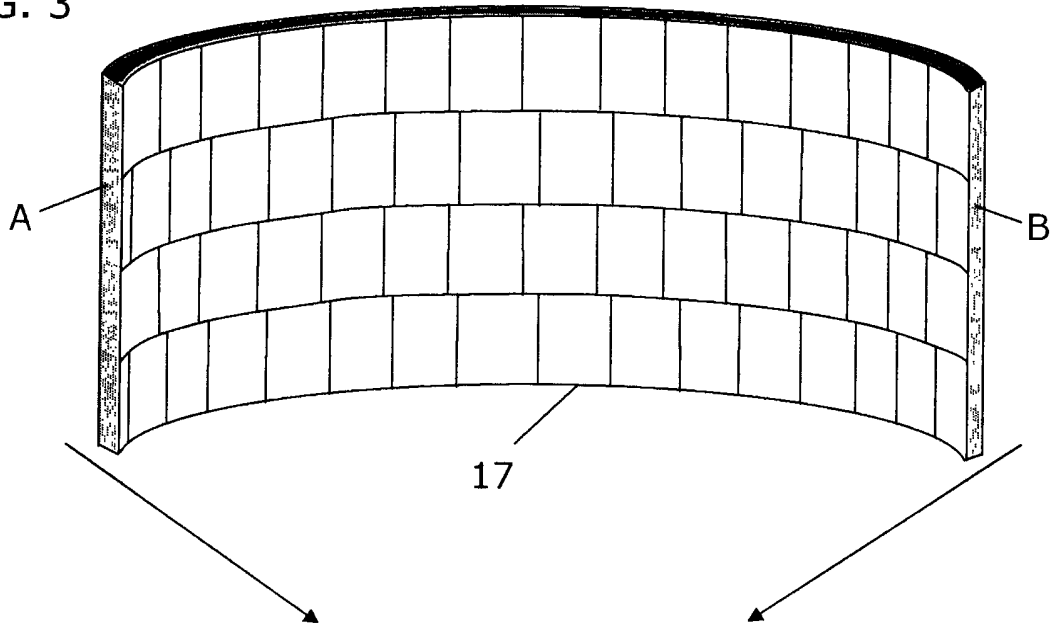


FIG. 2c



4/8

FIG. 3



5/8

FIG. 4a

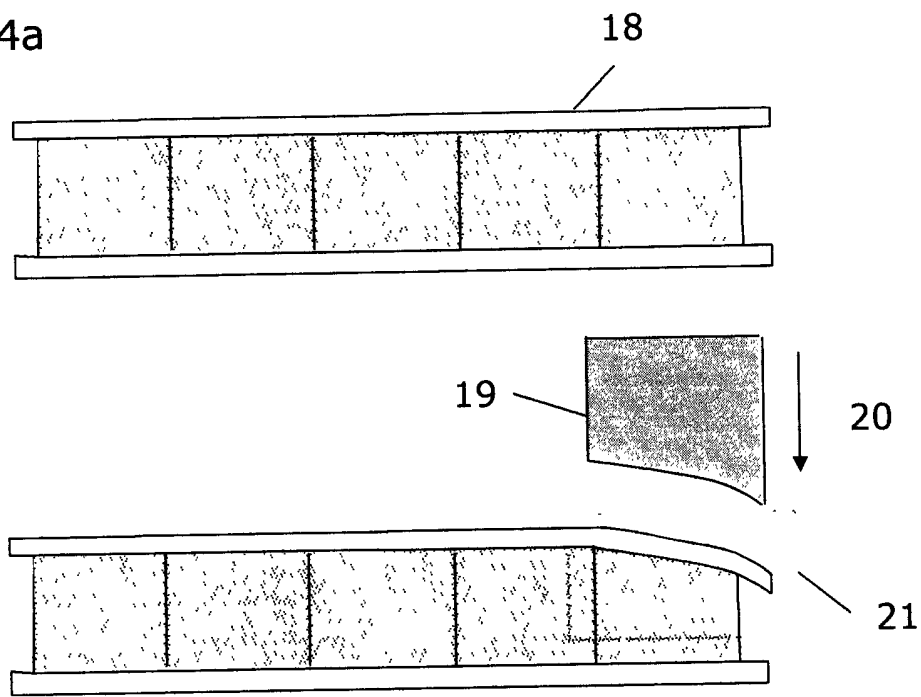
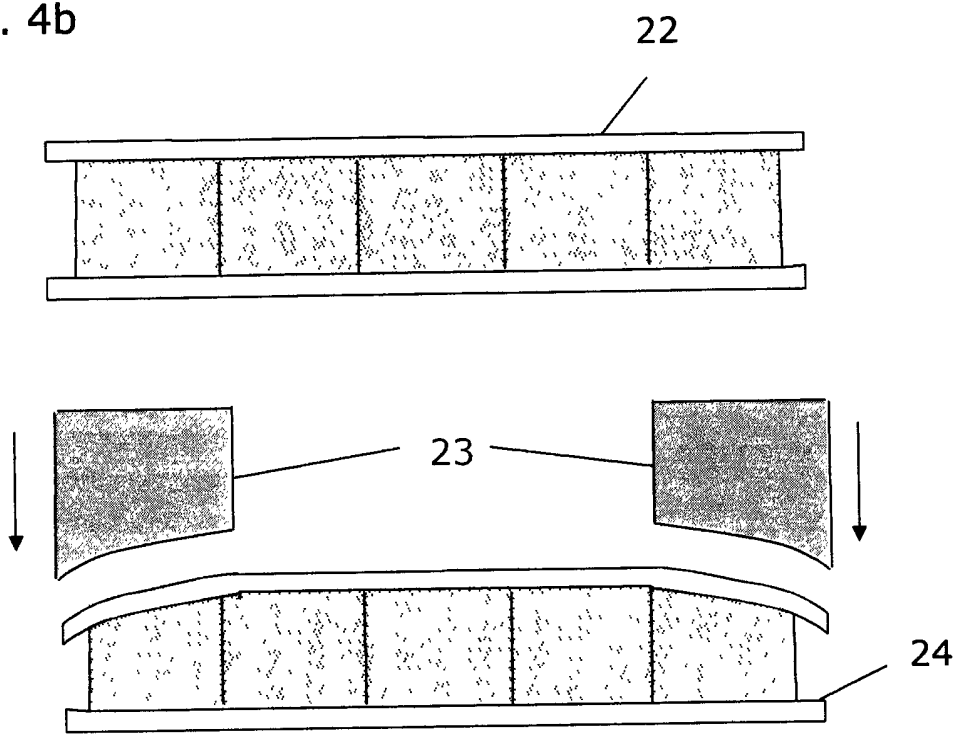


FIG. 4b



6/8

FIG. 5

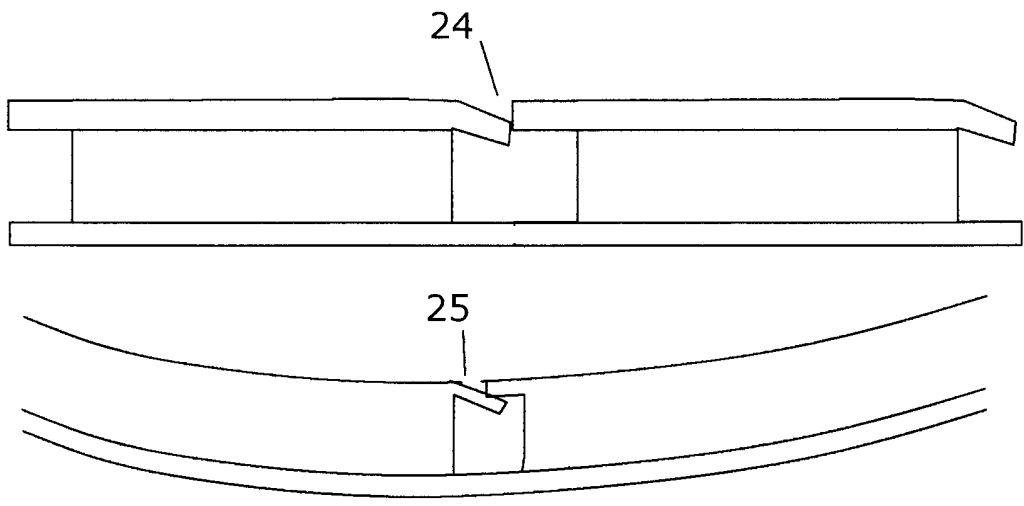
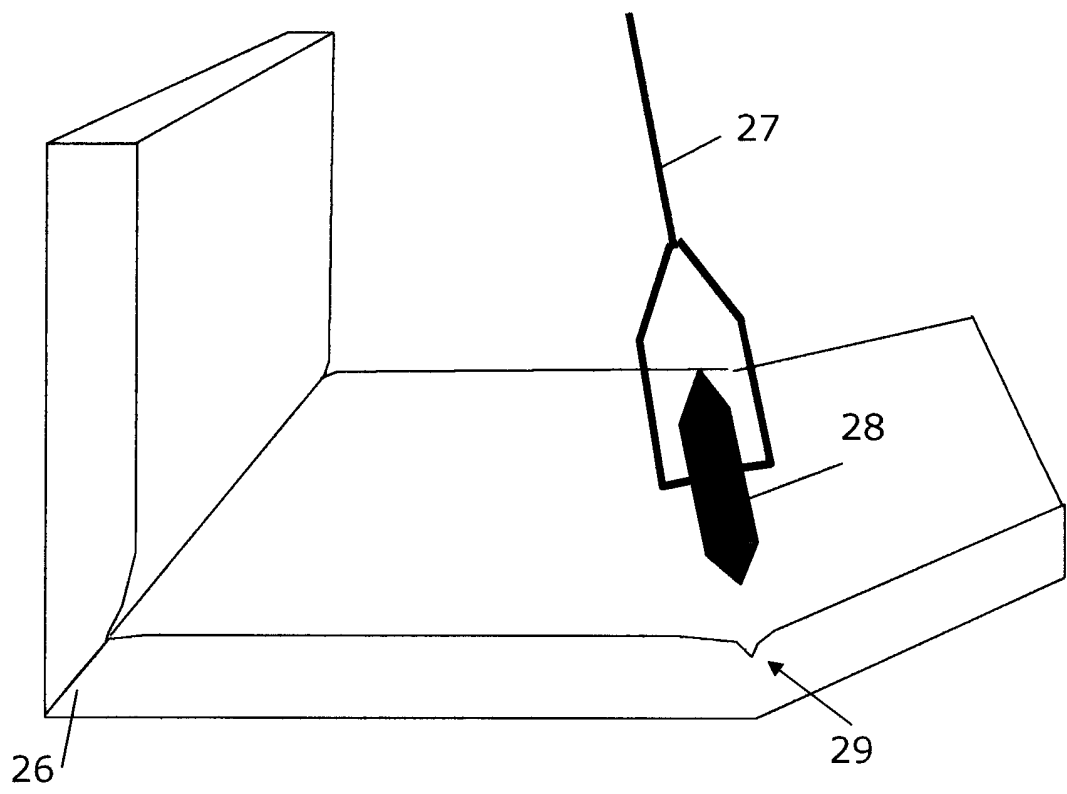


FIG. 6



7/8

FIG. 7

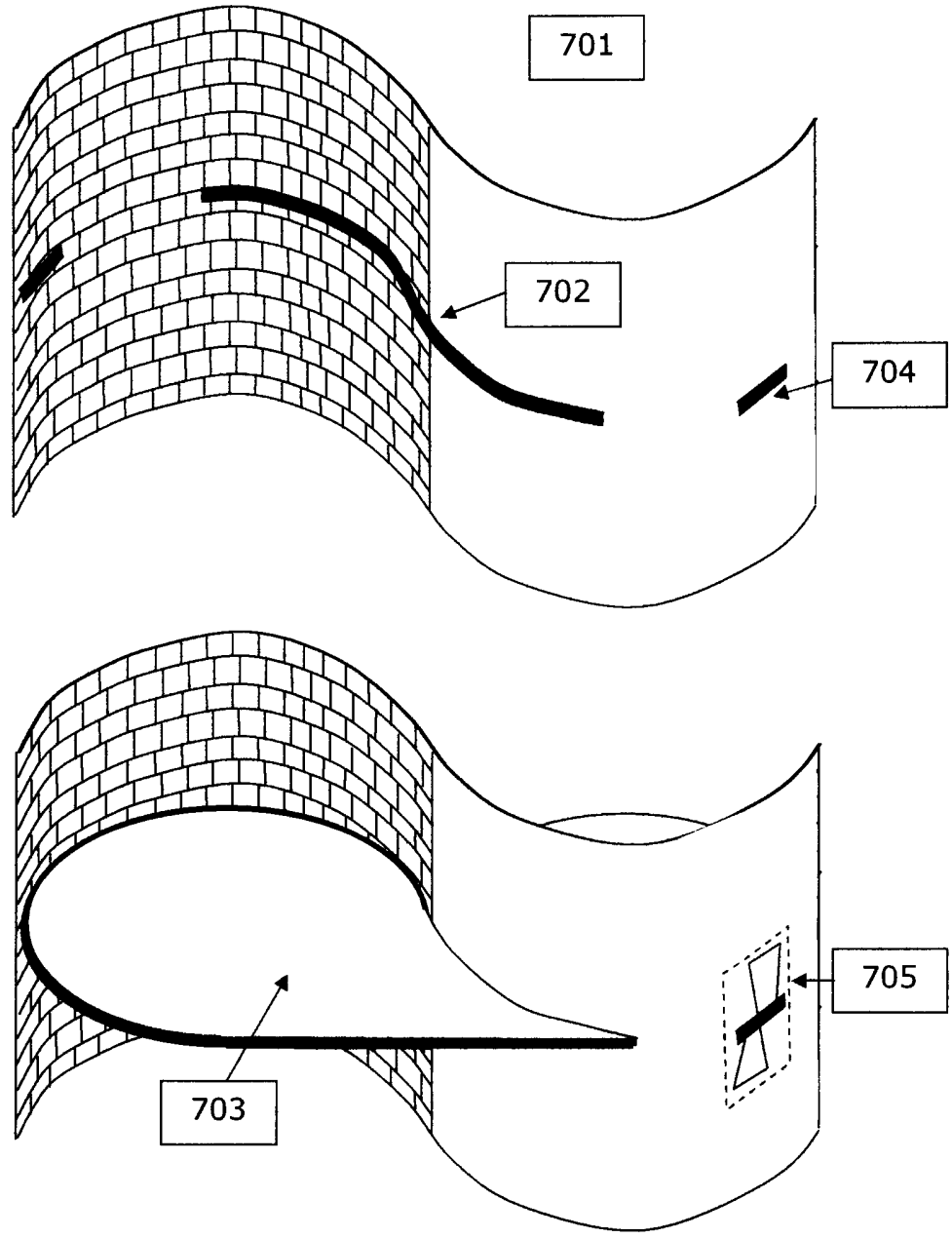
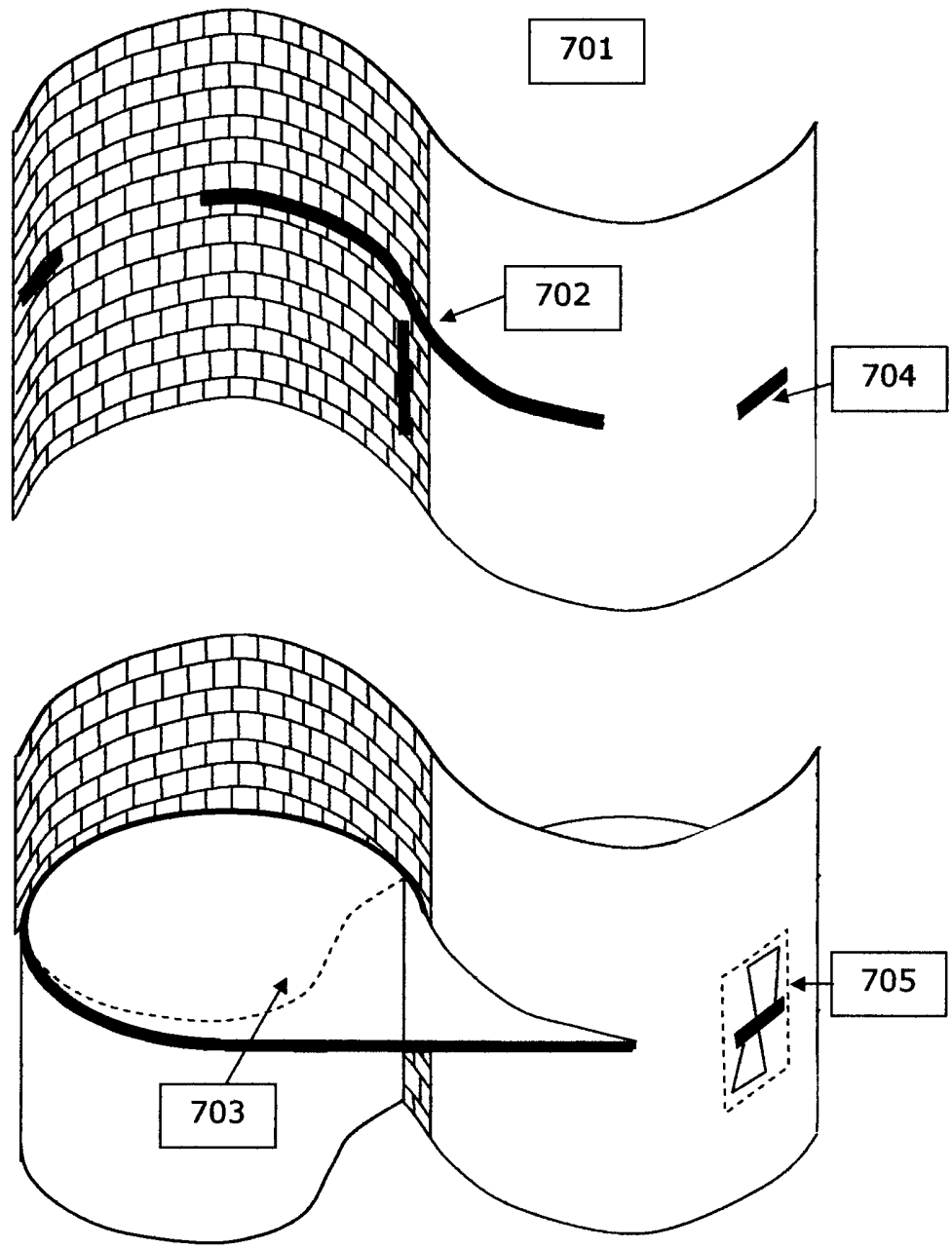


FIG. 8



-1-

SYSTEM AND METHOD FOR FOLDING AND JOINING CARDBOARD AND OBJECTS FORMED OF THE SAME

5

DESCRIPTION

BACKGROUND OF THE INVENTION

10 The invention relates to a system and method for folding and or joining composite board such as honeycomb board to form stylish consumer objects. More particularly, it relates to a system and method for folding and joining rigid honeycomb cardboard where the fold is curved and comprises a partly or a fully cylindrical shape. In particular, the invention teaches a method for creating
15 consumer objects and structures, which comprise fashionable shapes and which may be rendered with images to make them more appealing as well as improving the structural integrity of the said objects. In addition, the invention makes possible the creation of a new form of protective packaging material which can be shaped accordingly to protect goods from being damaged in transit.

20

In particular, this invention extends the teaching of an earlier patent application made by the same applicants entitled System and Method for Rendering an Image onto an Object and Objects Formed of the Same, filed August 15th 2005 at the UK Patent Office with number GB-A-0516755.6 This earlier patent
25 application comprehensively taught an inventive method for creating a range of goods, which were enhanced by a novel image rendering technique.

The current invention is particularly addressed towards the creation of enhanced consumer goods such as storage boxes, office dividing systems, cupboards, plant
30 containers, chairs, tables, beds, children's playhouses such as Wendy-houses, dolls houses, bags, pet boxes, pet homes, and caskets. In addition, the invention is further directed towards the creation of a new range of protective packaging material for glass bottles and other fragile products.

35 In several applications, the novel and inventive cardboard folding method makes use of honeycomb board which is cut in a particular way. This cutting method leaves the outer surface intact leaving it suitable for rendering with images as required.

40 Generally, cardboard such as honeycomb board is difficult to shape or fold into objects of a desirable shape or form. This sets limitations upon the use of this type of material for creating stylish products. Today, challenges remain when one wants to curve or shape honeycomb board or any similar type of board comprising at least two outer sheets separated by filling material. Conventional
45 methods for creating an angle in the board involve removing a rectilinear section of material comprising a strip of one outer board surface and an equally shaped

2-

5 section of filling material to enable the board to fold against itself along the line of the removed material. This approach, however, substantially reduces the strength of the board to the strength of a single outer sheet and in many cases there is very low or reduced torsional resistance or compressional strength at this fold.

10 The cause of the reduced strength at the fold is due to the removed material, which in itself adds complexity to the manufacturing process of folded shapes such as boxes comprising this fold. If it were possible to create a fold in the material which did not require the removal of any material, this would greatly simplify the manufacturing of shapes and boxes and also there would not be any waste generated.

15 In addition to this problem of reduced strength due to the loss of material, there is a clear need to create a fold having high torsional resistance at the fold. A folding method which can provide alternate interleaving of the material at the fold or rigidity through opposed compression at the fold would be highly desirable.

20 One of the key barriers preventing the use of honeycomb-like board comprising a composite of outer sheets and filling material separating the sheets, which may comprise additional inner sheets, is the difficulty of curving this material. In fact, rigidity and the resistance to curving are generally considered to be measures of the strength of the said board.

25 In the instance of the honeycomb board, if it were possible to curve the material, while maintaining the strength and rigidity in the vicinity of the joint, many new and exciting products could be formed as well as a range of low cost and highly rigid protective packaging material.

30 Generally, cardboard is considered a cheap and less desirable material for consumer goods. This view is misguided because manufacturing of cardboard composite materials is a high-tech business and the product has diverse and widespread application. The application of creative techniques which extend the range of three dimensional shapes that can be formed from this cardboard material greatly extend the market for consumer goods and packaging materials which can be made from it.

35 It is towards the exploitation of this consumer market through the provision of a new and exciting range of products that the current invention is directed.

40 No systems are presently known to the applicants, which address this market need in a highly effective and economic way.

Further to the limitations of existing technologies used for forming products and packaging materials from composite board, and so far as is known, no optimised system and method for folding and joining rigid composite board such as honeycomb board is presently available which is directed towards the specific needs of this problem area as outlined.

OBJECTS OF THE INVENTION

10 Accordingly, it is an object of the present invention to provide an improved system and method for folding and or joining composite board such as honeycomb cardboard which can provide an improved method for manufacturing stylish containers.

15 It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb cardboard to make possible the creation of curved cardboard objects from flat board such that the said objects comprise a high compressional strength and high torsional resistance and high rigidity at the said fold or joint.

20 It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb cardboard to make possible the creation of curved cardboard objects from flat board such that the said objects comprise a partly or a fully formed cylindrical shape.

25 It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb cardboard wherein the fold comprises one or more cuts made into a single outer surface of the board and pressure applied to one or both edges of the material either side of the cut.

30 It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb cardboard wherein the fold comprises two sets of parallel cuts made into one surface of the board at right angles to each other and whereupon the board can be folded into a curve wherein the cut surface is on the inner side of the curved board.

35 It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb cardboard wherein two sets of parallel cuts are made into one surface of the board at right angles to each other to create an area of rectangular cuts where the separate rectangular sections are held in place by the honeycomb material.

40

4

It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb cardboard wherein two sets of parallel cuts are made into one surface of the board at right angles to each other to create an area of rectangular cuts which form rectangles of sides **a** and **b** which are unequal in length such that the dimension of the rectangular cut **a** is preferably longer in the direction parallel to the axis of the fold than the rectangular cut **b** in the direction normal to the axis of the fold .

10 It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb cardboard wherein two sets of parallel cuts are made into one surface of the board at right angles to each other to create an area of rectangular cuts of board held in place by the honeycomb filling which comprises separate squares of board material of equal dimensions.

It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb cardboard wherein two sets of parallel cuts are made into one surface of the board at right angles to each other to create an area of rectangular cuts which in turn creates an area of parallel rows of rectangular sections of board held in place by the honeycomb filling wherein each section of alternative parallel rows of sections each have their leading edge depressed into the board alternatively. This provides alternative rows of rectangular sections wherein one forward edge, which is parallel to the axis of the fold, of each rectangular section of each row is deformed under pressure with row one having its left edge depressed, row two having its right edge depressed, row three having its left edge depressed and so on to create an alternating pattern of depressions.

30 It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb cardboard wherein two sets of parallel cuts are made into one surface of the board at right angles to each other to create an area of rectangular cut sections wherein each section has one forward edge depressed so that when the board is folded to form a curve or curved fold, each depressed edge moves into and under the non-depressed edge of the adjacent section to create an interleaved first row of sections and wherein the rows of sections above and below the said first row are depressed in the alternate way to create a fully interleaved structure which has high torsional resistance and high compressional resistance along the axis of the curved fold due to the alternating sequence of interleaved rows of sections.

45 It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb cardboard which comprises interleaved rectangular sections wherein

5-

each section has one depressed forward edge which moves into and under the non-depressed rear edge of an adjacent section wherein the width of each rectangular section normal to the axis of the curved fold determines the rate of curvature of the fold.

5

It is a further object of one embodiment of the present invention to provide a system and method for joining composite board such as honeycomb cardboard at a fixed angle which contains a dovetail to join two ends of flat board such that material is removed from one end of the board to leave a dovetail shaped profile connected by honeycomb filling to the lower section of surface board and a dovetail slot is cut in the opposing end into which the dovetail shape will be a securely fixed.

10

It is a further object of one embodiment of the present invention to provide a system and method for joining composite board such as honeycomb cardboard at a fixed angle which contains a dovetail to join two ends of the curved or folded board such that material is removed from one end of the board to leave a dovetail shaped profile connected by honeycomb filling to the lower section of surface board and a dovetail slot is cut in the opposing end into which the dovetail shape will be a securely fixed. and wherein the said lower section of surface board will wrap around the joint and be securely fixed.

15

20

It is a further object of one embodiment of the present invention to provide a system and method for joining composite board such as honeycomb cardboard at a fixed angle which contains a dovetail to join two ends of the curved or folded board such that material is removed from one end of the board to leave a dovetail shaped profile connected by honeycomb filling to the lower section of surface board and a dovetail slot is cut in the opposing end into which the dovetail shape will be a securely fixed and wherein the said lower section of surface board below the dovetail shaped profile extends beyond the said profile and can be used to wrap around the joint and be securely fixed to it.

25

30

It is a further object of one embodiment of the present invention to provide a system and method for joining two ends of composite board such as honeycomb cardboard at a fixed angle which contains a dovetail joint comprising a dovetail shaped profile which slots into a receiving hole wherein a rectangular section of surface card and honeycomb material is removed at the base of the dovetail profile to enable the dovetail profile to move into this space when the joint is closed.

35

40

It is a further object of one embodiment of the present invention to provide a system and method for joining two ends of composite board such as honeycomb cardboard at a fixed angle which contains a dovetail joint comprising a dovetail profile and a dovetail slot removed from the inner side of the board leaving an outer surface of material intact wherein a rectangular section of surface card and honeycomb material is removed at the base of the dovetail profile wherein the

45

width **a** of this rectangular section into which the dovetail section folds which is normal to the axis of the joint, determines the angle of the joint. If the width is equal to the thickness of the outer surface card and the honeycomb filling, then the angle of the joint will be 90 degrees. If the width **a** is less than or greater than the thickness of the outer surface card and the honeycomb filling then the angle of the joint will be greater or less than 90 degrees.

It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb board which makes possible the creation of curved or angled board structures which are highly suitable for packaging materials which can be shaped accordingly to protect goods from being damaged in transit.

It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb cardboard to enable the creation of enhanced consumer goods such as storage boxes, office dividing systems, cupboards, plant containers, chairs, tables, beds, children's playhouses such as wendy houses, dolls houses, bags, pet boxes, pet homes, rabbit-burrowing tubes for keeping rabbits busy, pet caskets, ashes caskets, coffins, bird boxes, bee houses, exhibition stands and the like.

It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board in a way which does not cut the outer surface of the said board thus leaving it suitable for rendering with images to create attractive products.

It is a further object of one embodiment of the present invention to provide a system and method for folding and or joining composite board such as honeycomb cardboard comprising two sheets of cardboard separated by a rigid spacing material or the like of the type, for example made by **Dufaylite of Cromwell Road, Saint Neots, Cambridgeshire UK**, wherein a variety of the objects are formed from folding said material using novel joints according to the current invention.

Other objects and advantages of this invention will become apparent from the description to follow when read in conjunction with the accompanying drawings.

BRIEF SUMMARY OF THE INVENTION

Certain of the foregoing and related objects are readily-attained according to the present invention by the provision of a novel system and method for folding and or joining composite board, which serves to address the diverse requirements for creating different structures and consumer devices and packaging material of higher torsional resistance and compressional strength. This inventive folding and joining method makes possible the use of lightweight rigid and semi-rigid

7-

materials for folding or curving the said board into attractive products.

The system and method for folding and or joining composite board making use of a highly effective and efficient technique in the preferred embodiment makes
5 possible the creation of a product range formed of low cost constructional materials comprising diverse curved and angled shapes while maintaining the structural integrity of the said objects in the region of the curves and angled joints. In particular the novel joints make possible a whole new range of stylish shapes and forms of consumer products which are not only enhanced in
10 structural integrity and by the imagery which they bear using the method of the invention but are also cheaper.

The invention is particularly directed to forming objects made of lightweight but strong materials such as reinforced cardboard or plastic composite boards
15 comprising two outer sheets separated by a rigid spacing material, which is known to be generally difficult to curve or shape in non rectilinear forms. According to alternative embodiments, the current invention provides for a system and method to create stylish objects of enhanced appearance and diverse curved and angular forms made possible by combining the rendering technique
20 with a number of novel folding and jointing techniques.

The system and method according to the invention has advantageous application to the construction of all manner of containers and consumer structures such as office dividing walls, Wendy-houses, tables and chairs, and packaging materials
25 and insulating materials for pipes and the like.

Other objects and features of the present invention will become apparent from the following detailed description considered in connection with the accompanying drawings, which disclose several key embodiments of the
30 invention. It is to be understood, however, that the drawings are designed for the purpose of illustration only and that the particular descriptions of the chair, and the Wendy House are given by way of example only to help highlight the advantages of the current invention in transforming a flat composite board into the basis for a range of desirable consumer products and do not limit the scope
35 of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a schematic of the two sections of one embodiment of the variable angle dovetail joint which shows the dovetail profile section comprising a
40 rectangular void at the base for forming secure angled joints according to the system and method of the current invention.

FIG. 2a illustrates a schematic of a section of composite board comprising an array of perpendicular cuts according to the current invention which makes
45 possible the curving of the composite board while maintaining high torsional and compressional resistance.

1 -

FIG. 2b illustrates one way of depressing the forward edge of adjacent rectangular sections where alternating adjacent rows are depressed in the counter orientation.

5 **FIG. 2c** illustrates an alternative way of depressing the board according to an alternating scheme where both the forward and rear edges of every second rectangular section are depressed and also where alternating adjacent rows are depressed according to an alternating scheme.

10 **FIG. 3** illustrates the way in which the board can be curved by making use of the alternating depressions according to either **FIG. 2b** or **FIG. 2c** or a mixture of the two.

FIG. 4a shows a cross sectional view of a single rectangular cut section before and after its leading edge is depressed with a tool to cause the depression.

FIG. 4b shows a cross sectional view of a single rectangular cut section before and after both its leading and rear edges are depressed with a tool.

15 **FIG. 5** shows how a depressed section can move under the non-depressed section of an adjacent section when the board is curved.

FIG. 6 shows how a cutting tool can be used to make opposing compressional joints for folding the material.

20 **FIG. 7** shows an example of how a section of board can be curved according to the invention and be integrated with a horizontal surface to form a seat.

DESCRIPTION OF A PREFERRED EMBODIMENT

25 Referring now in detail to the drawings, the details of a preferred embodiment of a system and method for folding and or joining composite board such as honeycomb cardboard is described which can provide an improved method for manufacturing stylish containers.

30 The following description makes full reference to the detailed features according to different embodiments as outlined in the objects of the invention.

Referring now to FIG.1, therein illustrated is an example of a dovetail joint according to one embodiment of the current invention.

35 This joint is intended to be used with composite honeycomb board which comprises two outer rigid sheets and an internal filling material. The board comprises two sections (1, 4) where a first section (1) comprises an uncut section of board adjacent to a second section (4) which has had the inner surface of rigid material and the internal filling material removed to leave an area of rigid
40 card and a dovetail section (2) in the centre of this area. Directly at the base of the dovetail segment (2) is a rectangular void (3) which comprises an area (**a** times **b**). Since the rigidity of the composite board is due to two outer rigid sheets separated by filling material, by removing all but the outer rigid material, the board will fold at that point. The rectangular void (3) provides a cavity for
45 the base of the dovetail joint to fold into, thereby adding strength to the dovetail at that point. The width (**a**) of the rectangular void and the width of the base of

the dovetail joint determine the angle of the fold of the board at that point. FIG. 1 shows the board folded at ninety degrees and further shows a section of board with a dovetail section removed which matches the protruding dovetail above the shoulder (d). It is intended that this section (6) is an example of the end of another section of board or the other end of the same section of board which is folded back to be joined to the end section (7). The two end sections do not show the full extent of the board which is joined but only the detail of the dovetail joint.

5
10 Several such dovetail joints may be used to secure the joint between two sections of board. The flat section of rigid card (4) surrounding the dovetail profile (2) may be used to secure the two sections (6,7) together by glue.

15 Referring now to FIG. 2a, therein illustrated is a section of composite board (8) which has had a series of vertical cuts (9) and horizontal cuts (10) cut into one surface of the board leaving an area of rectangular sections cut into one surface of the board. The horizontal distance between the vertical cuts (9) and the horizontal cuts (10) determines the rate of curvature of the board. If the cuts (9) are very close together, the curvature of the board is high. Naturally, the board may comprise different horizontal widths between the vertical cuts 9 to curve the material at different rates in the same section of board.

20
25 The following figures Fig. 2b and FIG. 2c now refer to part of that section identified in FIG. 2a as area 8a.

30 Referring now to FIG. 2b is shown an example of an area of 12 rectangular sections in separate rows (13,14) wherein each section comprises one depressed edge in an alternating pattern (11,12) such that a first row (13) has the right edge depressed and the adjacent row (14) has the left row depressed.

35 Referring now to FIG. 2c is shown an alternative embodiment where alternating rectangular sections of board have their forward and rear edges depressed accordingly.

40 In both the instances shown in FIG. 2b and FIG. 2c, the consequence of the depressions in an alternating way gives rise to a misalignment of the horizontal edges when the board is curved such that the compressional resistance at right angles to the direction of curvature is high.

45 Referring now to FIG. 3 is shown a curved section of board (17) according to the current invention which shows how the rectangular sections move together when end A is curved towards end B and how the vertical cuts are out of alignment with the cuts in adjacent rows and how this thereby provides increased compressional resistance at right angles to the direction of curvature.

Referring now to FIG. 4a is shown a side view of a single cross section of board

(18) and the result of depressing one edge (21) by way of a depressing tool (19) which moves downwards in a vertical motion (20). This tool (19) may comprise part of a machining process or it may form an element of a rotary tool which comprises teeth in the shape of the desired depression profile.

5 FIG. 4b shows a similar cross section of board in which both ends of the material are depressed to provide a depression pattern as shown in FIG. 2c.

10 The tool in this case (23) will form part of a machine process to stamp the material in accordance with the desired depression pattern.

All manner of known production techniques may be used to incorporate the depressing tool into a production line for creating the desired pattern for either of the examples shown in FIG. 2b and FIG. 2c.

15 FIG. 5 shows how the depressed edge (24) can move into the composite board and under a non-depressed edge (25) when the material is curved.

20 FIG. 6 shows an alternative cutting method to create an opposed compression joint using a single cutting tool comprising a handle (27) and a cutting wheel (28) which produces a cut (29) into one of the rigid sheets of the board. The board when folded creates a very strong joint by making use of the internal resistance of the honeycomb filling without requiring that any material be removed.

25 FIG. 7 shows an example of the way in which a chair (701) may be formed from a sheet of composite board where the two opposing ends are symmetrically cut and curved in opposition and a single sheet of rigid board (703) is slotted through a void in the centre (702) and anchored at either end through a slot (704) and fixed by way of a dovetail joint according to the current invention (705) which in turn may be securely glued and covered. An alternative embodiment of the chair as shown in FIG. 8 may comprise an extension of the lower wall of the chair which wraps around and under the horizontal seat (703) at each end and locks into a slot in the wall to give additional support below the seat.

35 The same method may be used create an extension of an office dividing system where the curved end wraps completely around and can form various table areas in elegant opposition which are fully integrated with dividing walls and which may end with a closed cylindrical end which provides additional stability to the structure. This closed cylindrical end may, in one embodiment also comprise the basic structure to hold a set of drawers, each of which comprise a curved end to match the curvature of the system. Alternatively, the end of the wall divider may terminate in a cylinder to hold a plant pot which also adds some weight and stability to the structure.

45

In alternative embodiments, the same system and method may be used to create a child's Wendy house and all the furniture within it at very low cost. The table and chairs may be made very stylish and attractive using the method of the current invention.

5

In particular, in one of the alternative embodiments, the innovative curving method of the current invention makes possible the creation of low cost, high insulating temporary protective shelters to be used in situations of emergency. In this application, the outer surface of the composite board can be coated with a waterproof vinyl-like sheet or paint or compound. The curving of the board makes possible the creation of a continuous surface which will provide a much better resistance against damp and cold and against wind than simple tents. Tents in such instances are generally not warm enough while composite board has indeed quite high thermal insulation. In addition, the board can be curved and locked into shape using the joints of the current invention and a compound can be injected into the curved structure which will set and lock the structure into a solid shape. This curving and locking of the sheet into a closed structure having high thermal resistance which can be subsequently set into shape using an injection of sealant compound demonstrates the importance of this invention and the diverse range of applications to which it may be applied.

10

15

20

While only several embodiments of the present invention have been described in detail it will be obvious to those persons of ordinary skill in the art that many changes and modifications may be made thereunto without departing from the spirit of the invention.

25

The present disclosure is for illustration purposes only and does not include all modifications and improvements which may fall within the scope of the appended claims.

30

Claims:

1. Method for folding and/or joining a flat composite board or honeycomb board comprising two outer rigid material surfaces separated by an internal filling material in order to form 3-dimensional consumer objects and structures comprising fashionable shapes characterised by the steps of;
 - cutting said board from one side to create vertical and horizontal cuts which intersect at right angles to form one or more equally spaced rectangular cuts without removing material and leaving the other outer surface intact,
 - applying pressure to one or both edges of said board either side of one or a plurality of cuts,
 - folding or curving and/or joining said board.

2. Method for folding and/or joining a flat composite board or honeycomb board as disclosed in claim 1 wherein said board comprising two sections (1, 4) wherein a first section (1) comprising an uncut section of said board adjacent to a second section (4) and further comprising the steps of making a dovetail joint by
 - removing the inner surface of said rigid material and said internal filling material for leaving a first area of said rigid material and forming a dovetail section (2) of intact board in the centre of said first area of said second section (4), wherein said dovetail section (2) comprising a protruding shoulder (d), and
 - removing the inner surface of said rigid material and said internal filling material of said first section (1) for leaving a second area of said rigid material for forming at the base of said dovetail section (2) a rectangular void (3) providing a cavity where said board is to be folded, wherein
 - the width (a) of said rectangular void (3) and the width of the base of said dovetail section (2) determining the angle of the fold said dovetail joint of said board, and further
 - removing the inner surface of said rigid material and said internal filling material of another section (6) of a second board or of the other end of the same board and matching the protruding material of said board with the removed material of said second board or of said other end of the same board for folding and joining said another section (6) to the end section (7) of said board.

3. Method for folding and/or joining a flat composite board or honeycomb board as disclosed in claim 2 further repeating one or a plurality of times said step of making a dovetail joint on said first section (1) and said second section (4) of said board.

4. Method for folding and/or joining a flat composite board or honeycomb board as disclosed in claim 2 or 3 further gluing the flat section of rigid card (4) in order to join said two sections (6,7).

5. Method for folding and/or joining a flat composite board or honeycomb board as disclosed in claim 1 wherein said step of making one or a plurality of line cuts further comprising;
 - making a series of vertical line cuts (9) and a series of horizontal line cuts (10) to build an area of rectangular cuts and enabling said board to be curved along a horizontal axis wherein the horizontal distance between said vertical line cuts (9) determining the rate of curvature.

6. Method for folding and/or joining a flat composite board or honeycomb board as disclosed in claim 5 wherein in an area (8a) of said composite board;
 - within each vertical column of said rectangular cut sections depressing one vertical cut edge of a first rectangular cut section by means of a depressing tool (19),
 - repeating the depressing of said vertical cut edge of each following rectangular cut section in the vertical column in an alternating pattern (11,12), wherein
 - in a first horizontal row of rectangular cuts (13) the right vertical edge of each of said rectangular cut being depressed, and
 - in the following horizontal row of horizontal cuts (14) the left vertical edge of each of said rectangular cut being depressed, and wherein
 - said steps of depressing alternating left and right vertical edges of contiguous rectangular cuts moving down said column until the end of said board, and wherein
 - said steps being repeated for each of the columns of said rectangular cuts until said area (8a) comprising rows of rectangular cuts having one vertical depressed edge adjacent to a non-depressed vertical edge and wherein each of said contiguous rows having the vertical cut edges of said rectangular cuts depressed in an alternating pattern.

7. Method for folding and/or joining a flat composite board or honeycomb board as disclosed in claim 5 wherein in an area (8a) of said composite board;
 - within each of said vertical column of rectangular cut sections depressing both of said vertical cut edges of a first rectangular cut section by means of a second depressing tool (23)
 - repeating the depressing of both of said vertical cut edges of every second rectangular cut section in the vertical column and creating a column of alternating depressed rectangular sections,
 - repeating said step of depressing both vertical cut edges of every alternate rectangular cut section to each contiguous column of said rectangular cuts in the column in the alternate sense to the previous contiguous column, and
 - repeating said steps of depressing for each of said columns of said rectangular cuts until said area (8a) comprising rows of said rectangular cuts having alternating depressed and intact of said rectangular sections and where contiguous rows having rectangular cuts comprising depressed and intact rectangular sections in an alternate sense.

8. Method for folding and/or joining a flat composite board or honeycomb board as disclosed in claim 5 wherein in an area (8a) of said composite board;
 - within each of said vertical column of said rectangular cut sections depressing both vertical cut edges of a first rectangular cut section by means of a second depressing tool (23)
 - repeating the depressing of both vertical cut edges for each of said rectangular cut section in said vertical column and creating a column of rectangular sections comprising both edges depressed, and
 - leaving the edges of every rectangular section in every second column intact, and
 - repeating said step of depressing both vertical edges of each of said rectangular section in said column for every alternate column until said area (8a) comprising rows of rectangular cuts comprising alternating depressed and intact rectangular sections and where contiguous rows having rectangular cuts comprising depressed and intact rectangular sections wherein said depressed and intact rectangular sections align vertically for forming alternating columns of depressed sections and intact sections.

9. Method for folding and/or joining a flat composite board or honeycomb board as disclosed in claim 6 or 7 or 8 wherein said tool (19, 23) being incorporated in a machine in order to optimise the making of said depressed edges in one or a combination of said patterns.
10. Method for folding and/or joining a flat composite board or honeycomb board as disclosed in claim 6 or 7 or 8 or 9 wherein the width of the rectangular cut sections determining the rate of curvature of the board.
11. Method for folding and/or joining a flat composite board or honeycomb board as disclosed in claim 1 wherein said step of cutting further comprising a simultaneous step of depressing and cutting for forming a cut comprising depressed edges (29) wherein
the tool for manufacturing said edges comprising a cutting wheel (28) depressing with an appropriate pressure said board along a line for folding said board (26) in different angles and for forming a joint between said 2 sections.
12. Product made by the method of claims 1-11.
13. Product as disclosed in claim 12 wherein said product being a storage box or an office dividing system or a cupboard or a plant container or a chair or a table or a bed or a children's playhouse (Wendy houses) or a dolls house or a bag or a pet box or a pet home or a rabbit-burrowing tube for keeping said rabbit busy or a pet casket or an ashes casket or a coffin or a bird box or a bee house or an exhibition stand.
14. A chair (701) as disclosed in claim 13 wherein the 2 opposite ends of said composite board are symmetrically cut and curved in opposition and further comprising a single sheet of rigid board (703) slotted through a void in the centre (702) and anchored at either end through a slot (704) and fixed by said dovetail joint (705) and glued.
15. Product as disclosed in claim 12 said product further being a high insulating temporary protective shelter to be used in situations of emergency, wherein
said shelter further comprising a waterproof vinyl-like sheet or paint or compound coating and wherein
said composite board having a high thermal insulation.
16. Product as disclosed in claim 12 or 15 comprising an injected sealant compound within the formed curved structure in order to strengthen the shape of said structure.

Product as disclosed in claim 12 for lining an excavated earth channel to receive a flowing concrete foundation to hold the said concrete in an optimum form and prevent collapse of the excavated earth channel.



For Innovation

15

Application No: GB0605415.9 **Examiner:** Robert Mirams
Claims searched: 1, 5 to 11 and, in part 12 to 17 **Date of search:** 19 September 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	n/a	WO94/13910 A1 (IATROU) e.g. page 13 line 29 to page 14 line 1
A	n/a	GB2162818 A (LEE) whole document
A	n/a	GB1075336 A (HODGKINSON) whole document
A	n/a	GB1029562 A (HODGKINSON) whole document
A	n/a	EP0353564 A (MASONITE) whole document

Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

B5N

Worldwide search of patent documents classified in the following areas of the IPC

B26D; B31F; B32B

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, JAPIO