(12) UK Patent Application (19) GB (11) 2516490 (13) A

(43) Date of A Publication 28.01.2015

(21) Application No: 1313232.9

(22) Date of Filing: 24.07.2013

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(51) INT CL:
B65D 81/38 (2006.01)

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(58) Field of Search:
INT CL **B65D**

(54) Title of the Invention: **Insulated container**
Abstract Title: **A blank for the assembly of an insulated container**

(57) A blank 100 for the assembly of an insulated container, comprising a plurality of insulation panels 110-160 interconnected by connecting portions 191-198 is disclosed. Providing the insulation panels with connecting portions has the advantage of bringing the panels together with a close tolerance fit during assembly of the insulated container. A close tolerance fit minimises heat transfer through the joints 171-178 between the insulation panels, commonly referred to as “edge loss”, and therefore may provide an improved insulated container compared to an insulated container with no connecting portions between insulation panels. The insulation panels of the blank may be formed from a polymer such as polystyrene or others. The blank may comprise retainers such as adhesive tape for retaining the container in its assembled configuration. A sheet comprising a plurality of blanks; an insulated container formed from the blank; a method of forming an insulated container; methods of forming the blank, and; an apparatus for forming the blank, are also disclosed.

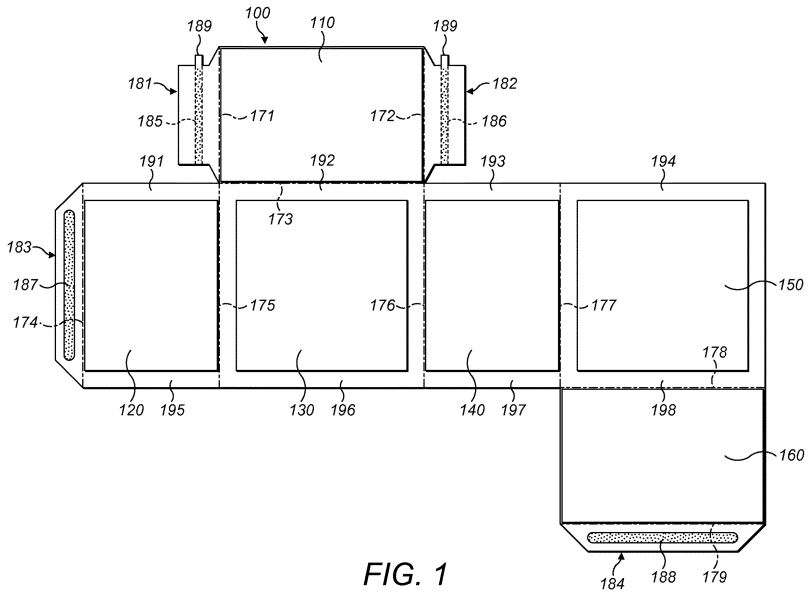

FIG. 1

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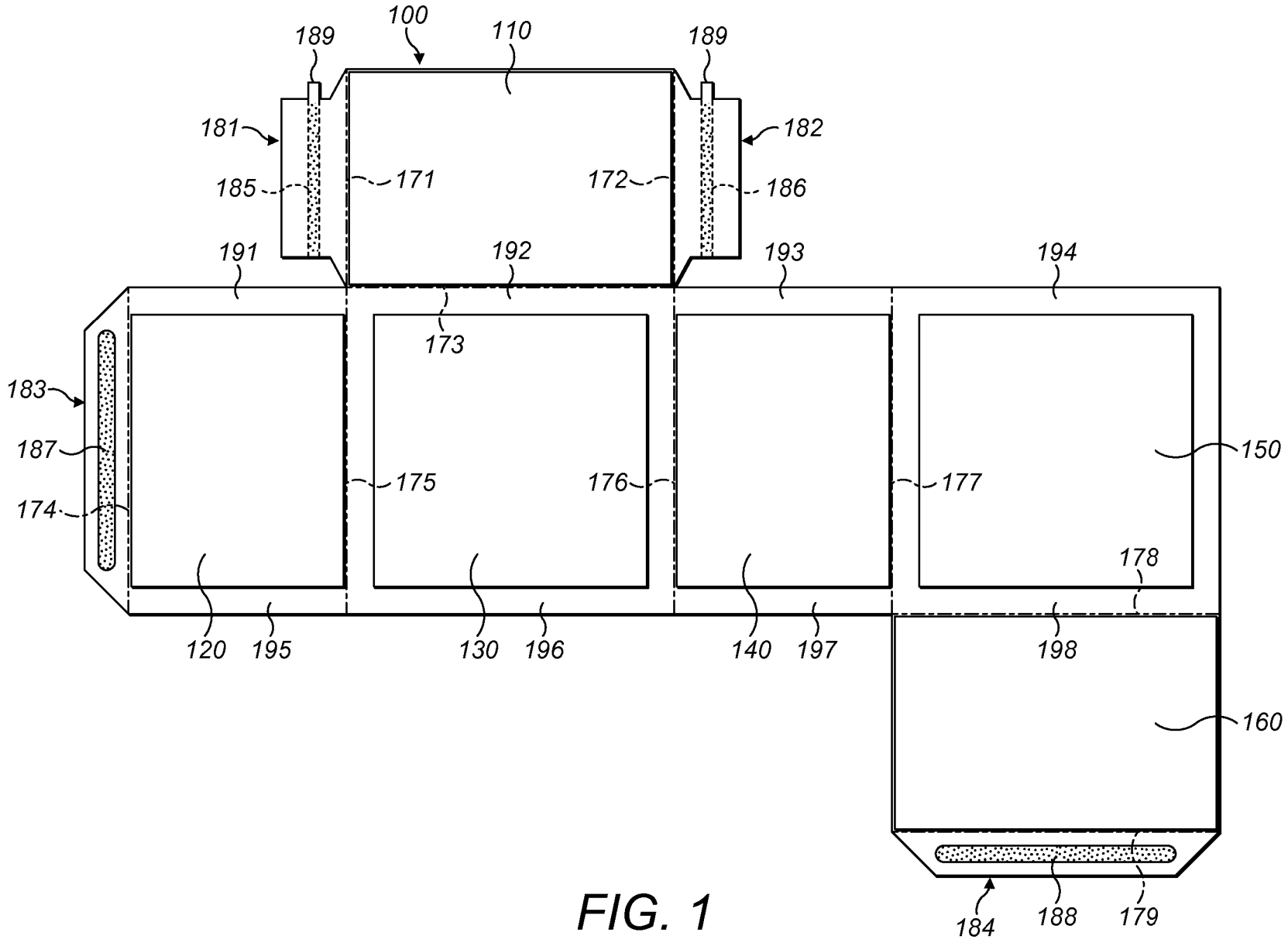
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FIG. 1

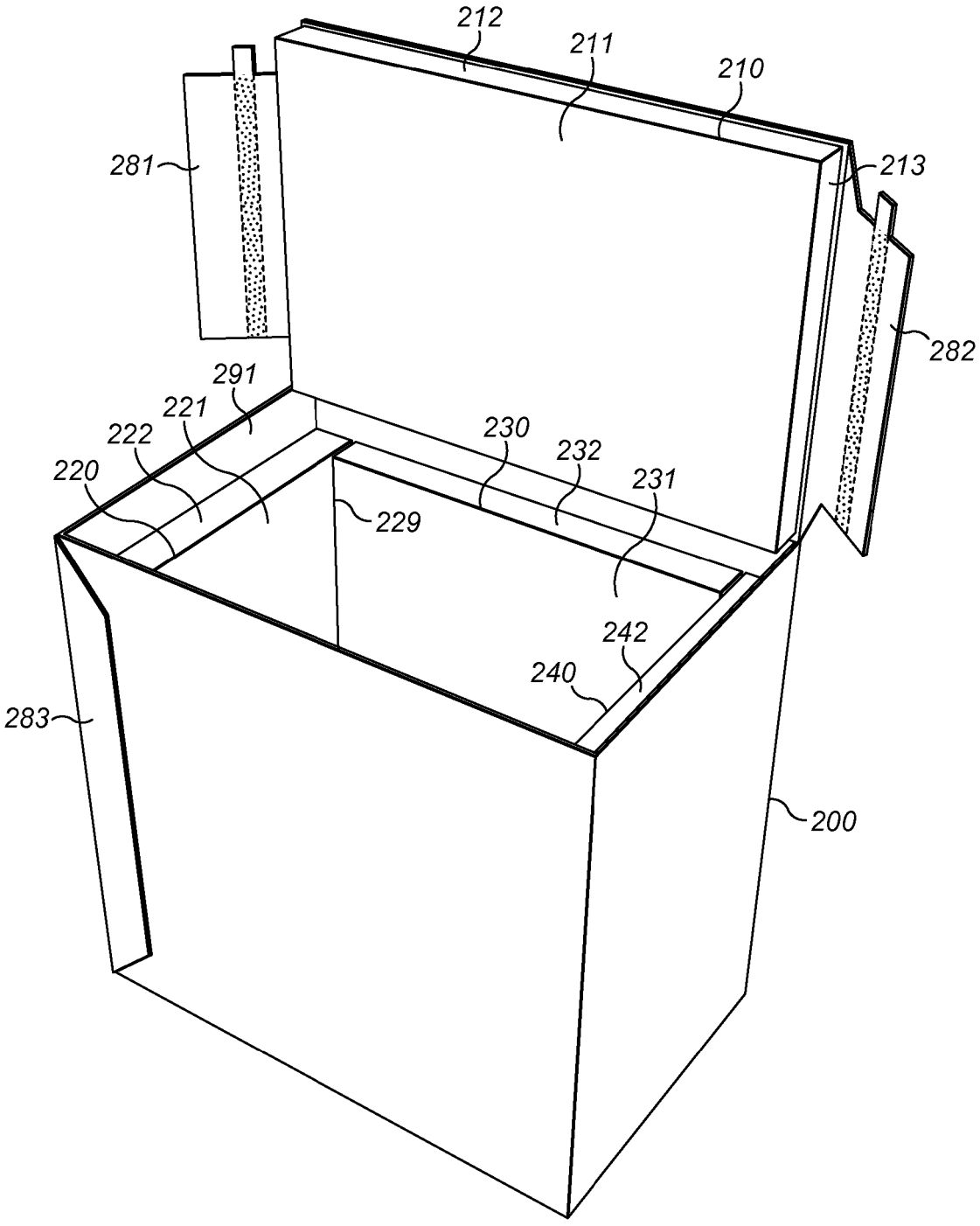
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FIG. 2

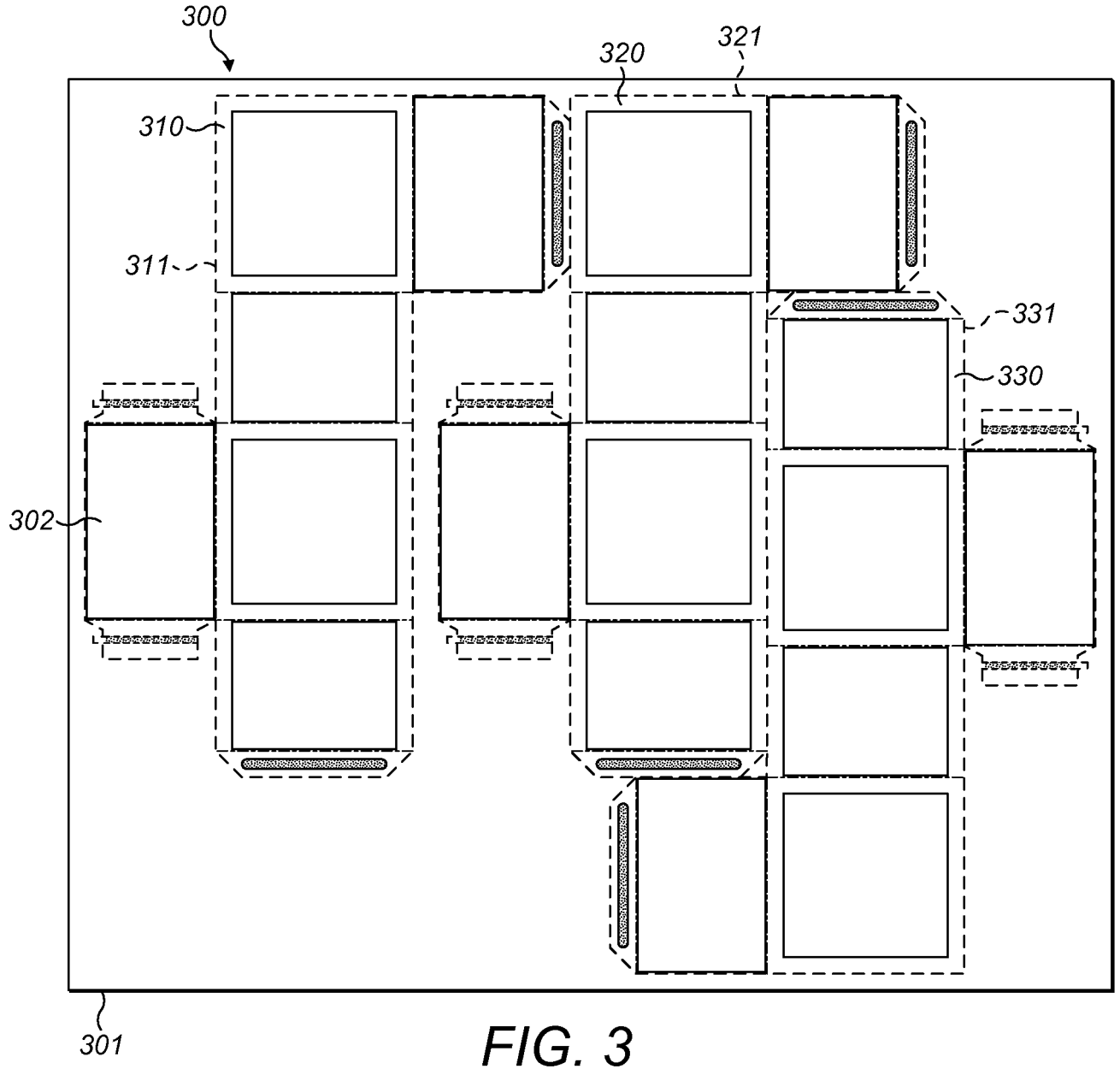

FIG. 3

Insulated Container

The present invention relates to a blank for the assembly of an insulated container, a sheet comprising a plurality of such blanks, insulated containers, methods of assembling insulated containers and apparatus for the construction of the aforementioned blanks, sheets and containers.

The transportation of temperature sensitive goods requires the use of packaging which can maintain the temperature of the temperature sensitive goods within a pre-determined range. This may be achieved by providing a packaging item with insulation, either in the form of loose insulation material or by constructing a rigid box out of an insulating material. For example, rigid insulating boxes made from polystyrene foam have been used for many years to transport various, relatively high value temperature sensitive goods such as medical supplies and biological samples. However, many temperature sensitive goods are of relatively low value, such as food and beverage products, and therefore may not justify the cost of providing and using rigid insulated boxes.

It is an aim of the present invention to overcome at least one of the disadvantages of the prior art.

It is an aim of the present invention to provide an insulated container which is easily assembled into an insulated container.

It is an aim of the present invention to provide an insulated container which can be shipped to a customer or end user more efficiently and cost effectively than insulated containers of the prior art.

It is an aim of the present invention to provide an insulated container which occupies less shipping volume when shipped to a customer or end user than insulated containers of the prior art.

According to the present invention there is provided a blank, a sheet, methods and an apparatus as set forth in the appended claims. Other features of the invention will be apparent from the dependent claims, and the description which follows.

According to a first aspect of the present invention there is provided a blank for the assembly of an insulated container, wherein the blank comprises a plurality of interconnected insulation panels; and wherein the insulation panels are interconnected by connecting portions.

Providing the insulation panels with connecting portions has the advantage of bringing the insulation panels together with a close tolerance fit during assembly of the insulated container. A close tolerance fit between the insulation panels minimises heat transfer through the joints between the insulation panels, commonly referred to as “egde loss”, and therefore may provide an improved insulated container compared to an insulated container with no connecting portions between insulation panels.

The blank may be assembled to form a five-sided container. The five-sided container may have an opening which can be covered with the addition of a separate lid portion. The blank may be assembled to form a six-sided container. The six-sided container may comprise at least one side which can be used as a re-closable lid.

The interconnected insulation panels of the blank are suitably configured to allow the blank to be manipulated into an assembled configuration to form an insulated container.

The blank comprises a plurality of interconnected insulation panels. The insulation panels may provide at least a part of the side-walls of the assembled container. The insulation panels suitably form substantially complete side-walls of the insulated container.

Suitably the blank comprises at least five insulation panels. Preferably the blank comprises six insulation panels. Preferably at least one of the insulation panels is comprised within a closable lid. Preferably the lid is re-closable once opened.

The insulation panels may be formed from a polymer insulation material. Suitable polymer insulation materials include polystyrene, polyethylene, polyurethane and polylactic acid. Suitable forms of polystyrene insulation material include beaded expanded polystyrene (EPS) and extruded polystyrene (XPS). A suitable form of polyethylene insulation material is expanded polyethylene (EPE). A suitable form of polyurethane insulation material is polyurethane foam. A suitable form of polylactic acid insulation material is expanded polylactic acid. Preferably the insulation panels are formed from expanded polystyrene.

The insulation panels may comprise an air pocket. The insulation panels may be structures capable of receiving a loose insulation material. For example, the insulation panels may be a hollow structure. The insulation panels may be provided in a collapsed form which can then be erected during assembly into a hollow structure to receive loose insulation material. Suitable loose insulation materials include paper fibre, mineral wool and polymer beads. Suitably polymer beads include polymer beads manufactured from reclaimed polymer material.

The insulation panels may be substantially cuboid in shape with two relatively large dimensions and a third relatively small dimension. The relatively small dimension may be considered to be the thickness of the insulation panel. The thickness of the insulation panel is not particularly limited; however the insulation panels are suitably at least 5 mm in thickness, for example at least 10 mm in thickness, preferably at least 15 mm in thickness. Suitably the insulation panels are up to 200 mm in thickness, for example up to 100 mm in thickness, preferably up to 50 mm in thickness.

The two relatively large dimensions of the insulation panels may be considered the length and width of the insulation panels. The length and width of the insulation panels are not particularly limited; however the insulation panels are suitably at least 50 mm in length and/or width, preferably at least 100mm in length and/or width. Suitably the insulation panels are up to 2000 mm in length and/or width, preferably up to 1000 mm in length and/or width.

The insulation panels may have a length:width ratio of from 10:1 to 1:1, for example from 5:1 to 1:1, preferably from 3:1 to 1:1.

The insulation panels may have a length:thickness ratio of from 1,000:1 to 2:1, for example from 100:1 to 2:1, preferably from 50:1 to 2:1.

The insulation panels may have squared edges. The insulation panels with squared edges may be brought together in the assembly of an insulated container to form abutting joints.

The insulation panels may have bevelled edges. The insulation panels with bevelled edges may be brought together in the assembly of an insulated container to form mitred joints.

The insulation panels are interconnected by connecting portions. Suitably the connecting portions connect two adjacent insulation panels. The connecting portions may be comprised of the same material as the insulation panels, such that the insulation panels and the connecting portions are formed of a continuous piece of insulation material. However, in the exemplary embodiments, the connecting portions are formed from a different material to the insulation panels.

Suitably the connecting portions are thinner than the insulation panels.

Suitably the connecting portions are semi-rigid. Suitably the connecting portions are spacers for the arrangement of the insulation panels in a suitable configuration separated by suitable distances for facilitating the assembly of an insulated container. Suitably the connecting portions restrain the insulation panels so that their adjacent side edges are a fixed distance

apart along a surface of the connecting portions. Suitably the connecting portions substantially prevent adjacent interconnected insulation panels from moving apart in a direction perpendicular to the adjacent side edges of the insulation panels. Suitably the connecting portions substantially prevent adjacent interconnected insulation panels from moving apart in the direction of the adjacent side edges of the insulation panels.

Suitably the connecting portions comprise a hinge for facilitating folding of adjacent insulation panels together during the assembly of the insulated container. Suitably the hinge is provided by a fold line. Suitably the hinge is situated off-centre on the connecting portions. Suitably the hinge is situated on the connecting portions closer to a first of two adjacent interconnected insulation panels. Suitably the hinge is substantially adjacent to a side edge of the first of two adjacent interconnected insulation panels. Suitably the hinge substantially adjacent to a side edge of the first of two adjacent interconnected insulation panels is at a distance from the side edge of a second of the two insulation panels approximate to the thickness of the first insulation panel. The positioning of the hinge substantially adjacent to a side edge of the first of two adjacent interconnected insulation panels and at a distance from the side edge of a second of the two insulation panels approximate to the thickness of the first insulation panel allows the adjacent insulation panels to be folded together into close contact abutting joints on assembly of the insulated container.

Suitably the connecting portions are bonded to the insulation panels. Suitably the connecting portions are adhesively bonded to the insulation panels.

Suitable materials from which the connecting portions may be constructed include cardboard, paperboard, corrugated cardboard, folding-boxboard, polymer film or extruded foam sheet material. Suitably the connecting portions are constructed from cardboard or paperboard.

Suitably the connecting portions form a continuous surface. Preferably the connecting portions are provided as a carton blank.

In some exemplary embodiments, the blank for the assembly of an insulated container comprises a plurality of insulation panels bonded to a carton blank wherein the carton blank comprises fold lines. Suitably the blank may be folded along the fold lines to form a carton. In these exemplary embodiments, forming the carton brings the insulation panels into contact which each other to provide an insulated internal container space.

The blank may comprise retainers for retaining the insulated container in its assembled configuration. The retainers substantially prevent relative movement of adjacent insulation panels. Suitable retainers include adhesive tape, hook and eye fastenings, press studs,

dovetail joints, tab locks, jigsaw piece fittings, rivets, lacing and snap-fit fixings. The retainers may be provided on the insulation panels. In embodiments wherein the connecting portions are provided by a separate material, the retainers may be provided on the separate material.

In embodiments wherein the blank comprises a carton blank, the carton blank suitably comprises retaining flaps. The retaining flaps suitably facilitate the retaining of the insulated container in the assembled configuration. The retaining flaps suitably comprise a retainer. Suitably retainers include adhesive tape, hook and eye fastenings, press studs, dovetail joints, tab locks, jigsaw piece fittings, rivets, lacing and snap-fit fixings.

The blank may comprise a barrier sheet. The barrier sheet may partially or completely cover either the upper or lower surface of the blank. The barrier sheet may be arranged on the blank in order to cover the internal surface of the insulated container once assembled. The barrier sheet may be arranged on the blank in order to cover the external surface of the insulated container once assembled. The barrier sheet may be a flexible or semi-rigid sheet. Suitably the barrier sheet is substantially resistant to the passage of moisture.

According to a second aspect of the present invention there is provided a sheet comprising a plurality of blanks according to the first aspect. Suitably the sheet comprises at least two blanks according to the first aspect. Suitably the sheet comprises at least three blanks according to the first aspect. The plurality of blanks comprised in the sheet may be defined by lines of weakening in the sheet. The plurality of blanks comprised in the sheet may be separated from the sheet by tearing along the lines of weakening. Suitably the lines of weakening are score lines or perforation lines.

Suitably the sheet is at least 150 mm in length and/or width, for example at least 300 mm in length and/or width, preferably at least 600 mm in length and/or width. Suitably the sheet is up to 6000 mm in length and/or width, for example up to 3000 mm in length and/or width, preferably up to 1500 mm in length and/or width. The sheet may have the approximate length and/or width of standard pallets used for transportation of goods. For example the sheet may have the approximate length and width of an imperial US pallet of 1200 mm and 1000 mm respectively. The sheet may have the approximate length and width of a Euro pallet of 1200 mm and 800 mm respectively.

According to a third aspect of the present invention there is provided an insulated container formed from a blank of the first aspect. Suitably the insulated container comprises at least five insulation panels brought into contact by the assembly of the insulated container from the blank. Preferably the insulated container comprises six insulation panels brought into contact with each other by the assembly of the insulated container from the blank.

The insulated container may be considered an assembled configuration of the blank of the first aspect. Suitably the insulated container is held in its assembled configuration by retainers provided on the blank. Suitably the insulated panels of the insulated container are held in contact with each other in the assembled configuration. Suitably the insulated panels of the insulated container are held in contact with each other under a compressive force.

Suitably the insulated panels of the insulated container are arranged to define an internal volume which may be used for storage. The internal volume may substantially define a single storage compartment. The insulated container may comprise more than one internal storage compartment. For example a dividing panel may be present to separate the internal volume into at least two storage compartments.

The insulated container may be substantially cuboid in shape having a length, width and a depth. Suitably the length, width and depth of the insulated container are each at least 50 mm, preferably at least 100 mm. Suitably the length, width and depth of the insulated container are each up to 2000 mm, for example up to 1000 mm, preferably up to 600 mm.

The insulated container may have an internal volume of at least 0.125 l, for example at least 1 l, preferably at least 5 l. The insulated container may have an internal volume of up to 1,000 l, for example up to 500 l, preferably up to 100 l.

According to a fourth aspect of the present invention there is provided a method of forming an insulated container, wherein the method comprises the steps of:

(a) providing a blank according to the first aspect;
(b) folding the blank to bring the insulation panels into approximate contact with each other to form an insulated container; and
(c) fixing the insulated container configuration using retainers.

The blank and the insulated container referred to in this fourth aspect may have any of the features of the blank and insulated container referred to in relation to the first and third aspects.

The blank provided in step (a) may be derived from a sheet according to the second aspect.

According to a fifth aspect of the present invention there is provided a method of forming a blank according to the first aspect, wherein the method comprises the steps of:

(a) providing a backing sheet; and

(b) bonding a plurality of insulation panels to the backing sheet with adhesive.

The method may comprise an additional step of providing the backing sheet with fold lines.

The method may comprise an additional step of cutting the backing sheet to produce the blank. The additional step of cutting the backing sheet may produce at least two blanks. The additional step of cutting the backing sheet may provide at least three blanks.

The method may comprise an additional step of providing the backing sheet with lines of weakening to define the blank.

The method may comprise an additional step of marking the backing sheet with suitable marks for assisting with the alignment of the insulation panels on the backing sheet.

Steps (a) and (b) may be carried out in any order.

According to a sixth aspect of the present invention there is provided apparatus for making a blank according to the first aspect or a sheet according to the second aspect.

The apparatus may comprise a frame for aligning the insulation panels in a suitable configuration for bonding to a backing sheet.

The first aspect of the present invention may provide an insulated container which is easily assembled by hand from a blank at the point of use.

The first and the second aspect of the present invention may provide a blank and a sheet respectively which can be transported to an end user more efficiently and cost effectively than a pre-made insulated container. Transportation costs depend on volume rather than weight and therefore transporting a complete insulated container is more expensive than transporting a blank which can later be assembled into an insulated container. The space saved by transporting blanks rather than assembled insulated containers may also mean that a transportation vehicle needs to make less trips to transport the same number of insulated containers to an end user than would be the case when transporting completed insulated containers, therefore saving the energy consumption and inevitable carbon dioxide emissions associated with the extra trips.

The first and second aspects of the present invention provide a blank and a sheet respectively which can be manufactured from simple processes that are more cost effective and efficient than methods of moulding complete insulated containers.

The present invention may be carried into practice in various ways but one embodiment will now be described by way of example and with reference to the accompanying drawings in which:

Figure 1 is a plan view of a blank according to the first aspect of the present invention;

Figure 2 is a perspective view of an assembled insulated container according to the third aspect of the present invention; and

Figure 3 is a plan view of a sheet according to the second aspect of the present invention comprising three blanks according to the first aspect.

The blank shown in Figure 1 comprises six insulation panels 110-160 mounted on a cardboard backing sheet using adhesive. Each insulation panel is intended to provide one face of a generally cuboid insulated container. The blank 100 comprises nine fold lines 171-179 to facilitate folding of the backing sheet and assembly of the insulated container from the blank 100. Insulation panels 120, 130, 140 and 150 are arranged on a backing sheet such that folding of fold lines 175, 176 and 177 brings the insulation panels into contact with each other to form abutting joints between panels 120 and 130, 130 and 140, 140 and 150, and 150 and 120. Fold line 174 facilitates folding of tab 183 in order to bring it into face to face contact with the reverse side of the backing sheet in the region of insulation panel 150. Tab 183 is provided with adhesive tape 187, which may be used to adhesively secure tab 183 to the reverse of the backing sheet in the region of insulation panel 150 to retain the insulation panels 120-150 in contact with each other in the assembled configuration. The blank 100 is also provided with lip forming regions 191-198 which allow for the top and bottom insulation panels 110 and 160 to be accommodated during assembly. The blank 100 also comprises fold line 178, bottom insulation panel 160, and bottom panel tab 184 which are arranged in order to allow the backing sheet to be folded along 178 during assembly to bring bottom panel 160 into contact in an abutting joint with the bottom edges of panels 120-150. Fold line 179 allows bottom panel tab 184 to be folded up and come into contact with the reverse surface of the backing sheet at the region of insulation panel 130. The bottom panel tab 184 is provided with adhesive tape 188 for adhesively securing bottom panel tab 184 to the reverse of the backing sheet in the region of insulation panel 130 to hold the bottom panel in position and the insulation panel 160 in contact with insulation panels 120-150. The blank 100 also comprises a top insulation panel 110, fold line 173 and closure flaps 181 and 182. Top insulation panel

110 and fold line 173 are arranged such that folding along fold line 173 brings the top insulation panel 110 into contact with the upper side edges of insulation panels 120-150 to form abutting joints. Closure flaps 181 and 182 are provided with adhesive strips 185 and 186 for securing the closure flaps to the reverse surface of the backing sheet in the region of insulation panels 120 and 140 in the assembled configuration. The closure flaps 181 and 182 are also provided with a tear tab 189 for tearing the closure flaps in order to release the top panel during opening.

Figure 2 shows an insulated container 200 assembled from the blank of Figure 1. Insulated container 200 is shown in a partially opened configuration wherein five of the six insulation panels 220-260 have been brought in to abutment with each other and the top panel 210 has been left open. The assembled insulated container 200 comprises abutting joint 229 between adjacent insulation panels 220 and 230. Similar abutting joints between insulation panels 230 and 240, 240 and 250, and 250 and 220, and also between panels 220, 230, 240 and 250 and the bottom insulation panel 260 are not shown.

Insulated container 200 comprises lip 291 which is a portion of backing sheet which extends above the corresponding side insulation panels 220-250. This lip 291 is provided in order to accommodate the top insulation panel 210 when the lid of the insulated container is closed. Closing the lid of the insulated container brings the side edges 212, 213, 214 (not shown) and 215 (not shown) of insulation panel 210 into face to face contact with the lip region 291. Closing the lid of the insulated container also forms abutting joints between the inner face 211 of insulation panel 210 with the side edge 222 of insulation panel 220, the side edge 232 of insulation panel 230, the side edge 242 of insulation panel 240 and side edge 252 of insulation panel 250 (not shown). The insulated container 200 also comprises re-closure flaps 281 and 282 for retaining the lid in the closed position.

Figure 3 shows a sheet 300 comprising 3 blanks for the assembly of an insulated container 310, 320 and 330. Sheet 300 comprises a backing sheet 301 of cardboard packaging material approximately 1.2 m x 1 m in size. Backing sheet 301 is provided with lines of weakness 311, 321 and 331 which define the three blanks 310, 320 and 330 respectively. The lines of weakness are provided to allow easy separation of the three blanks from each other and from the remainder of the backing sheet 301. Within each line of weakness are provided six insulation panels 302 which are adhesively bonded to the backing sheet and arranged according to the description of the blank 100 in relation to Figure 1. Sheet 300 allows for cost effective and efficient shipping of blanks for the assembly of insulated containers to customers and end users. Sheet 300 is the approximate size for use in transportation with standard pallets.

Sheet 300 shown in Figure 3 may be constructed by mechanically scoring backing sheet 301 with lines of weakness 311, 321 and 331 in order to define the separable portions for blanks 310, 320 and 330 respectively. Backing sheet 301 is then provided with markings to facilitate the placement of the insulation panels within each line of weakness defining the individual blanks. The individual insulation panels 302 or the backing sheet 301 are provided with adhesive and then the insulation panels 302 are placed on the backing sheet 301 in alignment with the markings provided on the backing sheet. The adhesive ensures that the insulation panels are fixed to the backing sheet, before shipping the sheet 300 to the end user.

Although preferred embodiment(s) of the present invention have been shown and described, it will be appreciated by those skilled in the art that changes may be made without departing from the scope of the invention as defined in the claims.

Claims

1. A blank for the assembly of an insulated container, wherein the blank comprises a plurality of interconnected insulation panels; and wherein the insulation panels are interconnected by connecting portions.

2. The blank according to claim 1, wherein the blank comprises at least five insulation panels.

3. The blank according to any preceding claim, wherein the insulation panels are formed from a polymer insulation material.

4. The blank according to any preceding claim, wherein the connecting portions comprise a hinge for facilitating folding of adjacent insulation panels together during the assembly of the insulated container.

5. The blank according to claim 4, wherein the hinge is situated off-centre on the connecting portions.

6. The blank according to any preceding claim, wherein the connecting portions form a continuous surface.

7. The blank according to any preceding claim, wherein the blank comprises retainers for retaining the insulated container in its assembled configuration selected from adhesive tape, hook and eye fastenings, press studs, dovetail joints, tab locks, jigsaw piece fittings, rivets, lacing and snap-fit fixings.

8. The blank according to any preceding claim, wherein the connecting portions are provided as a carton blank.

9. The blank according to any preceding claim, wherein the blank comprises a barrier sheet.

10. A sheet comprising a plurality of blanks according to any preceding claim.

11. An insulated container formed from a blank according to any of claims 1 to 9.

12. A method of forming an insulated container, wherein the method comprises the steps of:

(a) providing a blank according any of claims 1 to 9;

(b) folding the blank to bring the insulation panels into approximate contact with each other to form an insulated container; and

(c) fixing the insulated container configuration using retainers.

13. A method of forming a blank according to any of claims 1 to 9, wherein the method comprises the steps of:

(a) providing a backing sheet; and

(b) bonding a plurality of insulation panels to the backing sheet with adhesive.

14. An apparatus for forming a blank according to any of claims 1 to 9 or a sheet according to claim 10.

15. A blank, sheet, insulated container, method or apparatus substantially as described above, and/or with reference to the accompanying drawings.

Application No: GB1313232.9 **Examiner:** Mr Tanay Dutt

Claims searched: 1-15 **Date of search:** 18 November 2013

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
X	1-14	US2009/001086 A1 (RODERICK) See figures 2-6.
X	1-14	FR2682664 A1 (RATIONNELLE) See figures 1-3 & 5.
X	1-14	FR2205887 A5 (SAPLEST) See all figures.
X	1-14	WO88/07476 A1 (CARR) See abstract and figure 1.
X	1-5 & 7-14	US3156371 A1 (HARRISON) See figures 5 & 7.
X	1-4 & 6-14	FR1191499 A (CLAIREFOND) See figures 3 and 4.
X	1-4, 7, 10-12 & 14	DE1140212 B1 (KLAEMBT) See figures 1-4.

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} :

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

B65D

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

International Classification:

Subclass	Subgroup	Valid From
B65D	0081/38	01/01/2006