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(54) Title: CARTON WITH STRUCTURAL SUPPORT & BLANK THEREFOR

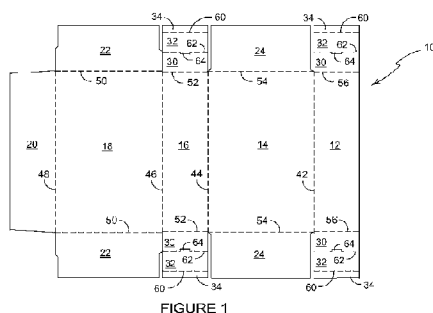
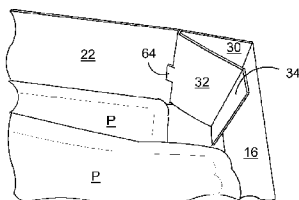


FIGURE 1





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CARTON WITH STRUCTURAL SUPPORT & BLANK THEREFOR

FIELD OF THE INVENTION

The present disclosure relates to a carton and a blank for making the carton comprising structural support. More specifically, but not exclusively, the disclosure relates to a foldable corner support structure.

BACKGROUND OF THE INVENTION

In the field of packaging, it is often required to provide consumers with a plurality of articles held together within a package. These packages are often stacked and grouped in pallets one on top of another for efficient transportation of large numbers of packages to retail outlets. Once at the retail outlet, packages may again be stacked on top of each other for efficient display purposes.

It is required to make cartons or packages from an optimum amount of material for both environmental and cost reasons. However, strength of the carton or package is a key consideration. It is desirable that the carton is strong enough to protect the articles held inside the package and structurally robust enough to withstand the forces that may be applied during stacking. It is also desirable that the carton is easy to construct and that features added to improve structural characteristics are readily erectable.

In some known cartons, the stacking strength is improved by adding a corner post type structure. In US 4,056,223 to Williams it is shown how a number of panels of additional material can be used to provide a tubular reinforcement of the corners of the carton which are held in place by adhesive. US 7,000,824 to Saulas and US 1,653,116 to Parks, each disclose corner post structures that are tubular in structure and offer good support for stacking. These tubular structures stay erected because of glue and staples respectively.

In US 2007/0145105 to Bates, a triangular shaped internal buttress arrangement is disclosed that enhances the stacking strength of the carton. The arrangement is

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formed from the distal portion of at least one of the side end flaps and is maintained in a tubular erected form by the articles contained in the carton. Redistribution of the articles during transit could therefore release the distal portion allowing it to return to its unfolded position and thus resulting collapsing the support structure.

The present disclosure seeks to provide an improvement over the prior art.

SUMMARY OF INVENTION

According to a first aspect, the disclosure provides a carton comprising an internal support structure disposed adjacent to a first wall of the carton, said support structure comprising at least two panels: a distal panel and a proximal panel directly coupled together along a hinged connection, said distal and proximal panels being folded relative to one another such that the support structure has a non-linear cross-sectional shape, the support structure further comprising an integral stopping means for preventing unfolding of one of said at least two panels relative to the other of the at least two panels so that the non-linear cross-sectional shape is maintained and the support structure is maintained in an erect condition.

Preferably the stopping means is an integral part of the support mechanism so that the use of additional adhesive or mechanical fixings such as staples are not required and as such construction of the carton with the support structure can be done relatively quickly and preferably can be automated.

Preferably, the stopping means is provided by a tab projecting from the distal panel beyond the hinged connection between the at least two panels of the support structure, which tab is formed as an integral extension of the distal panel and abuts said first wall of the carton to restrict unfolding of the distal panel relative to the proximal panel.

Preferably, the distal panel and tab are shaped in a complimentary fashion relative to the proximal panel so that the tab or stopping means is formed from material contained within the footprint of the blank of material from which the carton is formed.

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Optionally, the stopping means is provided by two tabs each projecting from the distal panel beyond the hinged connection between the at least two panels of the support structure, which tabs abut said first wall of the carton to restrict unfolding of the distal panel relative to the proximal panel.

Optionally, the or each tab has a square shaped edge or a rounded shaped edge, which edge abuts said first wall of the carton.

Preferably, the support structure is directly connected to the carton by means of a hinged connection between the proximal panel and a second wall of the carton disposed adjacent to said first wall such that said first and second walls are disposed in an angular relationship.

Additionally, the support structure may further comprise an extension panel hinged to the distal panel. Preferably, the support structure further comprises a second stopping means for preventing unfolding of the extension panel relative to the distal panel so that the extension panel and distal panel remain spaced and a non-linear cross-sectional shape is maintained.

Optionally, the second stopping means is provided by a second tab projecting from the extension panel beyond the hinged connection between the extension panel and distal panel of the support structure, which second tab is formed as an integral projection of the extension panel and abuts a panel of the carton to restrict unfolding of the extension panel relative to the distal panel.

Preferably, the second tab abuts either the first wall or a second wall of the carton disposed adjacent to said first wall to restrict unfolding of the extension panel relative to the distal panel and wherein, the proximal panel is hinged to the second wall of the carton and said first and second walls are disposed in an angular relationship. Preferably, the second stopping means is provided by two tabs projecting from the extension panel.

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Optionally the extension panel is disposed relative to the proximal and distal panels such that the support structure is triangular in cross-section, has an "L"-shaped cross section, has a zigzag or "Z"-shaped cross-section or has a "V"-shaped cross-section.

Preferably, the tab and/or second tab is formed from material that would have formed part of the proximal panel had the distal panel not been extended by the formation of the tab and/or second tab projecting beyond the hinged connection between the proximal and distal panels.

According to a second aspect, the disclosure provides a blank for forming a carton having a support structure having a non-linear cross-sectional shape, the blank comprising a series of panels for forming the main walls of the carton and comprising at least two panels for forming the support structure hinged to one of said plurality of panels for forming the carton, said at least two panels comprising a proximal panel hinged directly to said one of said plurality of panels, a distal panel hinged directly to the proximal panel and comprising a stopping means for preventing unfolding of the distal panel relative to the proximal panel.

Preferably, the stopping means is provided by one or more tabs, each formed as an integral extension of the distal panel and each formed from material that would have formed part of the proximal panel had the distal panel not been extended by the formation of said one or more tabs.

Additionally, the support structure may further comprise an extension panel hinged to the distal panel. Preferably, the blank further comprises a second stopping means for preventing unfolding of the extension panel relative to the distal panel once the blank is set-up into a carton, said second stopping means is provided by one or more tabs projecting from the extension panel beyond the hinged connection between the extension panel and distal panel, which one or more tabs is formed as an integral projection of the extension panel and formed from material that would have formed part of the proximal panel had the distal panel not been extended by the formation of

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said one or more tabs. Optionally, the or each tab has a square shaped edge or a rounded shaped edge.

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the disclosure will now be described with reference to the accompanying drawings, in which:

Fig. 1 shows a plan view of a blank for forming a carton according to a first embodiment of the disclosure;

Fig. 2 shows a plan view of a blank for forming a carton according to a second embodiment of the disclosure;

Figs. 3 and 4 show fragmentary internal views of a carton formed from the blank of Figure 1, illustrating a support structure in an erect condition;

Fig. 5 shows a fragmentary internal end view of the carton formed from the blank of Figure 1, illustrating a support structure in an erect condition;

Fig. 5B shows a fragmentary internal perspective view of a carton formed from the blank of Figure 1, illustrating an alternative formation of a support structure in an erect condition;

Fig. 6 shows a fragmentary enlarged perspective view of the blank of Figure 2;

Fig. 7 shows a fragmentary internal perspective view of a carton formed from the blank of Figure 2, illustrating a support structure in an erect condition;

Fig. 8 shows a fragmentary plan view of a blank for forming a carton, showing panels for forming a support structure according to a third embodiment of the disclosure; and

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Fig. 9 shows a fragmentary end view of a carton according to a fourth embodiment of the disclosure.

Fig. 10 illustrates a fragmentary plan view of a blank for forming the carton of Figure 9.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Exemplary embodiments of the disclosure will now be described with reference to all of the figures. Whereas Figures 1, 3, 4 and 5 illustrate a first embodiment; Figures 2, 6 and 7 illustrate a second embodiment, Figure 8 illustrates a third embodiment and Figures 9 & 10 illustrate a fourth embodiment of the disclosure, the embodiments differ in only certain details and will therefore be referred to together. For the avoidance of confusion, reference numerals used to denote features of the second embodiment, third embodiment and fourth embodiments are similar to those used to denote like features of the first embodiment, albeit raised by a factor '100', '200' and '300' respectively.

Turning now to Figures 1 and 2, carton blanks 10, 110 are shown. These blanks 10, 110 are formed from printable paperboard; however, other suitable foldable sheet material may be used. Indeed, it is envisaged that more than one blank could be utilised in applying the present disclosure and the illustration of a single blank having a support structure should not be construed as a limitation of the present disclosure. In each illustration of the present disclosure, a carton having four support structures disposed at a corner of a carton is shown. The provision of four support structures is optional and more or less than four support structures could be used. Furthermore the positioning of the support structures at corners of the carton should likewise not be considered as a limitation in the application of the present disclosure. Though positioning the support structure at a corner is beneficial for stacking strength and protection of crushable corners, it should be readily understood that in other embodiments the position of the support structure is not limited to a corner position.

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In each of the blanks depicted a plurality of panels are provided for forming a carton. The size, orientation and number of panels shown are not limiting and provide an example of a how the present disclosure can be implemented. The support structure of the disclosure is applicable to many differently sized and structured cartons.

In the present examples, the blanks 10/110 each comprise first and second side panels 12/112, 16/116; top panel 14/114; bottom panel 18/118 and glue flap 20/120. In addition, the top panel 14/114 and bottom panel 18/118 are provided with end closure panels 24/124, 22/122 hinged directly thereto. The aforementioned first and second side panels 12/112, 16/116; top panel 14/114, bottom panel 18/118 and glue flap 20/120 are hinged together in series along fold lines 42/142, 44/144, 46/146, 48/148 respectively. The end closure panels 24/124, 22/122 are hinged to the adjacent top or bottom panel 14/114, 18/118 along fold lines 54/154, 50/150 respectively. Panel arrangements for forming four support structures are provided in each blank 10, 110. In the first embodiment each of these panel arrangements comprises three panels: a proximal panel 30, a distal panel 32 and an extension panel 34. In the second embodiment only a proximal panel 130 and distal panel 132 are provided. The proximal panels 30/130 are each hinged directly to a main panel of the carton, in these embodiments to a first or second side panel 12/112, 16/116, along a fold line 56/156, 52/152 respectively. The proximal panel is also hinged (at an opposite side to hinged line 56/156, 52/152) to the distal panel 32/132. The proximal panel 30/130 and distal panel 32/132 are hinged together along an interrupted fold line 62/162. This fold line or hinged connection is interrupted by stopping means 64/164. In the illustrated embodiments the stopping means 64/164 takes the form of a single square edged tab. However it is envisaged that many other suitable structures and arrangements of stopping means 64/164 could be provided. These are discussed in more detail below.

In the first example depicted an extension panel 34 is hinged directly to the distal panel 32 by means of hinge connection 60. The extension panel 34 is entirely optional. It is envisaged that in some embodiments of the disclosure a carton may contain one or more support structures having the extension panel 34 as well as one

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or more support structures not comprising the extension panel 34 or indeed all support structures may not include the extension panel 34. The extension panel 34, when present, serves to provide cushioning for the articles and/or a brace between the support structure and a main wall of the carton.

Though in Figures 3 to 5 the extension panel 34 is shown as projecting away from the adjacent carton corner, in an alternative method of construction, the extension panel is folded on top of distal panel 32; the distal panel 32 and extension panel 34 are then folded together onto proximal panel 30 and the extension panel 34 becomes sandwiched between the two. Once the remaining carton structure is in place and end closure panel 22, 24 prevents complete unfolding of the support structure, the distal panel 32 unfolds relative to the proximal panel 30 until the stopping means 64 prevents further unfolding. The extension panel 34 also unfolds relative to the distal panel 32 until it provides a wedge or brace between either the end closure panel 22 and/or top panel 14. This alternative construction is shown in Figure 5B.

The support structure is formed by folding the distal panel 32/132 into overlapping relationship with the proximal panel 30/130. This is illustrated in Figure 6 in relation to the second depicted embodiment. The folded arrangement of proximal panel 30/130 and distal panel 32/132 is then folded about hinge connection 52/152 toward the adjacent main panel, which in the arrangements shown is a side panel 12/112, 16/116. The remainder of the carton is constructed by folding the top and bottom panels adjacent to the side panels 12/112, 16/116 at an angle to those panels and end closure panels 22/122, 24/124 folded to close the ends of the carton (as is known in the art). The end closure panels 22/122, 24/124, once folded to close an end of the carton, abut the support structure and contain the support structure within the carton. This is illustrated in each of Figures 3, 4 and 7. (Note that in Figures 3 and 4 the top panel 14/114 part of the carton has been cut-away in order to enable a clear view of the internal support structure to be shown).

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The stopping means 64/164 is employed to prevent the support structure from returning to its unfolded position. The stopping means 64/164 extends past or beyond the hinge connection 62/162 between the proximal panel 30/130 and distal panel 32/132 and can therefore act as a stop to prevent the distal panel 32/132 and proximal panel 30/130 from unfolding relative to one another. The natural resilience of the material used may encourage these panels 30/130, 32/132 to return to their unfolded, flat state. However, the stopping means provides an integrally formed physical block to this unfolding once the carton end has been closed because the stopping means 64/164 abuts the end closure panel 22/122, 24/124 and cannot move to allow unfolding of the distal panel 32/132 relative to the proximal panel 30/130. In this way, the support structure is maintained in an erect form without the need for mechanical fixings such as staples or adhesive of any kind.

The natural tendency of the distal panel 30/130 to return to its unfolded state causes the proximal and distal panels to be spaced apart and provide a 'V'-shaped cross-section that enhances the compression or stacking strength of the carton and thus reinforces the construction. Having a 'V'-shaped cross-section is an improvement over a simple reinforcement where panels 30/130, 32/132 lie flat against one another and are not spaced apart i.e. a linear 'I'-shape. Indeed a spacing between the proximal 30/130 and distal 32/132 panels that creates a non-linear cross section in, for example, a "V" shape, not a mere in-line "I" shape, provides enhanced reinforcement compared to layers of panels in substantially the same plane.

Preferably, and as illustrated in each of the embodiments, the tab 64 is formed from material that would have formed part of the proximal panel 30/130 had the distal panel 32/132 not been extended by the formation of the tab 64/164 projecting beyond the hinged connection 62 between the proximal 30/130 and distal 32/132 panels. In other words, in blank form, the tab 64/164 appears to be struck from the proximal panel 30/130. As such, the edge 62 between the distal panel 32/132 and proximal panel 30/130 comprising the hinged connection 62 is shaped such that the proximal 30/130 and distal 32/132 panels are shaped in a complimentary fashion.

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The tab or stopping means 64 is thereby formed from material contained within the footprint of the blank of material from which the carton is formed.

In the third depicted embodiment, a stopping means 264 is provided by two tabs rather than a single tab formed along the hinge connection 262. The two tabs each project further than the hinge connection 262 and each abut the neighboring end closure panel to prevent unfolding of the distal panel 232 relative to the proximal panel 230. In yet a further embodiment, the or each tab has a rounded shaped edge rather than a square cut edge. Indeed the exact shape of the tab edge is not important providing that sufficient frictional connection between the adjacent carton wall and tab can prevent or at least limit the distal panel 32/132/232 from unfolding.

In a fourth embodiment illustrated in Figures 9 and 10, an extension panel 334 is provided with an additional stopping means 364 as an interruption in the hinge connection 360 between the extension panel 334 and distal panel 332. During the construction of the carton, the extension panel 334 is, in this embodiment, is folded on top of the distal panel 332, after the distal panel 332 has been folded on top of the proximal panel 330. In this way a "zigzag" or concertina construction of the three panels is formed. Once contained by the main panels of the carton 322, 324, 316, the support structure's natural tendency to return to its unfolded position causes the overlaid panels 330, 332, 334 to spring open and out of overlapping relationship. The first stopping means 364 then restricts the amount of separation between the proximal panel 330 and distal panel 332 and the second stopping means 364 restricts the amount of separation between the extension panel 334 and distal panel 332. A support structure with a "Z"-shaped cross-section is thereby formed and held in the erected condition by operation of the first stopping means 364 abutting the end closure panel 322, 324 and by operation of the second stopping means 364 abutting the adjacent side panel 316. The arrangement comprising an extension panel 334 having a second stopping means 364 could also be folded in a similar fashion to that depicted in figure 5B but with the second, additional stopping means 364 abutting the second wall or side wall 316 to restrict or limit unfolding.

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It is envisaged that the carton and internal support structure can be formed by a series of sequential folding operations in a straight line machine so that the carton is not required to be rotated or inverted to complete its construction. The folding process is not limited to that described below and may be altered according to particular manufacturing requirements and/or made by hand.

It can be appreciated that various changes may be made within the scope of the present disclosure, for example, the size and shape of the panels may be adjusted to accommodate articles of differing size or shape or number. Though in the illustrated embodiments, the articles (P) shown are flexible pouches that do not offer much additional rigidity to the carton structure (the carton of the disclosure has particular applicability for packaging such flexible and less rigid articles) the support structure can be applied to a wide variety of cartons for packaging a wide variety of articles. Indeed, whereas fully enclosed cartons have been used for illustrative purposes, the disclosure is equally applicable to cartons having an open face for example a wrap around carton. In such a wrap around carton, the support structure could be disposed between a top and side wall of the carton to provide a resistance to crushing or to cushion the tops of articles.

In other embodiments of the disclosure, it is envisaged that the exact nature of the stopping means may take different formats to that shown. What is important is that means is provided for preventing or restricting the complete unfolding of a panel relative to another panel such that those two panels are maintained in spaced relationship and thereby create a shaped cross-section that provides additional support for resisting/absorbing stacking forces and/or other impact forces.

In other embodiments of the disclosure, it is also envisaged that the internal support structure or structures may be formed from a blank separate from the one from which the carton body is formed. Such a separate support structure may or may not be adhered partially to the inside surface of one or more of the carton walls.

It will be recognised that as used herein, directional references such as "top", "bottom", "front", "back", "end", "side", "inner", "outer", "upper" and "lower" do not

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limit the respective panels to such orientation, but merely serve to distinguish these panels from one another. Any reference to hinged connection should not be construed as necessarily referring to a single fold line only; indeed it is envisaged that hinged connection can be formed from one or more of the following, a short slit, a frangible line or a fold line without departing from the scope of the disclosure.

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CLAIMS

1. A carton comprising an internal support structure disposed adjacent to a first wall of the carton, said support structure comprising at least two panels including a distal panel and a proximal panel directly coupled together along a hinged connection, said distal and proximal panels being folded relative to one another such that the support structure has a non-linear cross-sectional shape, the support structure further comprising at least one integral stopping tab wherein the at least one stopping tab prevents unfolding of one of said at least two panels relative to the other of the at least two panels so that the non-linear cross-sectional shape is maintained and the support structure is maintained in an erect condition.
2. A carton according to claim 1 wherein the at least one stopping tab projects from the distal panel beyond the hinged connection between the at least two panels of the support structure, and the stopping tab is formed as an integral extension of the distal panel and abuts said first wall of the carton to restrict unfolding of the distal panel relative to the proximal panel.
3. A carton according to claim 1 or 2 wherein the at least one stopping tab comprises two tabs each projecting from the distal panel beyond the hinged connection between the at least two panels of the support structure, the two tabs abutting said first wall of the carton to restrict unfolding of the distal panel relative to the proximal panel.
4. A carton according to any of claims 1 to 3 wherein the at least one stopping tab has an edge that abuts said first wall of the carton.
5. A carton according to any preceding claim wherein the support structure is directly connected to the carton by a hinged connection between the proximal panel and a second wall of the carton disposed adjacent to said first wall such that said first and second walls are disposed in an angular relationship.

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6. A carton according to any preceding claim wherein the support structure further comprises an extension panel hinged to the distal panel.
7. A carton according to claim 6 wherein the support structure further comprises a second stopping tab for preventing unfolding of the extension panel relative to the distal panel so that the extension panel and distal panel remain spaced and a non-linear cross-sectional shape is maintained.
8. A carton according to claim 7 wherein the second stopping tab projects from the extension panel beyond the hinged connection between the extension panel and distal panel of the support structure, the second tab is formed as an integral projection of the extension panel and abuts a panel of the carton to restrict unfolding of the extension panel relative to the distal panel.
9. A carton according to claim 8 wherein the second stopping tab abuts either the first wall or a second wall of the carton disposed adjacent to said first wall to restrict unfolding of the extension panel relative to the distal panel and wherein the proximal panel is hinged to the second wall of the carton and said first and second walls are disposed in an angular relationship.
10. A carton according to claim 8 or 9 wherein the second stopping tab is provided by two tabs projecting from the extension panel.
11. A carton according to any of claims 6 to 10 wherein the extension panel is disposed relative to the proximal and distal panels such that the support structure is triangular in cross-section, has an "L"-shaped cross section, has a zigzag or "Z"-shaped cross-section or has a "V"-shaped cross-section.
12. A carton according to any of the preceding claims 2 to 11 wherein the first stopping tab is formed from material that would have formed part of the

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proximal panel had the distal panel not been extended by the formation of said tabs.

13. A blank for forming a carton having a support structure having a non-linear cross-sectional shape, the blank comprising a series of panels for forming the main walls of the carton and comprising at least two panels for forming the support structure, hinged to one of said plurality of panels for forming the carton, said at least two panels comprising a proximal panel hinged directly to said one of said plurality of panels, a distal panel hinged directly to the proximal panel and comprising at least one stopping tab for preventing unfolding of the distal panel relative to the proximal panel.
14. A blank according to claim 13 wherein the at least one stopping tab comprises a plurality of tabs, each formed as an integral extension of the distal panel and each formed from material that would have formed part of the proximal panel had the distal panel not been extended by the formation of said tabs.
15. A blank according to any of claims 13 or 14 wherein the support structure further comprises an extension panel hinged to the distal panel.
16. A blank according to any of claims 13 to 15 wherein the blank further comprises a at least one second stopping tab for preventing unfolding of the extension panel relative to the distal panel once the blank is set-up into a carton.
17. A blank according to claim 16 wherein said at least one second stopping tab comprises a plurality of tabs projecting from the extension panel beyond the hinged connection between the extension panel and distal panel, the tabs being formed as an integral projection of the extension panel and being formed from material that would have formed part of the distal panel had the extension panel not been extended by the formation of said tabs.

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18. A part-formed carton formed from the blank of any of claims 13 to 17, wherein the series of panels are at least partly folded and wherein one of said panels of the series is secured to another of said panels of the series.

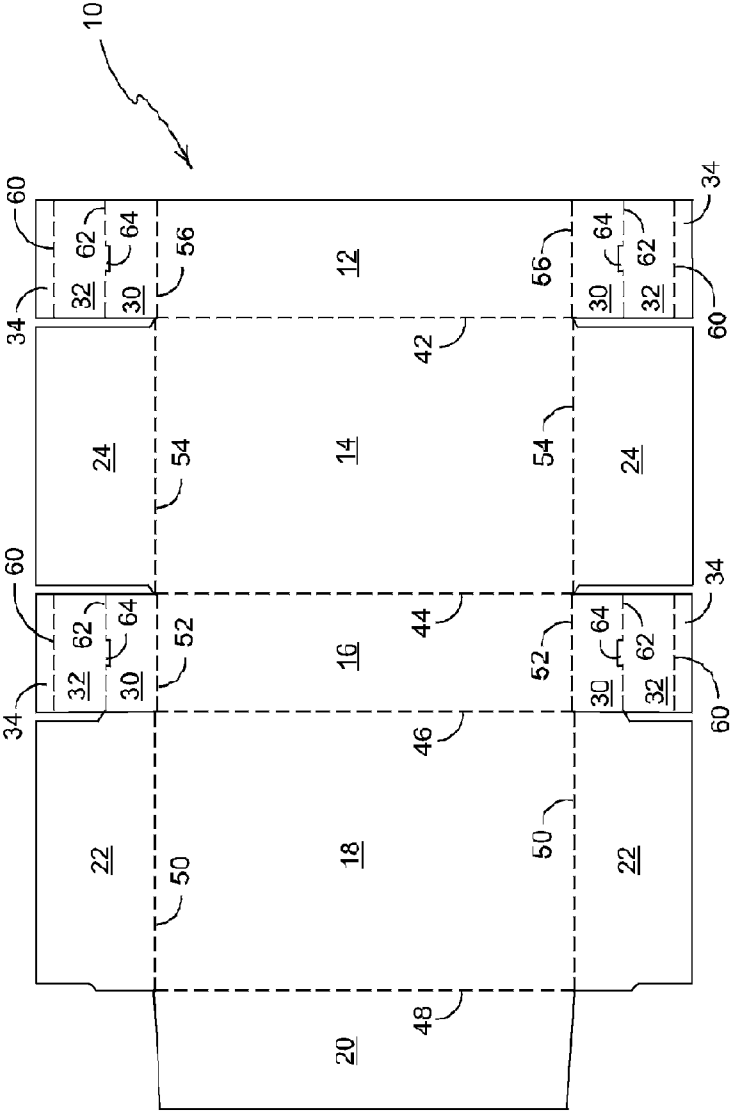


FIGURE 1

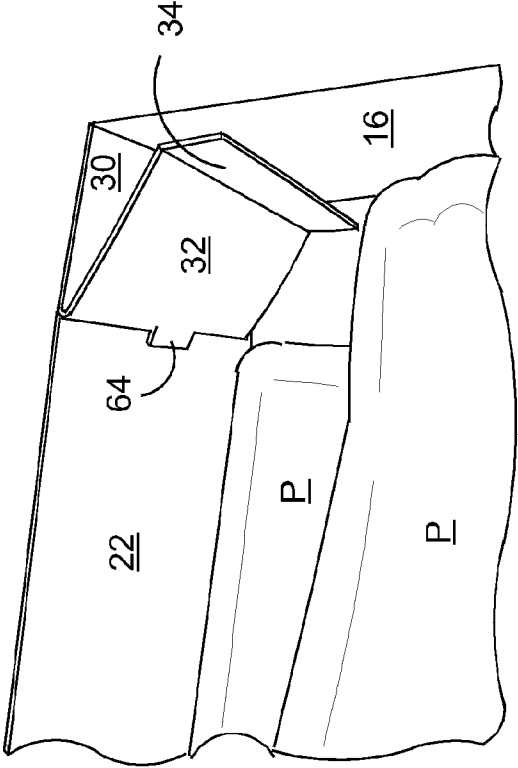


FIGURE 4

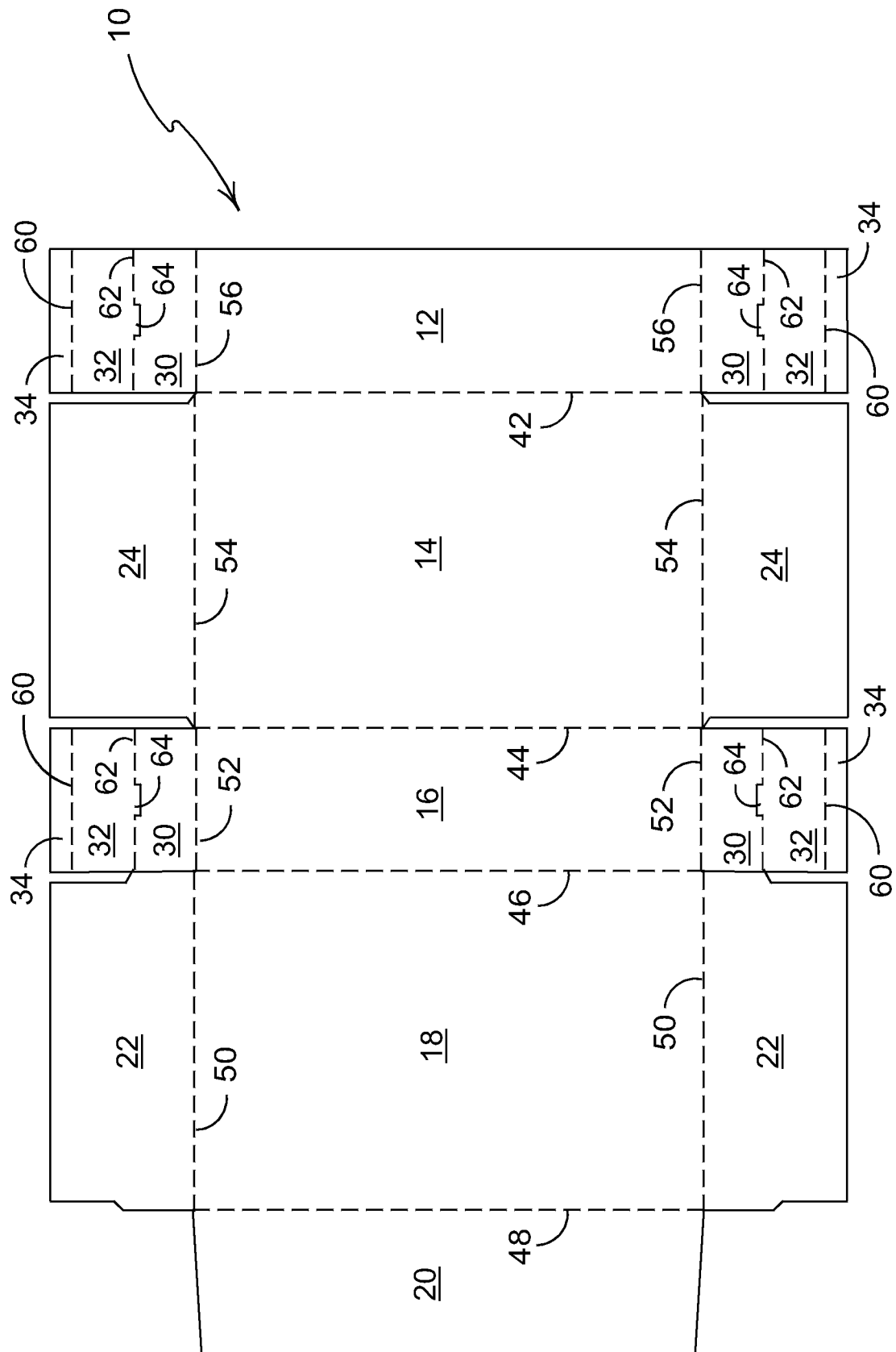


FIGURE 1

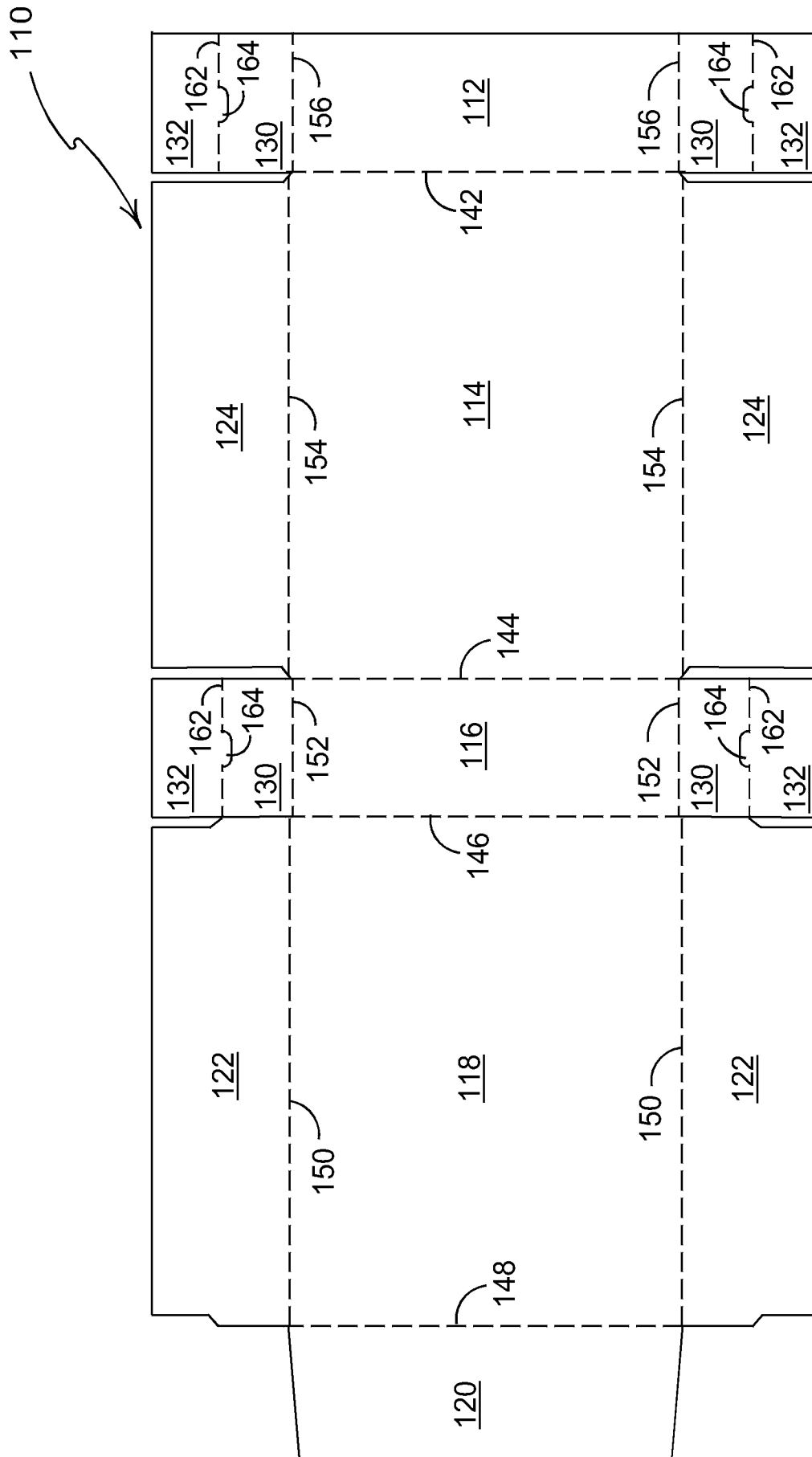


FIGURE 2

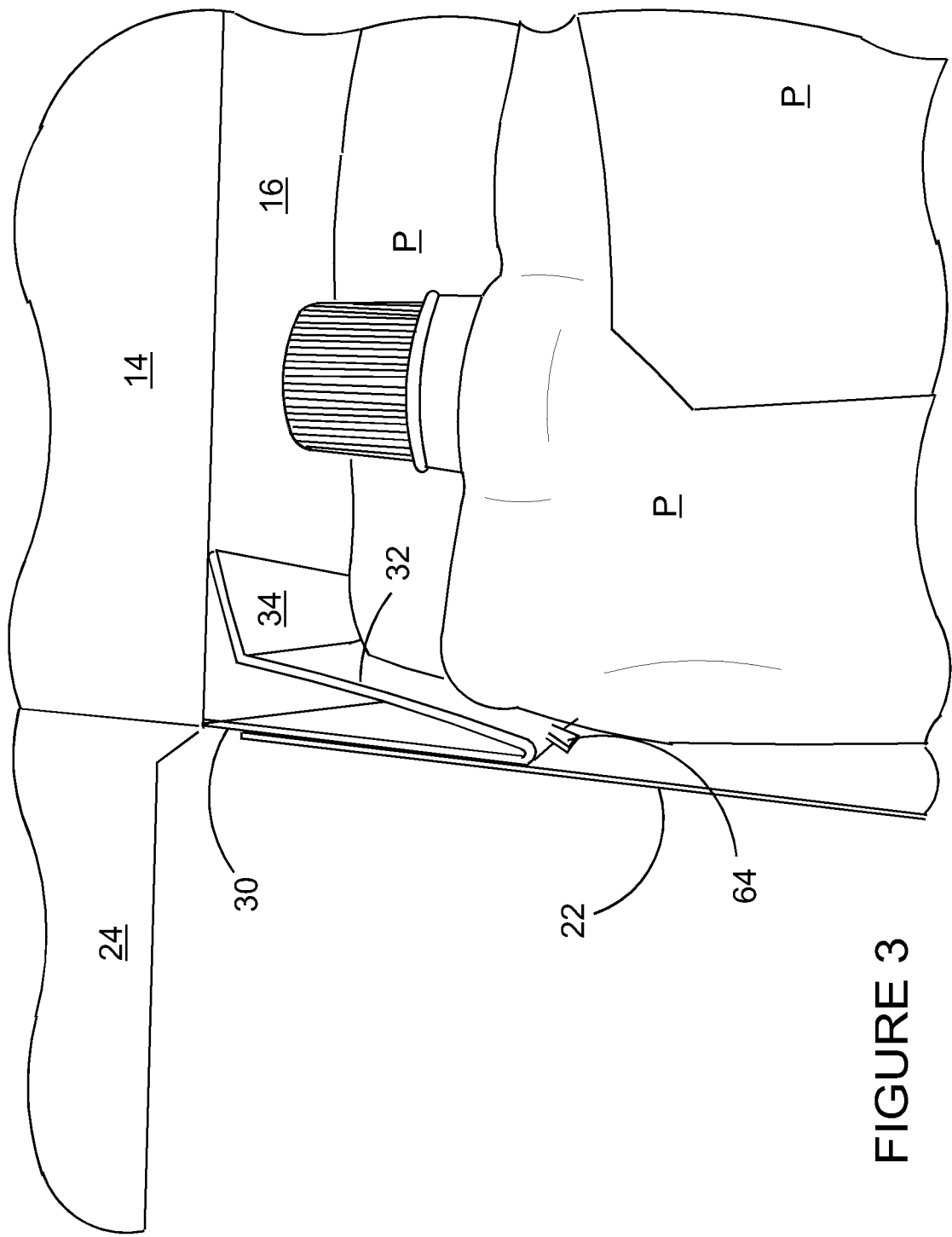


FIGURE 3

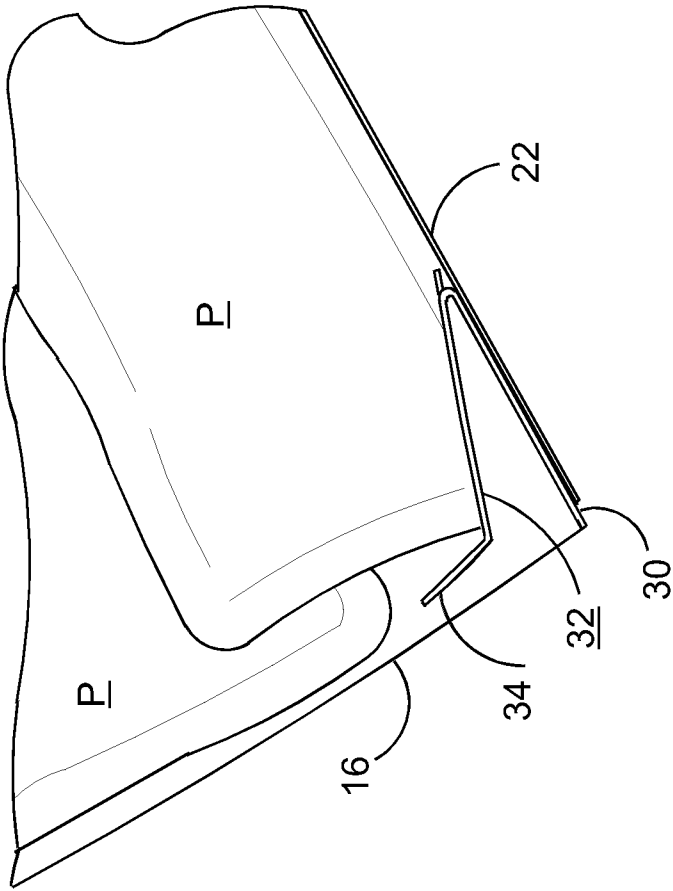


FIGURE 5

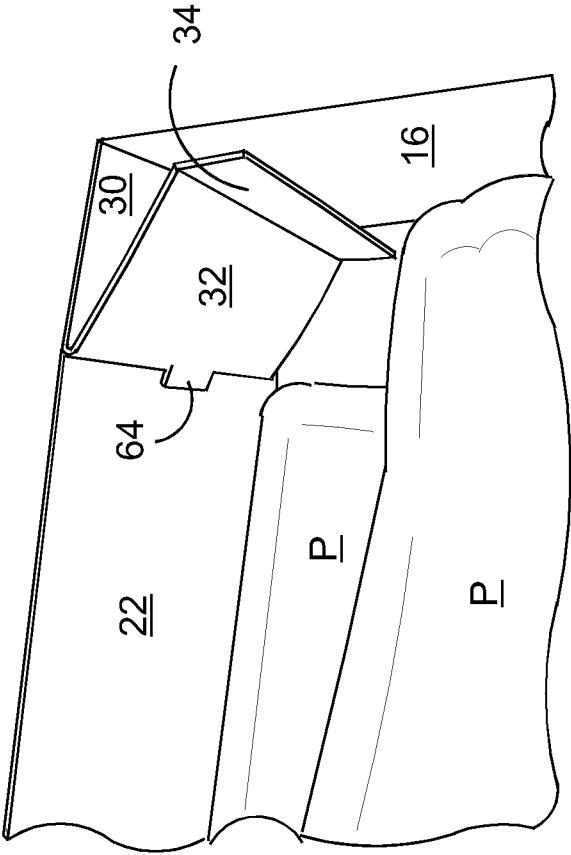
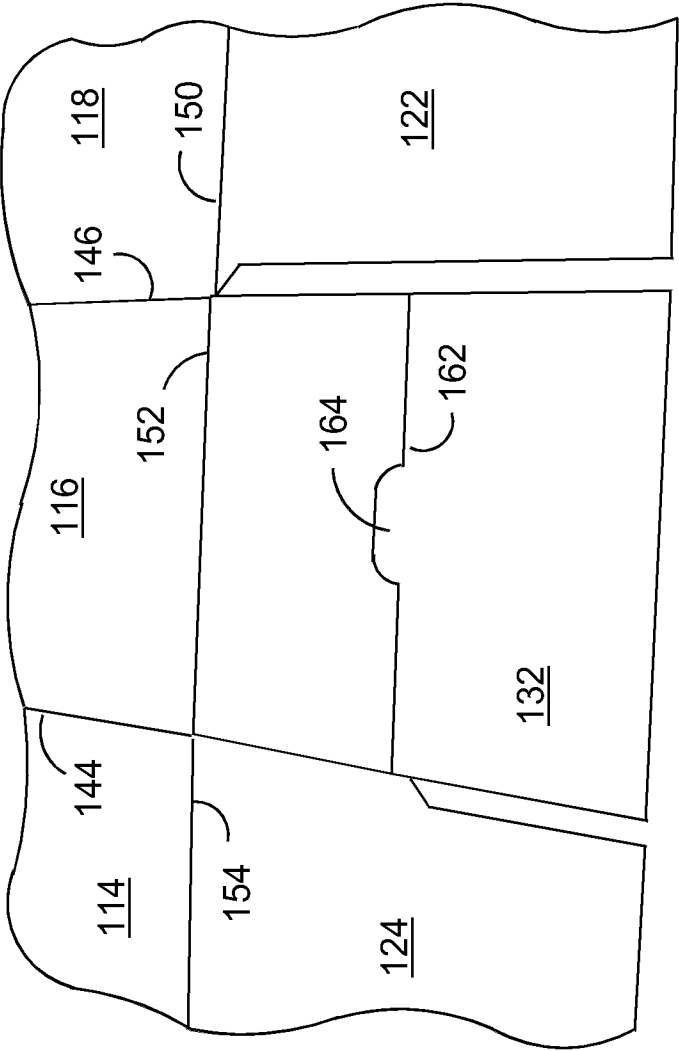
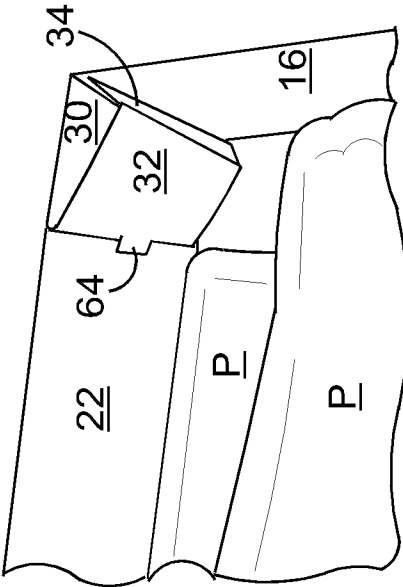
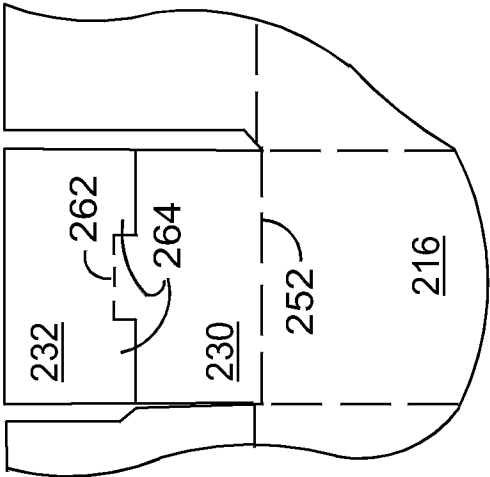
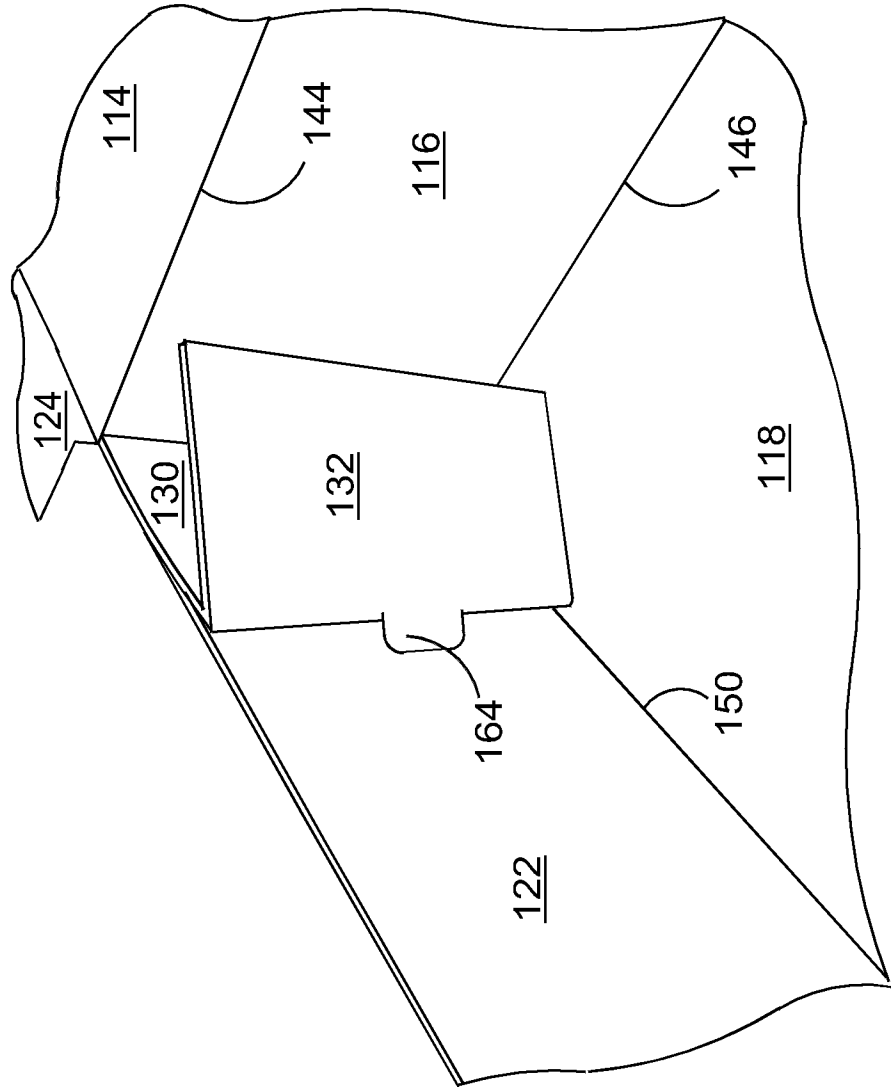


FIGURE 4





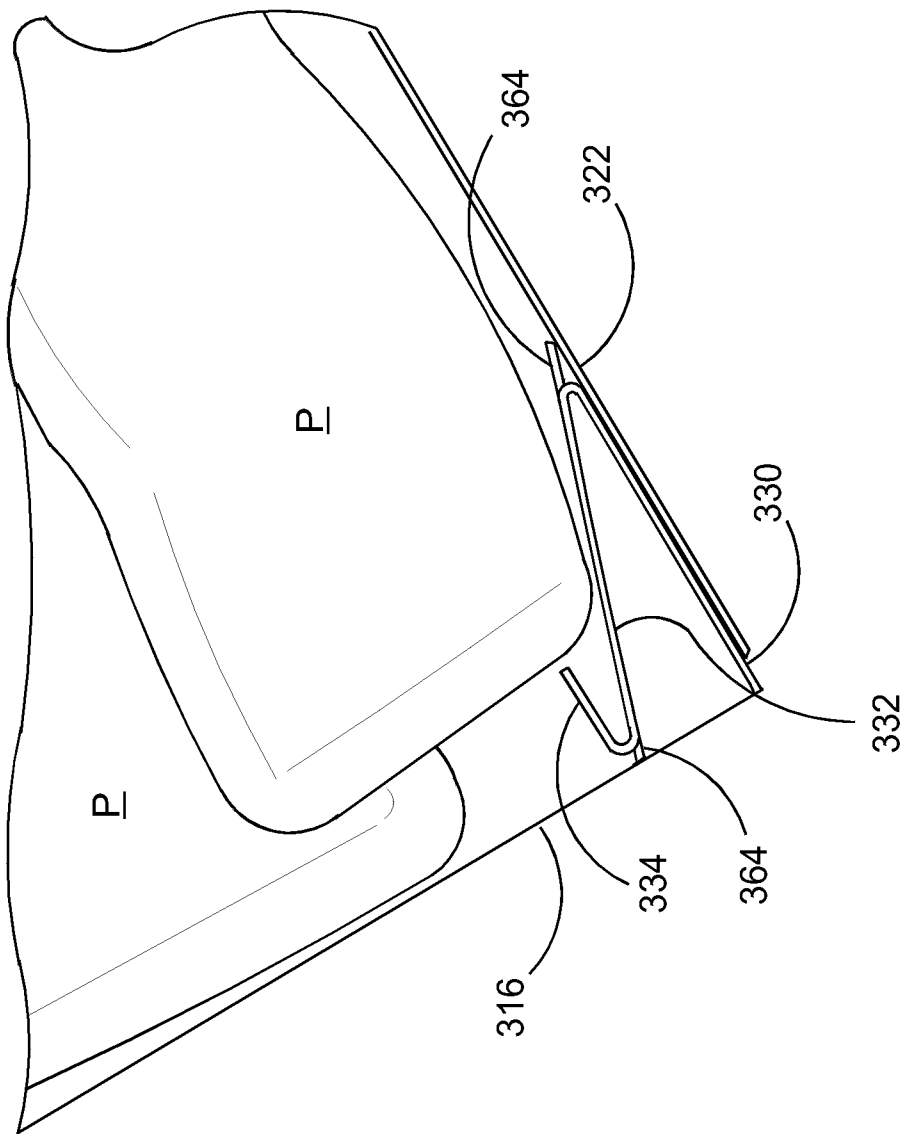


FIGURE 10

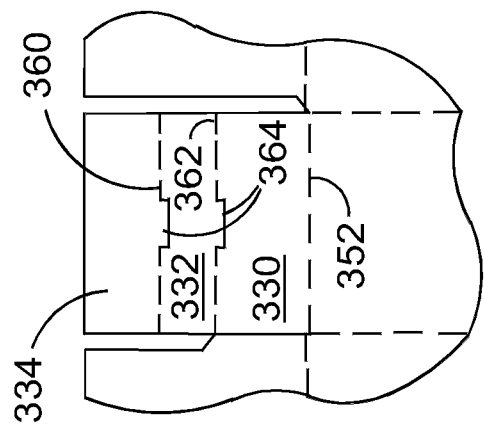


FIGURE 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/066014

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D5/50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/145687 A1 (CONWAY DOYLE A [US]) 7 July 2005 (2005-07-07) paragraph [0044] - paragraph [0046]; figures 2,11,12 -----	1-18

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

11 February 2010

Date of mailing of the international search report

01/03/2010

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2009/066014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005145687	A1	07-07-2005	NONE