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CN 206485701 U **CN 106672372 A**
JP 2006176188 A **US 5927593 A**

(58) Field of Search:
INT CL **B65D**
Other: **EPODOC, WPI**

(54) Title of the Invention: **Tamper evident packing case**
Abstract Title: **A self-erecting packing case**

(57) A self-erecting packing case formed from a single board blank, the packing case comprises first and second side walls 101a, 101b and first and second end walls 102a, 102b integrally connected together along respective parallel fold lines, a first-type base panel 104a integrally connected to a bottom end of each of the first and second side walls 101a, 101b along a respective fold line105a, 105b and, a second-type base panel 106a, 106b integrally connected to a bottom end of each of the first and second end walls 102a, 102b along a respective fold line107a, 107b wherein each first-type base panel 104a, 104b is glued to an adjacent second-type base panel 106a, 106b and comprises a fold line 108a, 108b along an edge of where the first-type base panel 104a, 104b is glued to the adjacent second-type base panel 106a, 106b and wherein each first-type base panel 104a, 104b further comprises a lobed section 109a, 109b integrally connected along a fold line 110a, 110b, wherein the lobed sections 109a, 109b of each first-type base panel 104a, 104b are arranged to deflect and then interlock with each other when the packing case is erected from a collapsed condition, thereby to form the base of the packing case.

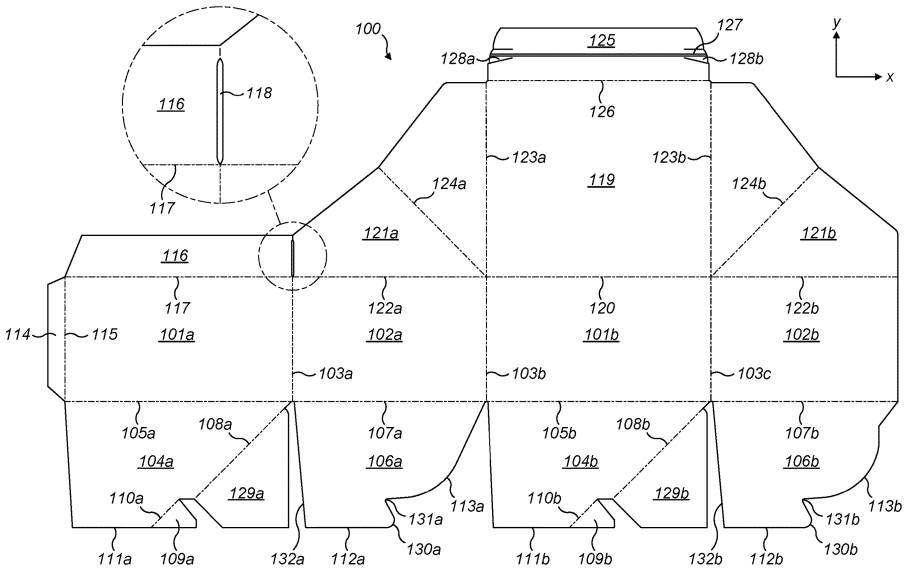

FIG. 1

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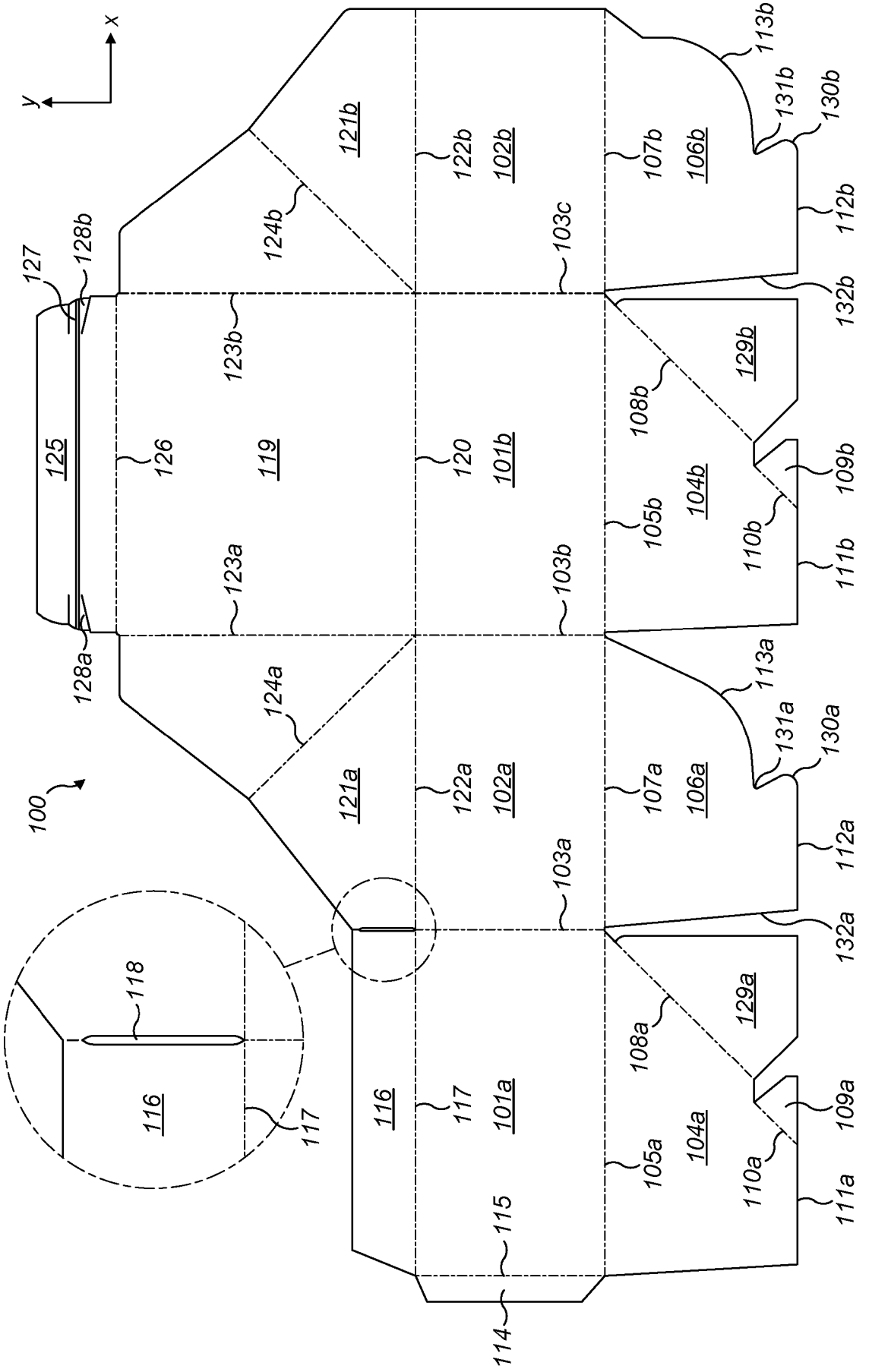
x
y
100
127
128b
128a
125
126
123b
123a
119
124b
124a
121b
121a
122b
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102b
102a
120
101b
101a
103c
103b
103a
107b
107a
106b
106a
105b
105a
104b
104a
108b
108a
129b
129a
109b
109a
110b
110a
111b
111a
112b
112a
113b
113a
131b
131a
130b
130a
132b
132a
115
114
116
117
118

FIG. 1

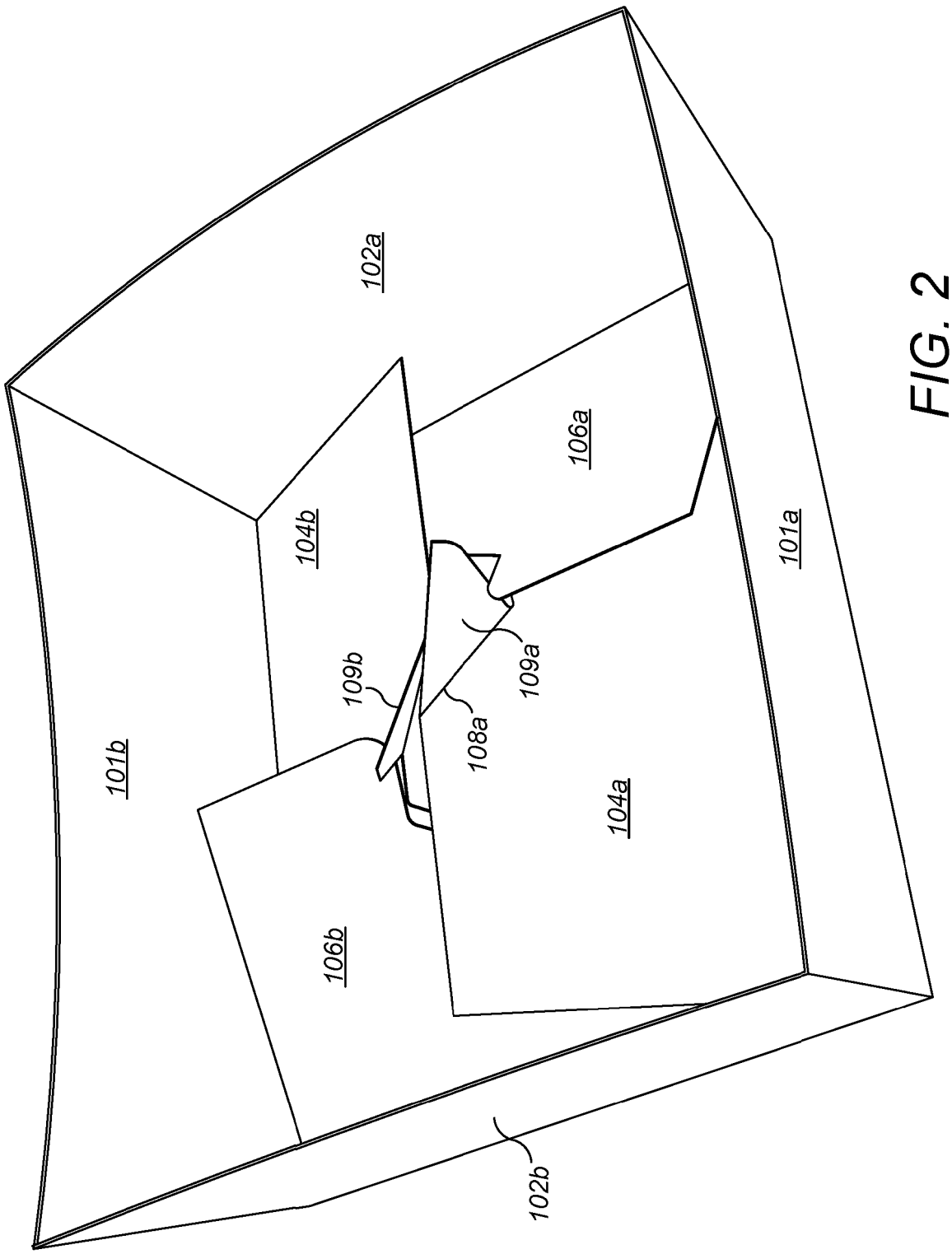

FIG. 2

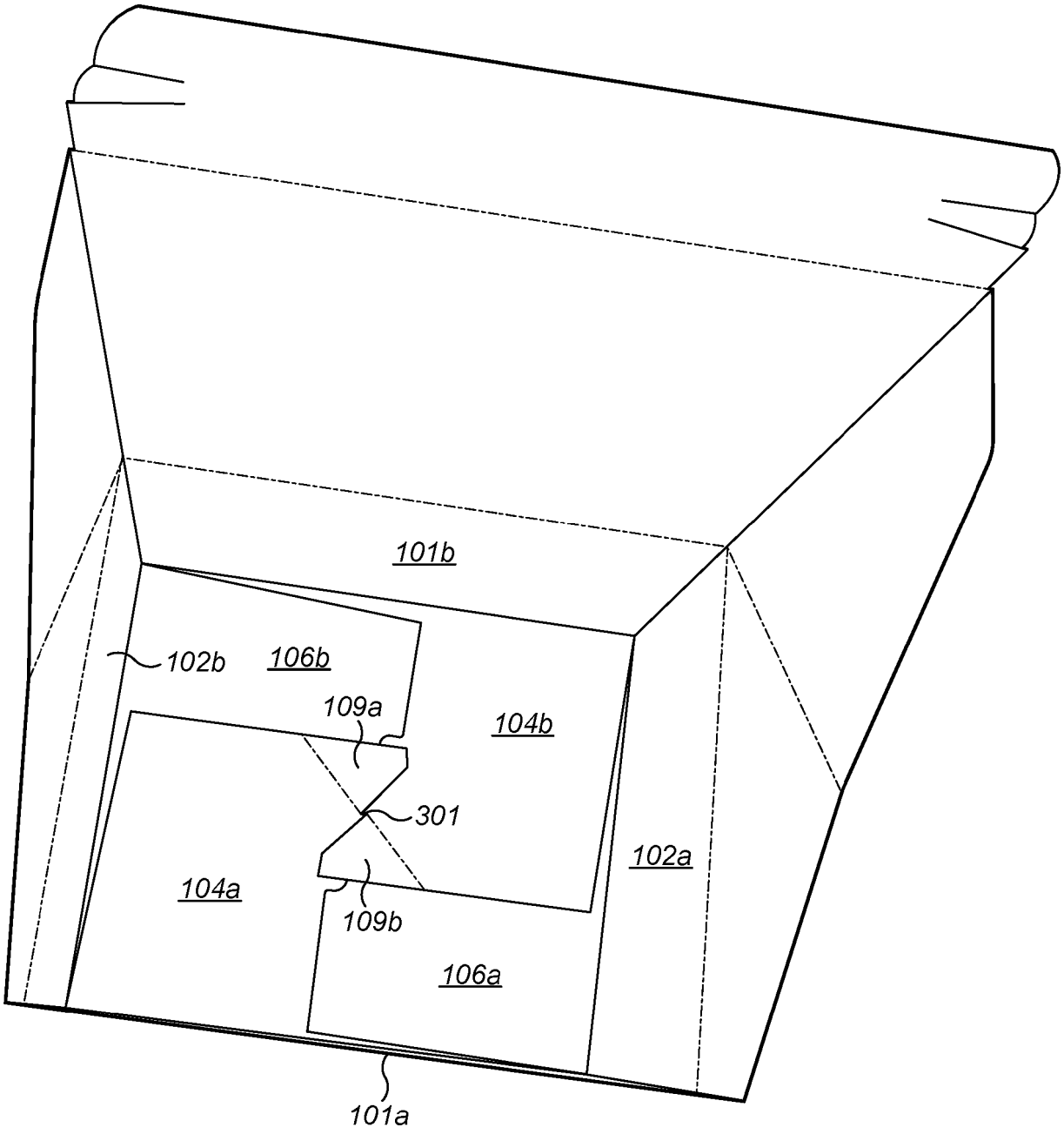

FIG. 3

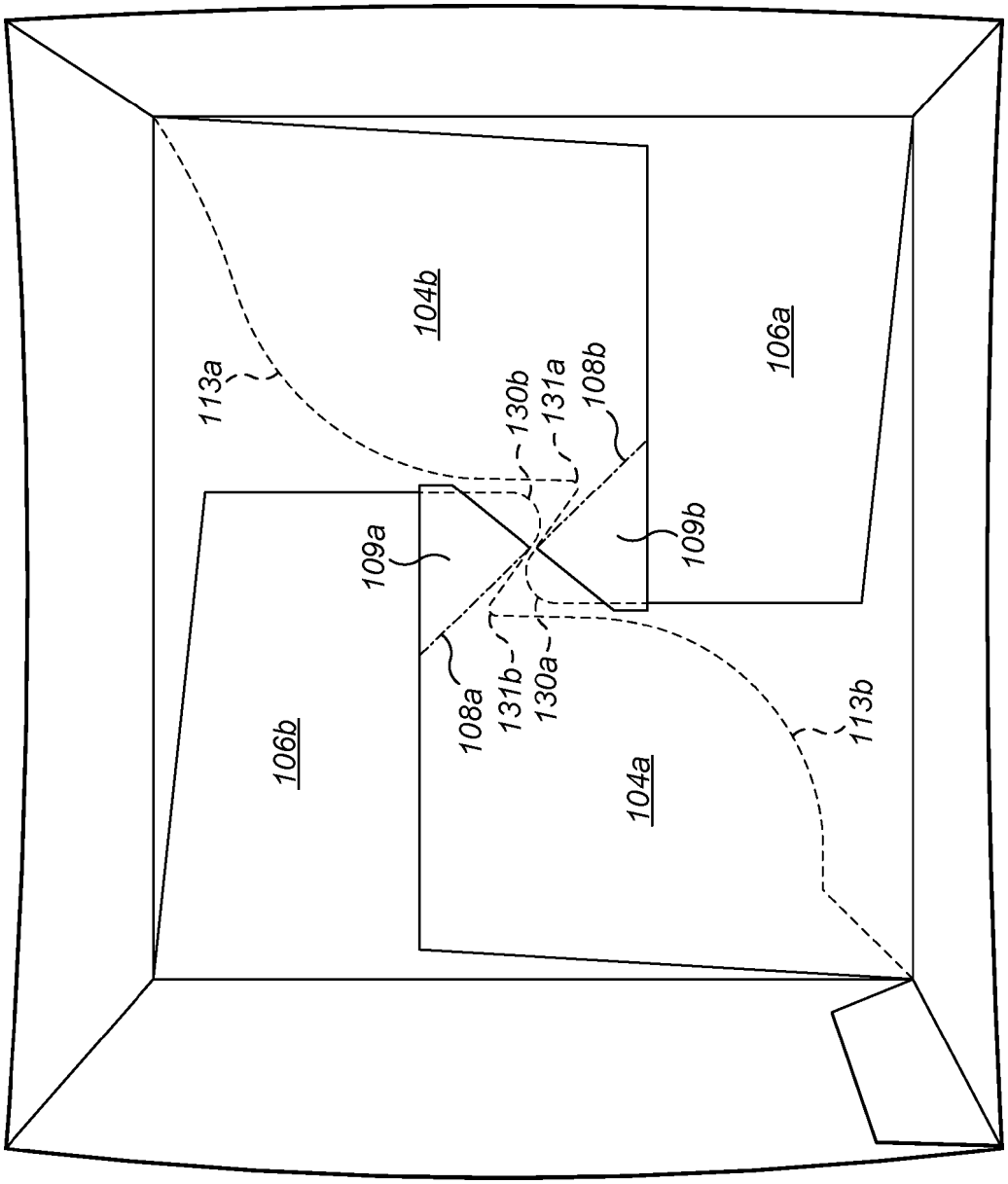
104b
106a
113a
130b
131a
108b
109a
109b
106b
108a
131b
130a
113b
104a

FIG. 4

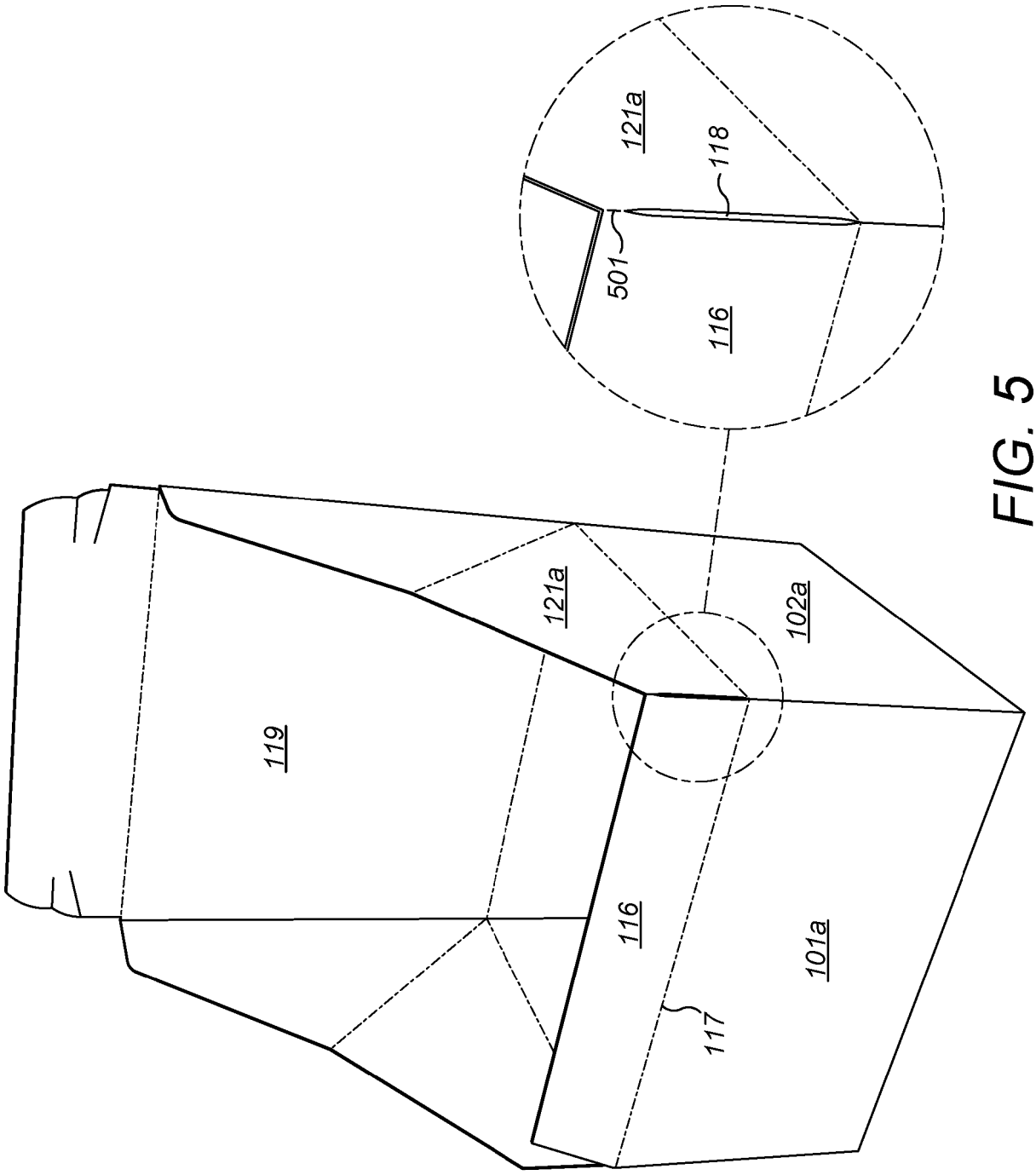

FIG. 5

TAMPER EVIDENT PACKING CASE

FIELD OF THE INVENTION

The present invention relates generally to packing cases. In particular, but not exclusively, the invention relates to ways in which to make packing cases stronger and more tamper evident.

BACKGROUND

With the growth of online shopping, there is a large demand for packaging products that online retailers can ship their goods in. Such packaging must be available in a range of shapes, sizes and strengths, and it must be possible to fully manufacture and assemble it on a high speed production line using machines. Additionally, the packaging must be easy to store and subsequently erect and close when goods are being packed.

Goods sold online are generally packed at a retailer's warehouse and then sent to a customer via a courier, at which point the retailer is no longer able to monitor the package. There is a risk of the package being tampered with during transport, which could result in goods being stolen or otherwise interfered with.

When the customer receives the package, it can be difficult for them to tell whether it has been tampered with. If goods are missing on delivery and it cannot be shown that the package was tampered with after it left the warehouse, the responsibility for replacing the missing goods will often fall to the retailer. This creates additional costs for the retailer, and causes inconvenience to the customer while they wait for a replacement.

There is a need for improved tamper resistant and tamper evident packaging that is machine manufactured and assembled, and is available in a variety of strengths and sizes.

SUMMARY OF THE INVENTION

According to a first aspect of the invention, there is provided a self-erecting packing case formed from a single board blank, the packing case comprising: first and second side walls and first and second end walls integrally connected together along respective parallel fold lines; a first-type base panel integrally connected to a bottom end of each of the first and second side walls along a respective fold line; and, a second-type base panel integrally connected to a bottom end of each of the first and second end walls along a respective fold line; wherein each first-type base panel is glued to an adjacent second-type base panel and comprises a fold line along an edge of where the first-type base panel is glued to the adjacent second-type base panel; and wherein each first-type base panel further comprises a lobed section integrally connected along a fold line, wherein the lobed sections of each first-type base panel are arranged to deflect and then interlock with each other when the packing case is erected from a collapsed condition, thereby to form the base of the packing case.

Alternatively, the first-type base panels could be connected to the end walls and the second-type base panels could be connected to the side walls.

Compared to conventional self-erecting packing cases, the interlocking lobed sections provide additional strength to the base of the packing case, thereby increasing the load-carry capacity of the packing case; the base strength of a packing case according to the present invention is comparable that that of a fully overlapping base, while using significantly less fibreboard.

The interlocking of the lobed sections improves tamper resistance by preventing the base of the packing case from being forced open. When a force is applied to the base of the packing case from outside the packing case, the lobed sections move toward each other and then abut against each other, preventing the base from opening. Additionally, the lobed sections make the packing case tamper evident, because they will shear off if a sufficiently large force is applied to force the base of the packing case open. For example, the lobed sections may shear off at least partially along the respective fold line connecting the lobed section and the first-type base panel.

Preferably, the lobed sections are shaped such that they will break at least partially along the respective fold line connecting the lobed section and the first-type base panel if the base of the packing case is forced open.

Preferably, each lobed section deflects by bending along the fold line connecting the lobed section and the first-type base panel.

Bending along the fold line allows for larger lobed sections than would otherwise be possible, therefore creating a more robust interlock between the lobed sections and increasing the strength of the base of the packing case.

Preferably, each second-type base panel is shaped such that it at least partially engages with the interlock between the first-type base panels when erected.

This provides greater strength to the base of the packing case, which increases the force required to open the packing case.

Even more preferably, the engagement between each second-type base panel and the interlock between the first-type base panels leaves sufficient space around the interlock to enable the interlocking lobed sections to lie flat or substantially flat.

Preferably, a bottom edge of each second-type base panel is cut substantially in line with a bottom edge of each first-type base panel. Alternatively or additionally, a first side edge of each second-type base panel is cut with an angle of between 0 and 43 degrees, preferably 5 degrees.

The bottom edge of each first-type or second-type base panel is the edge opposite and parallel to the fold line between the base panel and the respective side-wall or end-wall. The word substantially reflects the fact that manufacturing tolerances will often prevent the edges being cut exactly in line.

The angles of the side edges of the second-type base panel refer to the angles between the second-type base panel and a line parallel to the respective fold lines between the side-walls and end-walls when in blank form. A shallower angle of 5 degrees means less material is removed when cutting. The first side

edge is the side edge of the second-type base panel which is positioned on the interior of the erected packing case.

Cutting in this manner maximises the size of the second-type base panel without causing wastage when cutting, which in turn increases the strength of the base of the packing case.

Additionally or alternatively, a second side edge of each second-type base panel is cut with an angle of between 15 and 40 degrees, preferably between 25 and 35 degrees. Even more preferably, the second side edge is curved.

The second side edge is the side edge of the second-type base panel which is positioned on the exterior of the erected packing case. Being curved prevents the second-type base panels from catching on objects outside the packing case during transit.

Although preferred embodiments are manufactured with fibreboard, any type of board with sufficient strength could be used instead, such as Correx ®, carton board, pasted solid board, boxboard, rigid plastic or semi-rigid plastic.

Preferably, the packing case is rectangular.

In a preferred embodiment, one of the side walls is provided with an extension flap integrally connected along a fold line, wherein the extension flap is glued to an inner surface of an edge of an adjacent end wall during manufacture. Alternatively, one of the end walls could be provided with an extension flap integrally connected along a fold line, wherein the extension flap is glued to an inner surface of an edge of an adjacent side wall during manufacture.

This means a closed surface is formed around the perimeter of the side walls and end walls, such that there are no gaps, and improves the strength of the packing case. Having no gaps in the packing case is advantageous as it improves the tamper resistance of the packing case by preventing access to the contents.

Preferably, the packing case comprises an integral lid connected along a fold line to one of the side walls or one of the end walls.

This allows the packing case to be formed from a single blank.

Preferably, each end wall further comprises a top inner panel integrally connected along a respective fold line at a top edge of the end wall.

The top inner panels reduce access to the interior of the packing case.

Even more preferably, each top inner panel is also integrally connected to the integral lid along a respective fold line, wherein each top inner panel comprises a fold line that, when erected, forms a flap that collapses into the packing case when the lid is closed.

These top inner panels act as flaps that provide improved tamper resistance by preventing access to the contents through gaps around the lid of the packing case when the lid is closed.

Preferably, the integral lid further comprises an outer panel integrally connected along a fold line, wherein the outer panel comprises an adhesive strip on an inner surface that enables it to adhere to an outer surface of an opposing side wall.

This enables quick and easy sealing of the packing case, and also provides tamper resistance as the adhesive seal must be broken to open the lid.

Preferably, the outer flap further comprises an easy-open tape that is attached to the outer flap during manufacture. Alternatively, the outer flap may instead comprise a perforated section to enable easy opening, such as Zipper rule.

This enables the customer to easily open the packing case in an irreversible manner, such that it is immediately apparent if it has been opened before it reaches the customer, therefore providing improved tamper evidence.

The packing case optionally further comprises a top flap integrally connected along a fold line to a top edge of one of the side walls. This top flap may be of

the same width as the side wall it is integrally connected to, or it may have a width less than or greater than the width of the side wall. The top flap may alternatively be integrally connected to one of the end walls along a fold line.

The top flap is folded over before the packing case is sealed, and helps to prevent access to the contents of the packing case.

The top flap is optionally connected to an adjacent top inner flap by frangible slit.

When connected to an adjacent top inner flap, the top flap is held square during the manufacturing process and therefore acts as a continuation, in whole or in part, of the side wall and aids in the machine manufacture of shallow packing cases. The frangible slits means it is easily detached from the end wall during the erection process and folded over before the packing case is sealed.

The side walls and end walls of the packing case may be rectangular. Alternatively, the side walls and/or the end walls may be non-rectangular, for example the side walls and end walls may be trapezium-shaped such that the packing case is shaped like a truncated square pyramid. The side walls and end walls can be any shape that allows the packing case to be assembled and erected.

Different shapes of side walls and end walls allow for the manufacture of different shapes of packing case that are suitable for different uses.

BRIEF DESCRIPTION OF DRAWINGS

Examples of the present invention will now be described in detail with reference to the accompanying drawings, in which:

Figure 1 shows a blank for a packing case according to an embodiment of the present invention;

Figure 2 shows a packing case according to an embodiment of the present invention in a semi-erected sate;

Figure 3 shows a packing case according to an embodiment of the present invention in a fully erected state;

Figure 4 shows a wireframe view of the base of an embodiment of the present

invention in a fully erected state; and,

Figure 5 shows a packing case with a top flap comprising a frangible slit according to an embodiment of the present invention.

DETAILED DESCRIPTION

Figure 1 illustrates a blank 100 according to the present invention. All lengths in Figure 1 are defined in the y-direction, and all widths are defined in the x-direction. Each panel or wall in the blank 100 has two opposing surfaces, the topside surface being visible in the view of Figure 1, and the underside surface opposing said topside surface (i.e. not visible in Figure 1).

The blank 100 comprises first and second rectangular side walls, 101a and 101b, and first and second rectangular end walls, 102a and 102b, integrally connected along respective parallel fold lines 103a-c. When erected, the first and second side walls 101a and 101b oppose each other and the first and second end walls 102a and 102b oppose each other so as to define the side and ends walls of the erected packing case, which is substantially rectangular when viewed in plan form. The folds 103a-c are defined such that the topside surfaces of walls 101a, 101b, 102a and 102b are on the interior of the erected packing case. One skilled in the art will recognise that the terms wall and panel can be used interchangeably.

In Figure 1, the end walls have a smaller width than the side walls. However, in other embodiments the side walls may have the same width as the end walls so as to define a square packing case when viewed in plan form, or the end walls may have a larger width than the side walls. The lengths of each side and end wall are substantially the same. The fold lines 103a-c extend along the lengths of the respective side and end walls.

The blank 100 further comprises an extension flap 114 integrally connected to side wall 101a along fold line 115. When the blank is folded, the underside of extension flap 114 can be glued to the topside of end wall 102b (i.e. the face exposed to the internal environment when the packing case is erected) or the underside of end wall 102b (i.e. the face exposed to the external environment).

Gluing extension flap 114 to end wall 102b connects side wall 101a to end wall 102b, thereby connecting the walls of the packing case. Other means of fixing the extension flap 114 to end wall 102b are envisaged, such as stapling. Although Figure 1 shows extension flap 114 having a length substantially equal to that of side wall 101a, this is not necessarily the case, and in alternative embodiments, extension flap 114 may have a length shorter or longer than that of side wall 101a.

An integral lid 119 is integrally connected to the top end of side wall 101b along fold line 120. The length of integral lid 119 is substantially the same as the width of end walls 102a and 102b, such that the lid can be folded over to form a substantially enclosed inner volume when the packing case is erected. The skilled person will appreciate that alternative configurations, such as a packing case comprising a non-integral lid, are also possible.

The integral lid 119 further comprises an outer flap 125 integrally connected along fold line 126. When the integral lid 119 of the erected packing case is folded over, the topside surface of outer flap 125 can be adhered to the underside surface of side wall 101a, i.e. the inner facing surface of outer flap 125 is adhered to the outer facing surface of side wall 101a. This can be achieved for example using an adhesive strip (not shown in Figure 1).

Outer flap 125 further comprises an easy-open tape 127. Easy-open tape 127 allows the outer flap 125 to be torn along the line of the tape by pulling one or both of tabs 128a and 128b. This allows the integral lid 119 to be opened after outer flap 125 has been fixed to side wall 101b. Other easy-open devices and methods are envisaged, such as a Zipper rule.

The blank 100 further comprises top inner panels 121a and 121b integrally connected to end walls 102a and 102b along respective fold lines 122a and 122b. Top inner panels 121a and 121b are also integrally connected to integral lid 119 along respective fold lines 123a and 123b. Top inner panels 121a and 121b further comprise respective fold lines 124a and 124b. When the integral lid 119 of the erect packing case is folded over, top inner panels 121a and 121b fold inward along fold lines 124a and 124b (i.e. into the enclosed volume of the

packing case) such that they prevent access to the enclosed volume of the packing case through the spaces between the integral lid 119 and end panels 102a and 102b.

In the blank 100 in Figure 1, side wall 101a further comprises a top flap 116 integrally connected along fold line 117. The top flap 116 is also connected to top inner panel 121a along a frangible slit 118, as shown in the inset in Figure 1. During manufacture, top flap 116 acts as a continuation of side wall 101a and is held square to top inner panel 121a by frangible slit 118. When the packing case is erected, frangible slit 118 can be broken and top flap 116 can be folded over to allow integral lid 119 to be closed.

The blank 100 further comprises base panels 104a and 104b of a first type integrally connected to side walls 101a and 101b along respective fold lines 105a and 105b, and base panels 106a and 106b of a second type integrally connected to end walls 102a and 102b along respective fold lines 107a and 107b. The length of base panels 104a, 104b, 106a and 106b is substantially the same in the embodiment shown in Figure 1, such that the bottom edges 111a, 111b, 112a and 112b of the base panels are all cut in line with each other.

Base panels 104a and 104b comprise glue regions 129a and 129b respectively integrally connected along respective fold lines 108a and 108b. The topsides of glue regions 129a and 129b are glued to the undersides of base panels 106a and 106b respectively during manufacture. Alternative methods of fixing glue regions 129a and 129b to base panels 106a and 106b are also envisaged, such as stapling.

Base panels 104a, 104b, 106a and 106b together form the base of the erected packing case. When erected, the panels overlap, such that base panel 101a overlaps base panel 102b, base panel 102b overlaps base panel 101b, base panel 101b overlaps base panel 102a, and base panel 102a overlaps base panel 101a.

Base panels 104a and 104b further comprise lobed sections 109a and 109b integrally connected along respective fold lines 110a and 110b. During the

erection process, lobed sections 109a and 109b deflect around each other by bending at respective fold lines 110a and 110b. When the packing case is fully erected, lobed sections 109a and 109b lie substantially flat on the base of the packing case and interlock with each other to prevent base of the packing case from opening.

Base panels 106a and 106b are shaped to interact with the interlock between lobed sections 109a and 109b. Base panels 106a and 106b comprise protruding sections 130a and 130b, which surround and partially engage with the interlock of the erected packing case. Base panels 106a and 106b further comprise notches 131a and 131b respectively, which are shaped to provide space around the interlock to allow lobed sections 109a and 109b to lie substantially flat on the base of the packing case. This is perhaps best illustrated in Figure 4.

Base panels 106a and 106b further comprise first side edges 132a and 132b and second side edges 113a and 113b respectively. These are cut at shallow angles relative to the y-axis in order to maximise the size of the base panels and therefore increase the strength of the base. The size is limited by the need for the packing case to be self-erecting; if the angles are too shallow the first and second edges will interfere with the erection process. In the blank 100 of Figure 1, second side edges 113a and 113b are curved.

Figure 2 shows the base of an embodiment of a packing case assembled from blank 100 at an intermediate stage of the erection process. Lobed sections 109a and 109b are shown deflecting around each other by bending at respective fold lines 108a and 108b, such that they slide past each other as the packing case is erected.

Lobed sections 109a and 109b are shaped such that they deflect around each other without requiring the erector to manually position them. As the packing case is erected, the undersides of lobed sections 109a and 109b abut against each other or opposing base panels 104b and 104a respectively to cause them to deflect into the position shown in Figure 2. Lobed sections 109a and 109b slide past each other as the packing case is erected.

Figure 3 shows the base of an embodiment of a packing case assembled from blank 100 in a fully erected state. Base panels 104a, 104b, 106a and 106b overlap each other to form the base of the packing case. Lobed sections 109a and 109b lie substantially flat, having returned to their neutral position after deflecting around each other during the erection process; this ideally occurs due to the resilience of the packing case material and does not require manual intervention.

Lobed sections 109a and 109b interlock with each other when the packing case is fully erected. If a force is applied to the base of the packing case from above, for example due to the weight of items in the packing case, or from below, for example due to someone trying to force the base of the packing case open, lobed sections 109a and 109b abut against each other at approximately location 301, preventing the base from opening.

The packing case can be collapsed by the user manually deflecting lobed sections 109a and 109b and applying an upward force to the base of the packing case, such that the packing case can be reused if desired. This requires access to the interior volume of packing case 100 to manually deflect the lobed sections so is not possible when the packing case is sealed.

Figure 4 shows a wireframe view of the base of an embodiment of the present invention, in particular the interaction of the base panels 104a and 104b with the interlock between lobed sections 109a and 109b. The dashed lines represent the non-visible side edges 113a and 113b of base panels 104a 104b, i.e. the side-edges on the exterior of the erected packing case which are covered by base panels 101a and 101b. Protruding sections 130a and 130b can be seen to surround and partially engage with the interlock of the erected packing case. Notches 131a and 131b are shaped to provide space around the interlock to allow lobed sections 109a and 109b to lie substantially flat on the base of the packing case.

Figure 5 shows an embodiment of an erected packing case assembled from blank 100. In particular, the inset of Figure 5 shows frangible slit 118 connecting top flap 116 and top inner flap 121a. Top flap 116 can be detached from top

inner flap 121a by breaking the packing case at point 501. The top flap can then be folded into the packing case along fold line 117 before closing integral lid 119. Top flap 116 acts as a continuation of side wall 101a during manufacture. In the pictured embodiments, top flap 116 has substantially the same width as side wall 121a, but other embodiments are envisaged in which top flap 116 has a smaller width than side wall 121a.

Other configurations are envisaged for the frangible slit, for example using a v-shaped cut, such that the perforation line does not necessarily have to go to the top. In this case, the breaking point 501 would not be at the top of the top flap.

The packing case is generally supplied in flat form, having been glued during manufacture, and requires erection by the user prior to use. To erect the packing case, the user can unfold the packing case and apply an inwardly directed force at fold lines 103a and 103c, which causes the packing case to take on a generally cuboidal shape and simultaneously causes the base to form as the lobed sections 109a and 109b deflect around each other before interlocking as previously described. The user can apply an additional downward force to the base if necessary. Once the packing case is erected and packed, the integral lid can be closed and the packing case can be sealed.

CLAIMS

1. A self-erecting packing case formed from a single board blank, the packing case comprising:

first and second side walls and first and second end walls integrally connected together along respective parallel fold lines;

a first-type base panel integrally connected to a bottom end of each of the first and second side walls along a respective fold line; and,

a second-type base panel integrally connected to a bottom end of each of the first and second end walls along a respective fold line;

wherein each first-type base panel is glued to an adjacent second-type base panel and comprises a fold line along an edge of where the first-type base panel is glued to the adjacent second-type base panel;

and wherein each first-type base panel further comprises a lobed section integrally connected along a fold line, wherein the lobed sections of each first-type base panel are arranged to deflect and then interlock with each other when the packing case is erected from a collapsed condition, thereby to form the base of the packing case.

2. The packing case of claim 1, wherein each lobed section deflects by bending along the fold line connecting the lobed section and the first-type base panel.

3. The packing case of claim 1 or claim 2, wherein each second-type base panel is shaped such that it at least partially engages with an interlock between the lobed sections of the first-type base panels.

4. The packing case of claim 3, wherein the second-type base panel is shaped to leave sufficient space around the interlock to allow the lobed sections to lie flat or substantially flat.

5. The packing case of any preceding claim, wherein a bottom edge of each second-type base panel is cut substantially in line with a bottom edge of each first-type base panel.

6. The packing case of any preceding claim, wherein a first side edge of each second-type base panel is cut with an angle of between 0 and 43 degrees.

7. The packing case of claim 6, wherein the first side edge of each second-type base panel is cut with an angle of 5 degrees.

8. The packing case of any preceding claim, wherein a second side edge of each second-type base panel is cut with an angle of between 15 and 40 degrees.

9. The packing case of claim 8, wherein the second side edge of each second-type base panel is cut with an angle of between 25 and 35 degrees.

10. The packing case of claim 8 or claim 9, wherein the second side edge of each second-type base panel is curved.

11. The packing case of any preceding claim, wherein one side wall is provided with an extension flap integrally connected along a fold line, wherein the extension flap is glued to an inner surface of an edge of an adjacent end wall.

12. The packing case of any of claims 1-10, wherein one end wall is provided with an extension flap integrally connected along a fold line, wherein the extension flap is glued to an inner surface of an edge of an adjacent side wall.

13. The packing case of any preceding claim, further comprising an integral lid connected along a fold line to one of the side walls.

14. The packing case of claim 13, wherein each end wall further comprises a top inner panel integrally connected along a respective fold line at a top edge, wherein the top inner panel is also integrally connected to the integral lid along a respective fold line and wherein the top inner panel further comprises a fold line that, when erected, forms a flap that collapses into the packing case when the integral lid is closed.

15. The packing case of claims 13 or 14, further comprising an outer panel integrally connected to the integral lid along a fold line, wherein the outer panel comprises an adhesive strip on an inner surface arranged to adhere to an outer surface of an opposing side wall.

16. The packing case of claim 15, wherein the outer flap further comprises a perforated or zipper rule or an easy-open tape attached during manufacture.

17. The packing case of any preceding claim, further comprising a top flap integrally connected along a fold line to a top edge of one of the side walls or end walls.

18. The packing case of claim 17 when dependent upon claim 14 or any claim dependent thereon, wherein the top flap is connected to an adjacent top inner flap by a frangible slit.

19. The packing case of any preceding claim, wherein the board is formed of a material selected from a group comprising fibreboard, Correx, carton board, pasted solid board, boxboard, rigid plastic and semi-rigid plastic.

Application No:	GB1808832.8	**Examiner:**	Mr Rhodri Evans
Claims searched:	1-19	**Date of search:**	22 November 2018

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, 2, 5-13, 15-18	JP 2006176188 A (Otsuka) Figures 1 and 2 and WPI abstract accession number 2006-451143.
X	1, 2, 6-10, 12, 17, 19	US 5927593 A (Berkowitz) All figures and line 27 of column 4 to line 28 of column 5.
A	-	CN 206485701 U (Beijing)
A	-	CN 106672372 A (Beijing)

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

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
B65D	0005/10	01/01/2006
B65D	0005/02	01/01/2006