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(54) Coated waterproof carton with gusset panels

(57) A carton blank, a method for erecting a carton blank and a carton resulting from such erection is disclosed. The blank (2) has a base panel (4) and four side panels (6,8,10,12) forming side walls, each foldingly joined along each side of the base. Each adjacent pair of side walls is provided with a gusset (14,16,18,20) which is divided into two portion by a medial fold line. In accordance with the invention, the shape of the gusset portions on either side of the medial fold line is different so that during erection when the gusset panel portions are automatically folded into coplanar relationship, one portion remains exposed and is permitted to come into contact with the inner or outer surface of the side wall. One surface of the blank is provided with a polymer coating which melts on heating so that the carton erection can be completed by simply applying heat and pressure in the region of the gusset portion which is in contact with the side wall thereby securing one to the other through the adhesive action of the polymer on cooling. In this manner, the requirement for a separate adhesive application step during the manufacture of the carton is avoided.

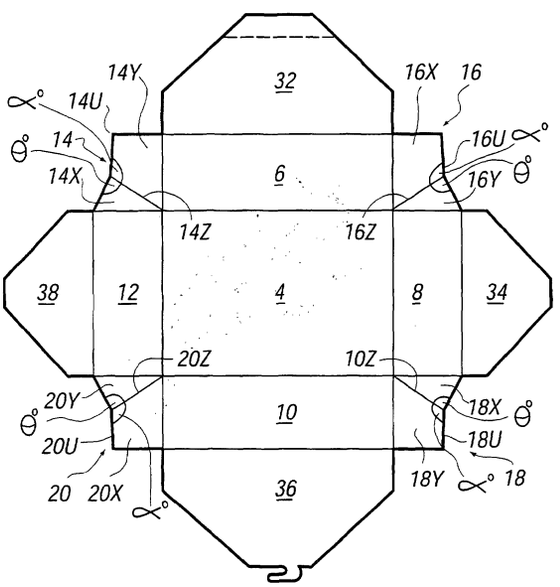

FIG. 4

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Description

[0001] This invention relates to a carton having folded gusset panels which facilitate the rigidification of the completed carton which is ideally erected from a single blank of a cut and creased sheet material, and more specifically this invention relates to cartons erected from cut and creased sheet materials which are provided on one side with a polymeric or other waterproof non-toxic chemical coating.

[0002] Although this invention is described hereinafter with almost exclusive reference to open-topped cartons which are adapted to contain foodstuffs or other moisture laden products, it will be appreciated by the skilled reader that the invention is not be considered as limited by the particular application to which the carton may be put. Notwithstanding this, the ideal and most probably only application of such cartons is to contain foodstuffs which during carton use will come into contact with the polymer coated carton inner walls.

[0003] The concept of using the polymeric coating applied to one or more surfaces of a cut and creased sheet material to prevent the board material from absorbing moisture from a food product within the carton is well known. Typical coatings include polyethylene terephthalate (PET), and polyethylene (PE) among others, and many of the polymers commonly used for this are known to become molten at temperature usually above 250°C. In their molten phase, such polymers become adhesive, and it is also well known to heat certain areas of the polymer coated surfaces of a carton blank prior to erection so that said areas can be adhesively secured to other areas of the blank during the erection process. The inherent advantage of manufacturing cartons in this manner is that it is not necessary during the erection to separately adhesive to particular areas of the blank, but of course coated board tends to be more expensive than uncoated board and furthermore the machinery used to erect the cartons from the blanks must be provided with heating apparatus in a convenient location.

[0004] The use of heat to melt polymer coatings during the formation of cartons is disclosed in our previous European published specification EP0995587.

[0005] The reader will also be aware of the vast number of possible carton shapes which are already available or which have been previously considered by designers. This invention is of particular relevance to a type of carton construction which involves foldable gussets which are connected along the edges of adjacent walls of the carton and which are folded over into contact with and adhered to the inner or outer surface of one or other of the particular walls to which the foldable gusset is connected.

[0006] The particular type of carton construction to which this invention is ideally but not exclusively suited is best described with reference to Figures 1 and 2 as provided herewith, which respectively show a perspective view of a carton in a partial state of erection, and a perspective view of a carton after complete erection but prior to the securing of the foldable gussets.

[0007] As can be seen from Figure 1, a carton blank 2 is formed from a single sheet of cut and creased material, typically a coated board, wherein the creases or fold lines define a number of separate panels. For example, a base 4 is defined by four fold lines 4A, 4B, 4C, 4D which also define the lower edges of side wall panels 6, 8, 10, 12. Between each of said side wall panels are foldingly connected gussets 14, 16, 18, 20 which each consist of pairs of triangular panels 14X, 14Y, 16X, 16Y, 18X, 18Y, 20X, 20Y which are essentially mirror images of one another about the fold lines 14Z, 16Z, 18Z, 20Z which separate said triangular panels. As can be seen from Figure 1, during erection of the carton, the side walls 6, 8, 10, 12 are rotated upwardly about the fold lines 4A, 4B, 4C, 4D and as this occurs, the gussets are either constrained or automatically fold outwardly as shown (or inwardly depending on the nature of the fold lines defining said gussets) and in doing so, the triangular panels of each gusset come into superposed relationship as shown in Figure 2. In this Figure, the carton erection is completed as far as the folding of the side walls into a substantially vertical orientation is concerned, the final steps in the construction are the application of spots of adhesive 24, 26, 28, 30 in the upper corners and on the outer surfaces of side wall panels 8, 12, and the folding of the gusset portions 14, 16, 18, 20 about the fold lines by which they are joined to the side wall panel pairs 6/8, 8/10, 10/12 and 12/6 respectively so that one of the surfaces of the triangular panels comes into contact with the adhesive and thus securing the gusset in its closed position (not shown).

[0008] Although Figures 1 and 2 show the carton as having lid panels 32, 34, 36, 38, such panels are not essential and a variety of different panels or flaps may be provided foldingly or otherwise connected along the uppermost edges of the side wall panels.

[0009] Relevant prior art documents showing cartons of the type described above are US5411204 to DeMay (on which the above Figures are fundamentally based), and GB2338475A in the name of Wilkins and others. Both these documents describe cartons erected from a single carton blank and provided with corner gussets which are foldingly connected to both adjacent side wall panels along at least part of their edges and which are folded around the corners of the erected cartons and secured against the side walls thereof. GB2338475A is limited by the feature that the lengths of the uppermost side of each of the triangular portion which constitute the gusset are approximately the same length as the width of the side walls to which the gusset portions are ultimately adhered. In this configuration the gussets overlap one another in the completed carton, and the numerous layers of board adjacent one another enhance the rigidity of the side walls of the carton to which the gussets are adhesively secured.

[0010] The primary disadvantage associated with the

carton construction described above is that the application of adhesive in discrete areas to either the outer surface of the side walls or to the surfaces of the triangular portions both complicates and lengthens the construction process, and furthermore apparatus adapted for carton manufacture in this manner must obviously be provided with means of applying an adhesive repeatably and with great rapidity.

[0011] It is an object of this invention to provide a method of constructing a carton from a single blank of cut and creased sheet material wherein the creases define a plurality of side wall panels around a base panel and gussets foldingly connected between one or more pairs of adjacent side walls which precludes the need for discrete application of adhesive but which nevertheless maintains or even enhances the rigidity of the completed carton.

[0012] It is a further object of the invention to provide a carton blank of cut and creased sheet material for use in the method.

[0013] It is a yet further object of the invention to provide a carton blank for use in the construction of cartons with side walls and gussets foldingly interconnected between said side walls which reduces the weight of the ultimately erected carton.

[0014] According to the invention there is provided a method of producing a carton from a carton blank, said blank in its pre-erection form having a plurality of panels defined between a plurality of fold lines and the free edges of said blank, said blank having at least a base panel defined by three or more fold lines by which a corresponding number of side panels are foldingly connected to said base, one or more pair of adjacent side walls being connected by a gusset which is foldingly connected to said side walls along at least part of the fold lines which define the side walls on either side of said gusset, said gusset having a medial fold line dividing same extending from the intersection of the fold lines between which the gusset is defined and a free edge of said gusset, said method including the steps of rotating the side wall panels upwardly about the three or more fold lines which simultaneously causes the gusset portions on either side of the medial fold line to approach one another until in planar contact, further including the step of folding the flattened gusset portions into planar contact with one or other of the side walls between which said gusset is provided and adhering same to said side wall, characterised in that the blank is formed in a material coated on at least one side with a meltable waterproof plastics or polymer composition and that the adhesion of the gusset portions to the side walls is achieved by compressing and simultaneously heating the gusset portion while in planar contact with said side wall, said gusset portions being differently shaped on either side of said medial fold line so that an area of one gusset portion remains exposed after the gusset portions are in planar contact, said exposed gusset portion being adhered to the side wall panel by virtue of the meltable composition thereon.

[0015] Preferably the material is coated on one side with a polymer or plastics composition, and most preferably with a polymer composition such as PE or PET.

[0016] Most preferably, the gusset portions approach one another to the outside of the interior of the carton defined by the side wall panels after erection thereof eventually coming into planar contact when said side walls are fully erected with respect to the base panel, said gussets then being folded around the vertices of the carton defined by the fold lines between which said gussets are provided and into contact with the outer surface of said side wall panels.

[0017] Preferably, the base is quadrangular and defined by four fold lines by which four side panels are foldingly connected thereto, and most preferably the base is rectangular.

[0018] In a second aspect of the invention, there is provided a carton blank, said blank in its pre-erection form having a plurality of panels defined between a plurality of fold lines and the free edges of said blank, said blank having at least a base panel defined by three or more fold lines by which a corresponding number of side panels are foldingly connected to said base, one or more pair of adjacent side walls being connected by a gusset which is foldingly connected to said side walls along at least part of the fold lines which define the side walls on either side of said gusset, said gusset having a medial fold line dividing same extending from the intersection of the fold lines between which the gusset is defined and a free edge of said gusset, characterised in that the blank is formed in a material coated on at least one side with a meltable waterproof plastics or polymer composition and in that the gusset portions on either side of the medial fold line which divides the gusset into its two portions are of different shape so that an area of at least one gusset portion remains exposed after the gusset portions are in planar contact after erection.

[0019] Preferably, the free edge of the gusset portions on either side of the medial fold line extend away from said medial fold line at different angles.

[0020] Those skilled in the art will realise that the use of a coated board which can be heated to melt the coating and use same as an adhesive is useful firstly because the requirement for separate adhesive application is mitigated, but additionally in the present invention, not only are the gusset portions on either side of the medial fold line are adhered to each other when in planar contact but the area of one of the gusset portions which is not covered by the other when in planar contact therewith, that is the exposed area, is adhered to the outer surface of an adjacent side wall panel. This significantly enhances structural rigidity of the side wall panel without any need to increase the number of layers of board which constitute the side wall.

[0021] A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings wherein:

Figure 1 shows a perspective view of a carton blank of prior art configuration in a partial state of erection,

Figure 2 shows a perspective view of the carton blank of Figure 1 in a more complete state of erection,

Figure 3 shows a perspective view of a carton blank according to the invention in a practically complete state of erection, and

Figure 4 shows a plan view of a carton blank according to the invention.

[0022] Referring firstly to Figure 3 in which reference numerals corresponding to the those used in Figures 1 and 2 are used, it can be seen that the gussets 14, 16, 18, 20 are provided with exposed areas which are hatched as regards gussets 14, 20. To complete the carton construction from this state of carton erection, the gussets 14, 20 are rotatingly folded as shown at 40, 42 respectively about corners 44, 46 defined by the fold lines which in turn define the sides of the panels 6, 10, and 12 proximate said gussets until the gussets are adjacent the side wall 12. The gussets 16, 18 are rotated in like manner as shown at 48, 50 until both are adjacent side panel 8. In this position, the compression and heat which is applied to both the side wall and both gussets melts the polymeric or plastics composition from which the blank is made firstly adhesively binding the contacting surfaces of gusset portions 14X, 14Y, 16X, 16Y, 18X, 18Y, 20X, 20Y together, and secondly adhesively bonding the exposed areas of gusset portions to the outer surface of the side walls 12 and 8 respectively.

[0023] From Figure 4 where like reference numerals have again been used, it can be seen that the shape of the gusset portions 14Y, 16X, 18Y and 20X adjacent side wall panels 6 and 10 is different and of larger area than the adjacent gusset portions 14X, 16Y, 18X and 20Y. Furthermore, it can be seen that the angles at which the free edges 14U, 16U, 18U, 20U which bound the gussets 14, 16, 18, 20 extend away from the medial fold lines 14Z, 16Z, 18Z, and 20Z at different angles. Specifically, the free edges subtend an obtuse angle α° with the medial fold lines in the gusset portions 14Y, 16X, 18Y, 20X and are nearperpendicular to the said medial fold lines in the gusset portions 14X, 16Y, 18X, 20Y, as shown at θ°. This difference ensures that at least some part of the total area of gusset portions 14Y, 16X, 18Y, 20X will remain exposed after the adjacent gusset portions 14X, 16Y, 18X, 20Y are folded into planar contact therewith as the cart is erected, as demonstrated in Figure 3. It is also to be noted that these exposed portions are in the same surface of the blank as the inner surfaces of the base and side wall panels, and are therefore coated with the polymeric or plastics composition which can melt and adhesively secure the exposed area of the gusset portion, and thus the gusset as a whole to the respective outer surface of the side wall panels, which may not be so coated.

[0024] It will be immediately understood from the description provided above that the area remaining exposed after the gusset portions come into planar contact during erection can be altered as required by providing different gusset portion shapes and provided that the gusset portions which constitute the gusset are not identical in shape or mirror images of one another, then there will always be some area of one or other of the gusset portions which remains exposed. The particular gusset portion on which the exposed area is presented will dictate to which of the adjacent side walls said exposed areas can be adhered. The invention is to be considered as embracing all possible permutations for folding rotation of the gussets into contact with adjacent side walls.

Claims

1. A carton blank, said blank in its pre-erection form having a plurality of panels defined between a plurality of fold lines and the free edges of said blank, said blank having at least a base panel defined by three or more fold lines by which a corresponding number of side panels are foldingly connected to said base, one or more pair of adjacent side walls being connected by a gusset which is foldingly connected to said side walls along at least part of the fold lines which define the side walls on either side of said gusset, said gusset having a medial fold line dividing same extending from the intersection of the fold lines between which the gusset is defined and a free edge of said gusset, **characterised in that** the blank is formed in a material coated on at least one side with a meltable waterproof plastics or polymer composition and **in that** the gusset portions on either side of the medial fold line are of different shape so that an area of at least one gusset portion remains exposed permitting the exposed portion to come into contact with the side panel after the gusset portions are in planar contact when the carton is erected from said blank.

2. A blank according to claim **characterised in that** the free edge of the gusset portions on either side of the medial fold line extend away from said medial fold line at different angles.

3. A method of producing a carton from a carton blank, said blank in its pre-erection form having a plurality of panels defined between a plurality of fold lines and the free edges of said blank, said blank having at least a base panel defined by three or more fold lines by which a corresponding number of panels forming side walls are foldingly connected to said base, one or more pair of adjacent side walls being connected by a gusset which is foldingly connected

to said side walls along at least part of the fold lines which define the side walls on either side of said gusset, said gusset having a medial fold line dividing same extending from the intersection of the fold lines between which the gusset is defined and a free edge of said gusset,
said method including the steps of rotating the side wall panels upwardly about the three or more fold lines which simultaneously causes the gusset portions on either side of the medial fold line to approach one another until in planar contact,
folding the flattened gusset portions into planar contact with one or other of the side walls between which said gusset is provided and adhering same to said side wall,
characterised in that
the blank is formed in a material coated on at least one side with a meltable waterproof plastics or polymer composition and that the adhesion of the gusset portions to the side walls is achieved by compressing and simultaneously heating the gusset portion while in planar contact with said side wall, said gusset portions being differently shaped on either side of said medial fold line so that an area of one gusset portion remains exposed after the gusset portions are in planar contact, said exposed gusset portion being adhered to the side wall panel by virtue of the meltable composition thereon.

4. A method according to claim 3 **characterised in that** the gusset portions approach one another to the outside of the interior of the carton defined by the side wall panels after erection thereof eventually coming into planar contact when said side walls are fully erected with respect to the base panel, said gussets then being folded around the vertices of the carton defined by the fold lines between which said gussets are provided and into contact with the outer surface of said side wall panels.

5. A blank according to claim 1 or 2, or a method according to claim 3 or 4 **characterised in that** the base is quadrangular and defined by four fold lines by which four side panels are foldingly connected thereto.

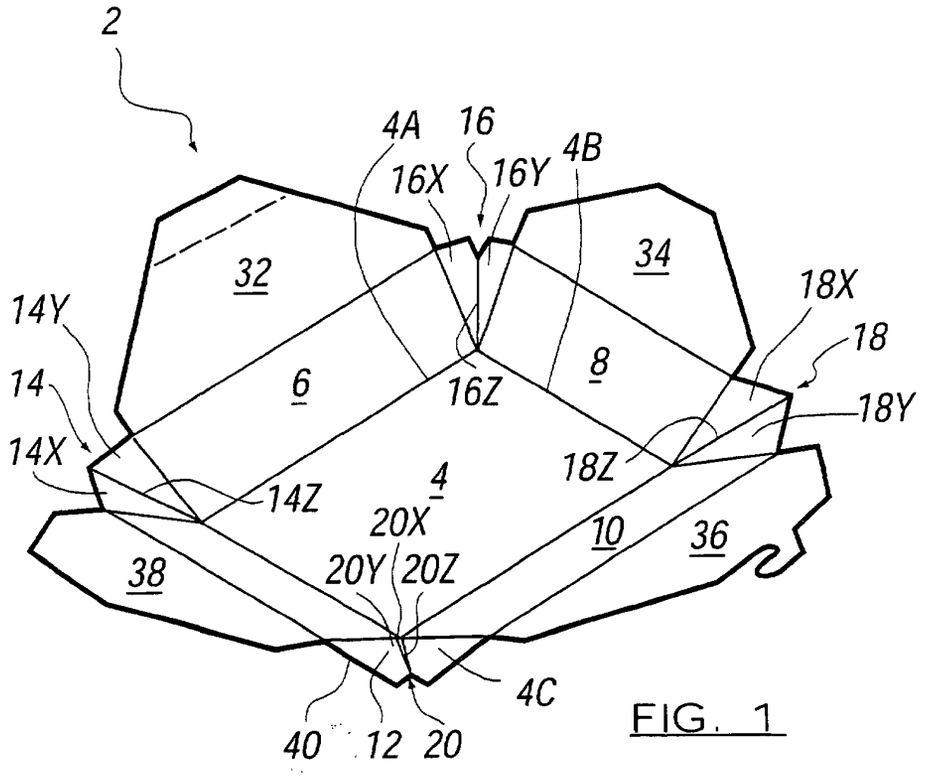
6. A blank or method according to claim 6 **characterised in that** the base is rectangular.

7. A blank or method according to any preceding claim **characterised in that** the material is coated on one side with a polymer or plastics composition.

8. A blank or method according to claim 7 **characterised in that** the material is coated with PE or PET.

9. A carton erected according to the method of any of claims 3-8.

10. A carton erected from the blank of any of claims 1-2 and 5-8 when dependent on 1 or 2.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4A
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16X
16Y
4B
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18X
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14Y
14
6
16Z
8
18Y
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14Z
20X
10
36
38
20Y
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4C
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FIG. 1

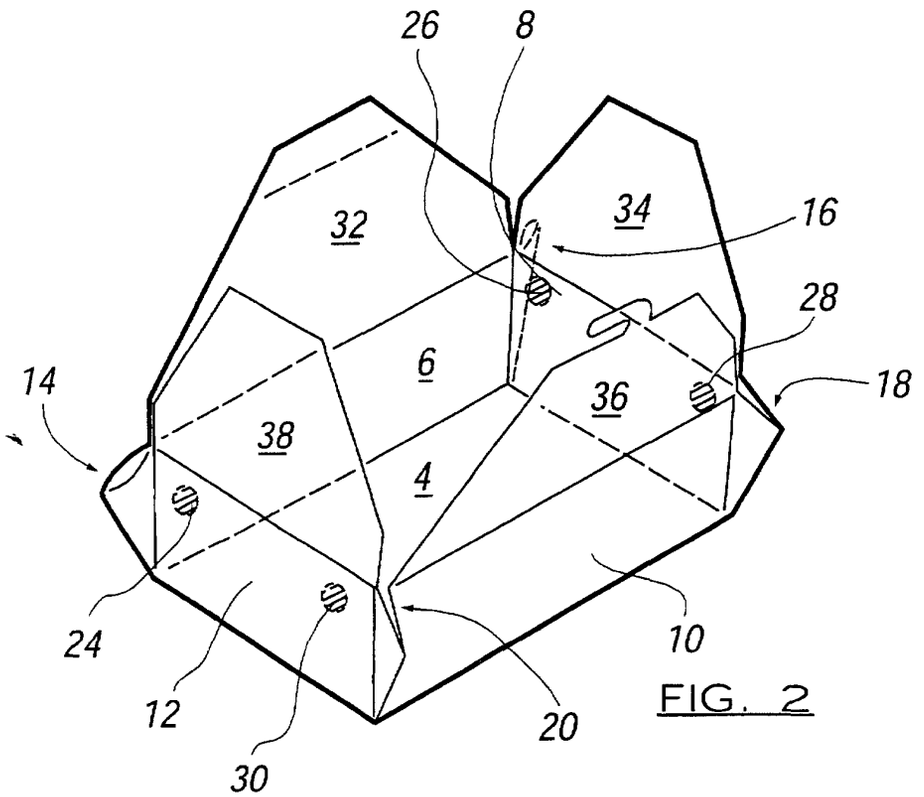
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FIG. 2

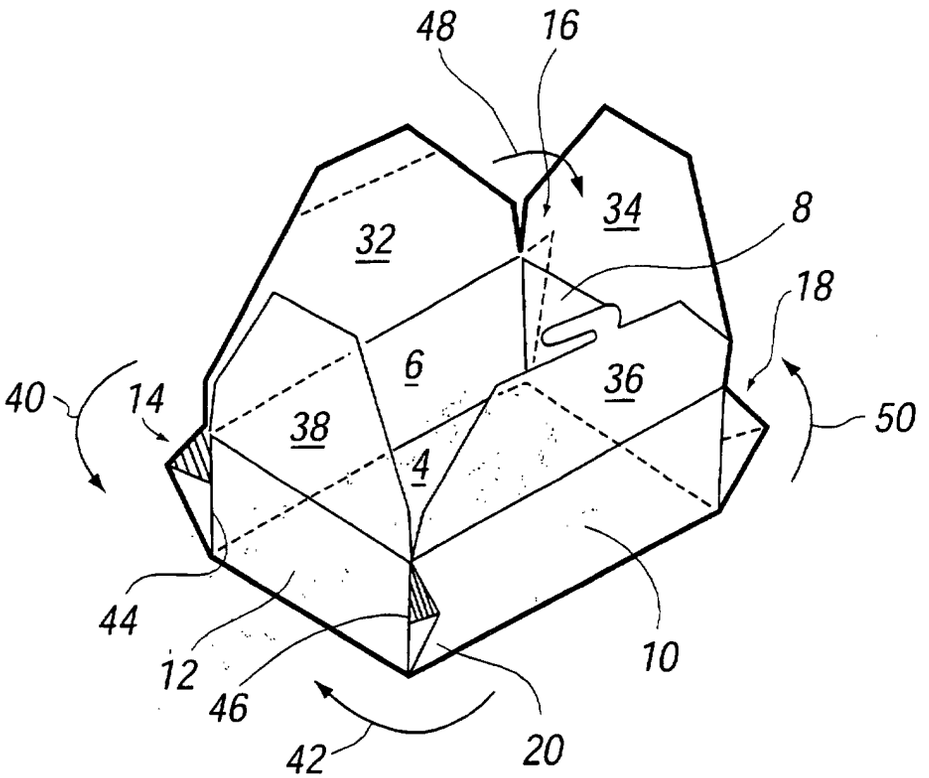
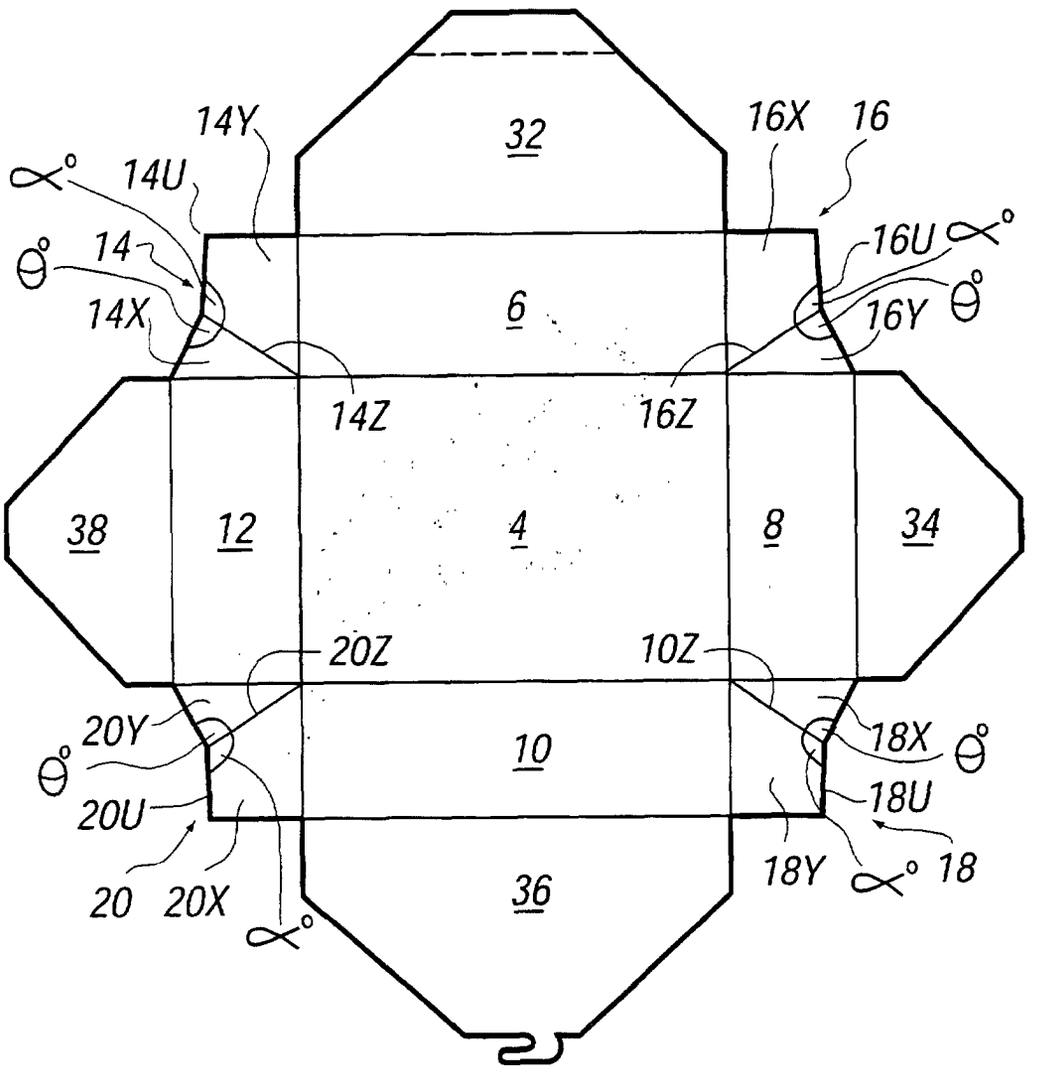


FIG. 3


14Y
16X
16
32
α°
14U
θ°
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10Z
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18U
18Y
α°
18
20
20X
α°
36

FIG. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 00 2531

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	GB 1 075 786 A (WEYERHAEUSER CO) 12 July 1967 (1967-07-12) * the whole document *	1-10	B65D5/24 B65D5/56 B65D5/42
X	GB 975 414 A (TILLOTSONS LIVERPOOL LTD) 18 November 1964 (1964-11-18) * the whole document *	1-3,5-10	
A	US 5 638 978 A (CADIENTE ANTHONY) 17 June 1997 (1997-06-17) * abstract; figures *	1-10	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	23 May 2002	Balz, O

CATEGORY OF CITED DOCUMENTS

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23-05-2002

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