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(54) **Wrap-around carton with dispensing feature**

(57) A carrier package (150), comprising a carrier and containers located therein, said carrier (150) comprising a top panel (20), two side panels (50,60), a bottom panel (30), first and second upper (54a,64a) and lower (56a,66a) gussets at least partially closing an upper and a lower part of a first and a second end of the carrier (150) respectively, and a dispenser pattern (100) extending at least partially across each of the top panel (20), the bottom panel (30), and at least one of the side panels (50,60), with the dispenser pattern (100) defining a dispenser flap (70) that is at least partially removable from a remainder of the carrier (150) so that a dispenser opening through which the containers (C) can be dispensed is defined by the remainder of the carrier (150) in response to the dispenser flap (70) having been at least partially removed from the remainder of the carrier (150).

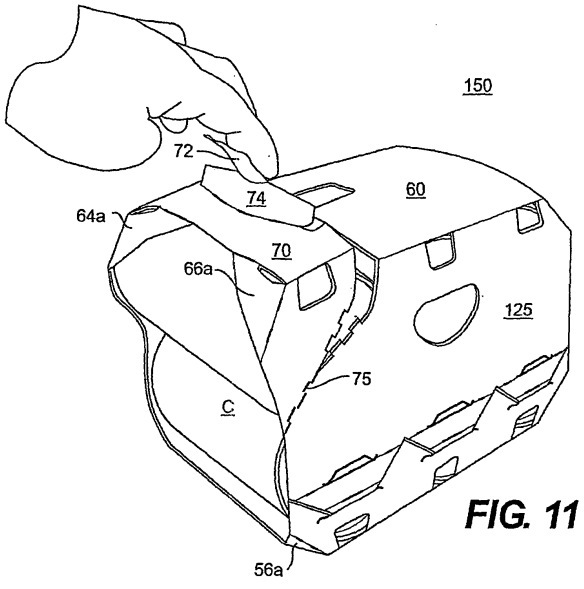

FIG. 11

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 60/657,133, filed February 28, 2005, and U.S. Provisional Application No. 60/683,612, filed May 23, 2005, both of which are entirely incorporated herein by reference.

BACKGROUND

[0002] The present invention relates to a carrier package comprising a carrier and a plurality of containers located within said carrier. Generally described, a wrap-around carrier is conventionally formed by wrapping a carrier blank around a set of containers, and connecting opposite ends of the blank to one another with adhesive material or mechanical locks. A conventional wrap-around carrier is typically separated at the connected blank ends, or portions of the carrier are torn at the ends of the carrier, to allow removal of the containers held within the carrier.

SUMMARY

[0003] The present invention aims at improving such carriers for containers to be packaged therein in that the risk for containers to fall out of the carrier is reduced.

[0004] This object is achieved by carrier packages defined in independent claims 1, 3, and 5. As identified in detail in the respective claims the carrier package of the present invention, thus, comprises a specific retention panel extending completely across the first end of the carrier or a retention flap that is not in contact with either of the first and second side panels respectively.

[0005] Further aspects and benefits of the present invention are readily ascertainable from the claims and the description of preferred embodiments.

[0006] Conventional wrap-around carriers typically do not have a dispensing feature that is defined where containers contained in the carrier can be dispensed in a controlled manner. As a result, conventional wrap-around carriers suffer from the disadvantage that once open, they can no longer hold containers or the overall integrity of the carrier is compromised.

[0007] There is therefore a need for wrap-around carriers that have dispensing features. More generally described, there is a need for wrap-around carriers that provide a new balance of properties.

[0008] In a second aspect of the present invention, the wrap-around carrier further comprises a drop down gusset on its rear end to further restrain the articles within the carrier from falling out of the carrier. The drop down gusset provides an additional area for printed information or the like.

[0009] In accordance with one further aspect, the present invention generally relates to a wrap-around article carrier with tuck-in flaps, gussets and a dispensing feature. The carrier generally is held together by a locking system and accommodates a plurality of containers to form a carrier package. The tuck-in flaps and gussets are proximate on the open ends of the wrap-around article carrier to retain the articles securely inside the carrier package and to allow information printed on the articles such as product information, brand information, logos, and other information to be viewed by potential customers. In addition, the carrier package may occupy less area than conventional carrier packages. In accordance with one example, when dispensing is desired, the carrier package is placed on its side panel and the dispensing feature is removed from the carrier package to form an opening from which articles are dispensed. The integrity of the carrier is substantially preserved after the dispensing feature is removed. Further, the remaining tuck-in flaps and gussets can help to retain the articles inside the carrier package so the articles can be dispensed in a controlled fashion after the removal of the dispensing feature.

[0010] In one embodiment of the present invention, the wrap-around carrier package is constructed by engaging primary or secondary locks. In another embodiment of the present invention, the wrap-around carrier package is constructed by engaging primary or secondary locks with a divider guard feature to further restrain the articles within the carrier from falling out of the carrier.

[0011] In one aspect of the present invention, the wrap-around carrier in addition has push-in tabs on its rear end to further restrain the articles within the carrier from falling out of the carrier.

[0012] Those skilled in the art will appreciate the above stated advantages and other advantages and benefits of various additional aspects reading the following detailed description of the embodiments with reference to the below-listed drawing figures.

[0013] According to common practice, the various features of the drawings discussed below are not necessarily drawn to scale. Dimensions of various features and elements in the drawings may be expanded or reduced to more clearly illustrate the embodiments of the invention.

[0014] According to another aspect the carrier package comprises a carrier and a plurality of containers located within the carrier, the carrier comprising a top panel, a first side panel adjacent to the top panel, a second side panel adjacent to the top panel and disposed on a side of the carrier package opposite to the first side panel, a bottom panel adjacent to each of the first and second side panels and opposite from the top panel, a first upper gusset at least partially closing an upper part of a first end of the carrier, a first lower gusset at least partially closing a lower part of the first end of the carrier, a second upper gusset at least partially closing an upper part of a second end of the carrier, a second lower gusset at least partially closing a lower part of the second end of the carrier, and a dispenser pattern extending at least par-

tially across each of the top panel, the bottom panel, and at least one of the first and second side panels, with the dispenser pattern defining a dispenser flap that is at least partially removable from a remainder of the carrier so that a dispenser opening is defined by the remainder of the carrier in response to the dispenser flap having been at least partially removed from the remainder of the carrier, wherein the dispenser flap is configured so that, when the dispenser flap is at least partially removed so that the dispenser opening is defined by the remainder of the carrier, the containers can be dispensed through a dispenser opening in the carrier.

[0015] In the carrier package defined above the dispenser pattern may comprise at least one tear line. The carrier package further may comprise a retention panel, wherein the carrier includes opposite first and second ends that are each open, the retention panel extends completely across the first end, and the dispenser flap is adjacent the second end. The carrier package may further comprise a retention flap that is not in contact with either of the first and second side panels and extends downwardly from the top panel to partially obstruct an open end of the carrier. The carrier package may further comprise a retention flap that is not in contact with either of the first and second side panels and extends upwardly from the bottom panel to partially obstruct an open end of the carrier.

[0016] According to another aspect of the present invention a blank for erecting into a wrap-around carrier may comprise a top panel, a first side panel foldably connected to the top panel, a second side panel that is opposite from the first side panel and is foldably connected to the top panel, a first bottom panel foldably connected to the first side panel, and a second bottom panel foldably connected to the second side panel, wherein the first bottom panel and the second bottom panel are for being secured together when the blank is erected into the wrap-around carrier, and wherein a dispenser pattern extends at least partially across each of the top panel, at least one of the first and second side panels, and at least one of the first and second bottom panels, with the dispenser pattern defining a dispenser flap for being at least partially removable from a remainder of the blank.

[0017] In the carrier blank defined above the dispenser pattern may comprise at least one tear line. The first bottom panel may include securing features for operatively interacting with securing features of the second bottom panel to secure the first and second bottom panels together when the blank is erected into the wrap-around carrier. The securing features of the first bottom panel may include at least one locking flap, and the securing features of the second bottom panel may include at least one opening for at least partially holding the locking flap. The blank may further comprise at least one retaining flap in the second bottom panel, wherein the retaining flap is for being held in an erected configuration by the locking flap when the carrier is erected from the blank. The blank may further comprise a push-in tab defined by at least one cut in a rear end of the top panel. The blank may further comprise a push-in tab defined by at least one cut in a rear end of the top panel. The blank may further comprise a first front tuck-in panel connected to a front end of the first side panel, a first rear tuck-in panel connected to a rear end of the first side panel, a second front tuck-in panel connected to a front end of the second side panel, a second rear tuck-in panel connected to a rear end of the second side panel, a first front retaining panel foldably connected between the first front tuck-in panel and a right front truncated corner of the first bottom panel, a first rear retaining panel foldably connected between the first rear tuck-in panel and a right rear truncated corner of the first bottom panel, a second front retaining panel foldably connected between the first front tuck-in panel and a left front truncated corner of the top panel, a second rear retaining panel foldably connected between the first rear tuck-in panel and a left rear truncated corner of the top panel, a third front retaining panel foldably connected between the second front tuck-in panel and a right front truncated corner of the top panel, a third rear retaining panel foldably connected between the second rear tuck-in panel and a right rear truncated corner of the top panel and, a forth front retaining panel foldably connected between the second front tuck-in panel and a left front truncated corner of the second bottom panel; and a fourth rear retaining panel foldably connected between the second rear tuck-in panel and a left rear truncated corner of the second bottom panel. The blank may further comprise a dividing fold line that divides the second rear retaining panel into two foldably connected portions along the dividing fold line. The blank may further comprise a dividing fold line that divides the third rear retaining panel into two foldably connected portions along the dividing fold line. The blank may further comprise a cut line separating a portion of the top panel defined by the area between the second rear retaining panel and the third rear retaining panel from the top panel to form a drop down gusset.

[0018] According to a still further aspect of the present invention a carrier package comprises a carrier and a plurality of containers located within the carrier, the carrier comprising a top panel, a first side panel adjacent to the top panel, a second side panel adjacent to the top panel and disposed on a side of the carrier package opposite to the first side panel, a bottom panel adjacent to each of the first and second side panels and opposite from the top panel, the bottom panel comprising a first bottom panel joined to a second bottom panel by at least primary male and primary female locking elements, at least one first gusset at least partially closing a first end of the carrier, at least one second gusset at least partially closing a second end of the carrier, and a dispenser pattern extending at least partially across each of the top panel, the bottom panel, and at least one of the first and second side panels, with the dispenser pattern defining a dispenser flap that is at least partially removable from a remainder of the carrier so that a dispenser opening is

defined by the remainder of the carrier in response to the dispenser flap having been at least partially removed from the remainder of the carrier; wherein the dispenser flap is configured so that when the dispenser flap is at least partially removed, the containers can be dispensed through the dispenser opening. In the above identified carrier package the first and second bottom panels may be further secured by secondary male and secondary female locking elements. Further the dispenser pattern may comprise at least one tear line. The carrier package may further comprise a retention panel, wherein the carrier includes opposite first and second ends that are each open, the retention panel extends completely across the first end, and the dispenser flap is adjacent the second end. The carrier package may further comprise a retention flap that is not in contact with either of the first and second side panels and extends downwardly from the top panel to partially obstruct an open end of the carrier. The carrier package may further comprise a retention flap that is not in contact with either of the first and second side panels and extends upwardly from the bottom panel to partially obstruct an open end of the carrier.

According to a still further aspect of the present invention a carrier package comprises a carrier and a plurality of containers located within the carrier, the carrier comprising a top panel, a first side panel adjacent to the top panel, a second side panel adjacent to the top panel and disposed on a side of the carrier package opposite to the first side panel, a bottom panel adjacent to each of the first and second side panels and opposite from the top panel, the bottom panel comprising a first bottom panel joined to a second bottom panel, and a dispenser pattern extending at least partially across each of the top panel, the bottom panel, and at least one of the first and second side panels, with the dispenser pattern defining a dispenser flap that is at least partially removable from a remainder of the carrier so that a dispenser opening is defined by the remainder of the carrier in response to the dispenser flap having been at least partially removed from the remainder of the carrier; wherein the dispenser flap is configured so that when the dispenser flap is at least partially removed so that the dispenser opening is defined by the remainder of the carrier, the containers can be dispensed through the dispenser opening. In the carrier package identified above the first and second bottom panels may be secured by primary male and primary female locking elements. The first and second bottom panels may be further secured by secondary male and secondary female locking elements. The carrier package may further comprise a retention panel, wherein the carrier includes opposite first and second ends that are each open, the retention panel extends completely across the first end, and the dispenser flap is adjacent the second end. The carrier package may further comprise a retention flap that is not in contact with either of the first and second side panels and extends downwardly from the top panel to partially obstruct an open end of the carrier. The carrier package may further comprise a retention flap that is not in contact with either of the first and second side panels and extends upwardly from the bottom panel to partially obstruct an open end of the carrier.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

FIG. 1 is a plan view of a blank used to form a wrap-around carrier package having a dispensing feature according to a first embodiment of the present invention.

FIGS. 2-3 are perspective views of loading and partial erection of the first carrier package embodiment.

FIG. 4 is a bottom view of the erected first carrier package embodiment.

FIG. 5 is a front view of the first carrier package embodiment.

FIG. 6 is a rear view of the first carrier package embodiment.

FIG. 7 is a front perspective view of the first carrier package embodiment.

FIG. 8 is a bottom perspective view of the first carrier package embodiment.

FIG. 9 is a perspective view of the first carrier package embodiment.

FIG. 10 illustrates a user opening the dispensing feature of the first carrier package embodiment.

FIG. 11 illustrates a user further opening the dispensing feature of the first carrier package embodiment.

FIG. 12 illustrates the first carrier package embodiment with its dispensing feature removed.

FIG. 13 is a plan view of a blank used to form a wrap-around carrier package having a dispensing feature according to a second embodiment of the present invention.

FIG. 14 is a plan view of a blank used to form a wrap-around carrier package having a dispensing feature according to a third embodiment of the present invention.

FIG. 15 is a bottom view of the third carrier package embodiment.

FIG. 16 is a front view of the third carrier package embodiment.

FIG. 17 is a rear view of the third carrier package embodiment.

FIG. 18 illustrates the third carrier package embodiment with its dispensing feature removed.

FIG. 19 is a plan view of a blank used to form a wrap-around carrier package having a dispensing feature according to a fourth embodiment of the present invention.

FIG. 20 is a rear view of the fourth carrier package embodiment.

FIG. 21 is a perspective view of the fourth carrier package embodiment.

FIG. 22 is a bottom perspective view of the fourth

carrier package embodiment.

FIG. 23 illustrates the fourth carrier package embodiment with its dispensing feature removed.

FIG. 24 is a plan view of a blank used to form a wrap-around carrier package having a dispensing feature according to a fifth embodiment of the present invention.

FIG. 25 is a rear view of the fifth carrier package embodiment.

FIG. 26 is a perspective view of the fifth carrier package embodiment.

FIG. 27 illustrates the fifth carrier package embodiment with its dispensing feature removed.

DETAILED DESCRIPTION

[0020] **FIG. 1** is a plan view of a blank **8** used to form a carrier package **150** (illustrated in **FIGS. 4-12)** according to a first embodiment of the present invention. The blank **8** comprises a first or inner bottom panel **30** foldably connected to a first side panel **50** at a fold line **33,** a top panel **20** foldably connected to the first side panel **50** at a fold line **25,** a second side panel **60** foldably connected to the top panel **20** at a fold line **29,** and a second or outer bottom panel **40** foldably connected to the second side panel **60** at a fold line **45.** Overall, the blank **8** is generally rectangular in shape. The exterior or print side of the blank **8** is illustrated in **FIG. 1,** whereas the interior side of the blank is partially shown in **FIGS. 2-3.**

[0021] The top panel **20** has a generally rectangular shape with truncated corners and curved cut outs **21a, 21b.** The curved cut outs **21a, 21b** can be shaped and sized so that the top panel **20** generally conforms to shapes of the containers **C** held within the finished carrier package **150 (FIG. 7).**

[0022] The inner bottom panel **30** includes cut outs forming primary female locking edges **38a, 38b, 38c** that are adapted to respectively engage primary male locking tabs **48a, 48b, 48c** of the outer bottom panel **40.** The inner bottom panel **30** also includes slits **32a, 32b, 32c** adapted to respectively receive secondary male locking flaps **42a, 42b, 42c** extending from the outer bottom panel **40.** The outer bottom panel **40** includes a fold line **47** which is interrupted by the slits that define the primary male locking tabs **48a, 48b, 48c.** The secondary male locking flaps **42a, 42b, 42c** are connected along the interrupted fold line **47** and each flap includes an intermediate fold line **43a-c.** Although the locking elements are illustrated to demonstrate a typical bottom panel locking arrangement suitable for use with the carrier package of the present invention, it should be understood that any desired form of bottom panel locking means may be employed. For example, glue or other adhesive material, or other suitable fastening means, may be used to secure the bottom panels **30, 40** together. For example, a description of an alternative locking system is discussed below with reference to **FIG. 14.**

[0023] A first front tuck-in **panel 52a** is foldably connected to the front end of the first side panel **50** at a fold line **51a**. A first rear tuck-in panel **52b** is foldably connected to the rear end of the first side panel **50** at a fold line **51b.** A second front tuck-in panel **62a** is foldably connected to the front end of the second side panel **60** at a fold line **61 a.** A second rear tuck-in panel **62b** is foldably connected to the rear end of the second side panel **60** at a fold line **61b.**

[0024] A first front retaining panel **56a** is foldably connected to a right front truncated corner of the inner bottom panel **30** at a fold line **53a,** and to the first front tuck-in panel **52a** at a fold line **55a.** A first rear retaining panel **56b** is foldably connected to a right rear truncated corner of the inner bottom panel **30** at a fold line **53b,** and to the first rear tuck-in panel **52b** at a fold line **55b.** A second front retaining panel **54a** is foldably connected to the first front tuck-in **panel 52a** at a fold line **57a,** and to a left front truncated corner of the top panel **20** at a fold line **59a.** A second rear retaining panel **54b** is foldably connected to the first rear tuck-in panel **52b** at a fold line **57b,** and to a left rear truncated corner of the top panel **20** at a fold line **59b.**

[0025] A third front retaining panel **64a** is foldably connected to a right front truncated corner of the top panel **20** at a fold line **63a,** and to the second front tuck-in panel **62a** at a fold line **65a.** A third rear retaining panel **64b** is foldably connected to a right rear truncated corner of the top panel **20** at a fold line **63b,** and to the second rear tuck-in panel **62b** at a fold line **65b.** A fourth front retaining panel **66a** is foldably connected to the second front tuck-in panel **62a** at a fold line **67a,** and to a left front truncated corner of the outer bottom panel **40** at a fold line **69a.** A fourth rear retaining panel **66b** is foldably connected to the second rear tuck-in panel **62b** at a fold line **67b** and to a left rear truncated corner of the outer bottom panel **40** at a fold line **69b.**

[0026] One or more of the fold lines **55a, 57a, 55b, 57b, 65a, 67a, 65b, 67b** may include, for example, one or more slits. The slits may extend to the respective edges of the blank **8** to facilitate folding of the tuck-in panels.

[0027] According to one exemplary aspect of the invention, a dispenser pattern **100** is defined in the blank **8.** The dispenser pattern **100** may be defined by tear lines **71** and **75.** The illustrated dispenser pattern **100** extends across a portion of each of the top panel **20,** the second side panel **60** and the outer bottom panel **40** proximate the front end of the blank **8.** The dispenser pattern **100** defines a dispensing feature **70.** The illustrated dispenser pattern **100** also includes a fold line **73,** a curved fold line **77,** and slits **78** respectively extending from the two ends of the curved fold line **77** to the tear line **75.** The lines **73, 77** define a pulling tab **74** in the dispensing feature **70.** The portion of the dispensing feature **70** that is surrounded by cut lines **71** and the fold line **73** forms an extension pulling tab **72** that is an extension of the pulling tab **74.**

[0028] Cut outs **84a-g** are respectively formed between each retaining panel and associated side panel. Compressing cut outs **82a-f** are respectively formed in

the inner bottom panel **30** and the outer bottom panel **40** along fold lines **33** and **45.** The compressing cut outs **82a-f** can receive the heels of the containers C retained in the erected carrier **150.** A viewing aperture **80** can be formed in the blank **8** by removing a portion of the outer bottom panel **40.** Apertures **80a, 80b** can also be formed in the top panel **20** (shown in **FIG. 13)** or in the first side panel **50** (not shown).

[0029] An exemplary method of erecting the carrier **150** will now be discussed with reference to **FIGS. 2-4. FIG. 2** illustrates an initial step in erection of the carrier package **150,** in which containers **C** are placed top side down on the interior side of the top panel **20** of the blank **8.** Referring to **FIG. 3,** the side panels **50, 60** are then folded upwardly toward the containers C. As the side panels **50, 60** are folded upwardly, the tuck-in panels **52a, 52b, 62a, 62b** are tucked inwardly about the fold lines **51a, 51b, 61a, 61b** respectively. At the same time and as a result, the retaining panels **54a, 54b, 56a, 56b, 64a, 64b, 66a, 66b** are drawn inwardly so as to respectively partially wrap around portions of the containers **C** and to form gussets. After the outer bottom panel **40** is secured to the inner bottom panel **30** as discussed below, the tuck-in panels **52a, 52b, 62a, 62b** and retaining panels **54a, 54b, 56a, 56b, 64a, 64b, 66a, 66b** are held in place by virtue of the tuck-in panels **52a, 52b, 62a, 62b** being respectively sandwiched between the cans **C** and the side panels **50, 60.**

[0030] Referring to **FIG. 4,** the outer bottom panel **40** is secured to the inner bottom panel **30** by first respectively engaging primary male locking tabs **48a, 48b, 48c** with primary female locking edges **38a, 38b, 38c.** The male locking flaps **42a, 42b, 42c** are respectively inserted through, and cooperatively interact with, the slits **32a, 32b, 32c** to further secure the outer bottom panel **40** to the inner bottom panel **30.** The secured together inner bottom panel **30** and outer bottom panel **40** form a bottom panel **125.** The heels of containers **C** are respectively associated with the compressing cut outs **82a-f** to allow tighter wrapping of the carrier package **150** around containers **C.**

[0031] **FIG. 5** is a front view of the erected carrier package **150.** As shown in **FIG. 5,** when the tuck-in panel **52a** is folded inwardly about the fold line **51a,** the retaining panels **54a, 56a** respectively abut the containers **C** adjacent thereto and form a pair of gussets **54a, 56a.** When the tuck-in panel **62a** is folded inwardly about the fold line **61 a,** the retaining panels **64a, 66a** respectively abut the adjacent containers **C** and form a pair of gussets **64a, 66a.** The gussets **54a, 64a** secure the top portion of the containers **C** from the front end. The gussets **56a, 66a** secure the bottom portion of the containers **C** from the front end. **FIG. 6** is a rear view of the erected carrier package **150.** As shown in **FIG. 6,** when the tuck-in panel **52b** is folded inwardly about the fold line **51b,** the retaining panels **54b, 56b** respectively abut the adjacent containers **C** and form a pair of gussets **54b, 56b.** When the tuck-in panel **62b** is folded inwardly about the fold line **61b,** the retaining panels **64b, 66b** respectively abut the adjacent containers **C** and form a pair of gussets **64b, 66b.** The upper gussets **54b, 64b** secure the top portion of the containers **C** from the rear end. The lower gussets **56b, 66b** secure the bottom portion of the containers **C** from the rear end.

[0032] **FIGS. 7-9** are perspective views of the erected carrier package **150.** In **FIG. 7,** the carrier package **150** rests on its bottom panel **125.** In **FIG. 8,** the carrier package **150** rests on its first side panel **50** with the dispensing feature **70** facing upwardly. The dispensing panel **70** is defined by the dispenser pattern **100.** The containers **C** are retained by gussets **64a, 66a, 54a, 56a** from the front end, and by gussets **64b, 66b, 54b, 56b** from the rear end.

[0033] An exemplary method of opening of the dispensing feature **70** will now be discussed with reference to **FIGS. 10-12.** In **FIG.** 10, the carrier package **150** rests on the first side panel **50.** A user starts to open the dispensing feature **70** by pulling the pulling tab **74** and the extension pulling tab **72** outwardly. **FIG. 11** illustrates the dispensing feature **70** being further pulled away from the carrier **150. FIG. 12** illustrates the dispensing feature **70** being completely removed with the containers C retained within the carrier package **150.**

[0034] According to one aspect of the present invention, the carrier package **150** can be opened to allow dispensing of individual containers in a controlled manner. In addition, because the carrier is wrapped very tightly around the containers, the package allows for efficient use of shipping, storage, and display space.

[0035] **FIG. 13** is a plan view of a blank **208** used to form a carrier package according to a second embodiment of the present invention. The second embodiment of the present invention is like the first embodiment of the present invention, except for variations noted and variations that will be apparent to those of ordinary skill in the art in view of this disclosure. The dispensing panel of the second embodiment of the present invention is different from the dispensing panel in the first embodiment of the present invention. As shown in **FIG. 13,** the dispensing panel **270** has the pulling tab **274** but does not include the extension pulling tab **72 (FIG. 1).** The pulling tab **274** is defined by a portion of the cut line **275** and the curved fold line **277.** Referring to **FIG. 13,** in addition to aperture **80,** there are two additional apertures **80a, 80b.** The apertures **80a, 80b** are each shown to be removably obstructed by a flap, but the apertures as well as the flaps covering them are optional.

[0036] **FIG. 14** is a plan view of a blank **408** used to form a wrap-around carrier package **550** (illustrated in **FIGS. 15-18)** according to a third embodiment of the present invention. The blank **408** of the third embodiment is identical to the blank **8** of the first embodiment, which is illustrated in **FIG. 1,** except for variations noted and variations that will be apparent to those of ordinary skill in the art in view of this disclosure. Some of the features of the third embodiment that have some general similarity

to, or are identical to, features of the first embodiment are respectively identified with the same reference numbers except that four hundred has been added to the subject reference numbers of the third embodiment.

[0037] The locking system of the third embodiment of the present invention is different from the locking system in the first embodiment of the present invention. On a related note and for example, the carrier **550** formed from the blank **408** includes divider guards **128a, 128b (FIGS. 16** and **17)** that serve to further retain containers **C** within the carrier **550.**

[0038] As shown in **FIG. 14,** the blank **408** comprises a first or inner bottom panel **430** foldably connected to a first side panel **50** at a fold line **33,** a top panel **20** foldably connected to the first side panel **50** at a fold line **25,** a second side panel **60** foldably connected to the top panel **20** at a fold line **29,** and a second or outer bottom panel **440** foldably connected to the second side panel **60** at a fold line **45.**

[0039] The inner bottom panel **430** includes cutouts forming primary female locking edges **438a, 438b, 438c** that are adapted to engage primary male locking tabs **448a, 448b, 448c** respectively on the outer bottom panel **440.** The inner bottom panel **430** also includes slits **432a, 432b, 432c** adapted to respectively receive secondary male locking flaps **442a, 442b, 442c** extending from the outer bottom panel **440.** The outer bottom panel **440** includes a fold line **447** which is interrupted by the slits that define the primary male locking tabs **448a, 448b, 448c.** The secondary male locking flaps **442a, 442b, 442c** are connected along the interrupted fold line **447** and each flap includes an intermediate fold line **443a-c.**

[0040] Primary female locking edges **438a** proximate the front end of the blank **408** and primary locking edge **438b** proximate the rear end of the blank **408** respectively have flaps **120a** and **120b** associated therewith. The flaps **120a** and **120b** are separated from the inner bottom panel **430** by cut lines **127a** and **127b** respectively and are foldably connected to the inner bottom panel **430** at fold lines **121a** and **121b,** respectively. On flap **120a,** two additional fold lines **123a** and **125a** converge at a slit **113a,** generally forming a triangle with the fold line **121a.** On flap **120b,** two additional fold lines **123b** and **125b** converge at a slit **113b,** generally forming a triangle with the fold line **121b.** The male locking flap **442a** has two asymmetrical edges **112a** and **114a.** The male locking flap **442b** has two asymmetrical edges **112b** and **114b.**

[0041] When the carrier **550** is erected, the flaps **120a, 120b** are folded inwardly so that they each engage a respective outer pair of the containers C, and at least the male locking flaps **442a, 442b** are folded about ninety degrees about their fold lines **443a, 443b** so that the locking flaps **442a, 442b** respectively extend between adjacent containers **C.** Each of the flaps **120a, 120b** will respectively engage lower portions of two adjacent cans, as illustrated in at least **FIGS. 16** and **17.** Typically the male locking flap **442c** is also folded about ninety degrees about its fold line **443c** so that the locking flap **442c** extends between the interior pair of adjacent containers **C.** The erected carrier **550** is held closed, in part, by the edge **114b** of the male locking flap **442b** engaging the inner bottom panel **430** proximate a curved end portion of the slit **432b,** the edges **115a, 115b** of the male locking flap **442** respectively engaging the inner bottom panel **430** proximate the opposite curved end portions of the slit **432c,** and the edge **114a** of the male locking flap **442a** engaging the inner bottom panel **430** proximate an end portion of the slit **432.** The edges **112a** and **112b** respectively of the male locking flaps **442a, 442b** respectively engage with the slits **113a** and **113b** of the flaps **120a, 120b** to secure the flaps in their erected positions and thereby form divider guards **128a** (shown in **FIGS. 16** and **18)** and **128b** (shown in **FIG. 17)** respectively. The edges **112a** and **112b** of the male locking flaps **442a, 442b** can be at least somewhat hook-shaped to enhance their respective holding of the flaps **120a, 120b** in their erected positions to thereby form the divider guards **128a, 128b**

[0042] **FIG. 15** is a bottom plan view of the carrier package **550** erected from the blank **408.** The outer bottom panel **440** engages the inner bottom panel **430** to form a bottom panel **525.** Erecting the divider guards **128a** and **128b** leaves apertures **88a** and **88b** respectively in the bottom panel **525.** The fold lines **443a, 443b, 443c** are in line with slits **432a, 432b, 432c,** to facilitate the male locking flaps **442a, 442b, 442c** being erected to be upright or substantially perpendicular to the bottom panel **525.**

[0043] **FIGS. 16** and **17** illustrate opposite ends of the carrier package **550** showing the divider guards **128a** and **128b** respectively. The divider guards **128a** and **128b** in the carrier package **550** further restrain the containers **C** so the containers **C** can be dispensed in a controlled manner.

[0044] **FIG. 18** illustrates the carrier package **550** in its dispensing configuration. As shown in **FIG. 18,** the edge **112a** of erected male locking flap **442a** extends into the slit **113a** to engage and secure the flap **120a** to thereby form the divider guard **128a.** This arrangement illustrated in **FIG. 18** is representative of the manner in which the edge **112b** of the erected male locking flap **442b** engages with respect to the slit **113b** in the flap **120b** to form the divider guard **128b.**

[0045] **FIG. 19** is a plan view of a blank **608** used to form a wrap-around carrier package **750** according to the fourth embodiment of the present invention. The fourth embodiment of the present invention is like the first embodiment of the present invention, except for variations noted and variations that will be apparent to those of ordinary skill in the art in view of this disclosure. Some of the features of the fourth embodiment that have some general similarity to, or are identical to, features of the first embodiment are respectively identified with the same reference numbers except that six hundred has been added to selected reference numbers of the fourth embodiment.

[0046] The fourth embodiment of the present invention has cut lines **23** and **43** respectively in the top panel **20** and bottom panel **40** of the blank **608,** to define push-in tabs **24** and **44.** The carrier **750** formed from the blank **608** includes the push-in tabs **24** and **44** because they further retain containers **C** within the carrier **750.**

[0047] In accordance with the fourth embodiment of the present invention, the cut lines **23** and **43** do not extend all the way to the rear edge of the blank **608.** That is, the opposite ends of each of the cut lines **23** and **43** terminate proximate, yet distant from, the rear edge of the blank **608.** In accordance with the fourth embodiment of the present invention, fold lines **131** and **133** respectively extend from the opposite ends of the cut line **23** to the rear edge of the blank **608,** and fold lines **135** and **137** respectively extend from the opposite ends of the cut line **43** to the rear edge of the blank **608.** The push-in tab **24** is foldably connected to the top panel **20** at fold lines **131** and **133.** The push-in tab **44** is foldably connected to the outer bottom panel **40** at fold lines **135** and **137.**

[0048] **FIG. 20** illustrates the two push-in tabs **24** and **44** respectively restraining the top and bottom portions of containers **C. FIG. 21** is a rear view of the erected carrier package **750** showing the two push-in tabs **24** and **44. FIG. 22** illustrates carrier package **750** resting on its first side panel **50,** so that the push-in tab **44** on the bottom panel **40** is seen. **FIG. 23** illustrates the carrier package **750** after the dispensing feature **70 (FIGS. 19, 21** and **22)** has been removed.

[0049] **FIG. 24** is a plan view of a blank **808** used to form a wrap-around carrier package **950** according to a fifth embodiment of the present invention. The fifth embodiment of the present invention is like the first embodiment of the present invention, except for variations noted and variations that will be apparent to those of ordinary skill in the art in view of this disclosure. Some of the features of the fifth embodiment that have some general similarity to, or are identical to, features of the first embodiment are respectively identified with the same reference numbers except that eight hundred has been added to selected reference numbers of the fifth embodiment.

[0050] The fifth embodiment of the present invention includes a drop down gusset **90.** More specifically, the carrier **950** formed from the blank **808** includes the drop down gusset **90** to further retain containers **C** within the carrier **950.**

[0051] The blank **808** comprises a first or inner bottom panel **30** foldably connected to a first side panel **50** at a fold line **33,** a top panel **820** foldably connected to the first side panel **50** at a fold line **25,** a second side panel **60** foldably connected to the top panel **820** at a fold line **29,** and a second or outer bottom panel **40** foldably connected to the second side panel **60** at a fold line **45.** The top panel **820** has truncated corners defined by fold lines **59a, 63a, 859b** and **863b** respectively. A portion of the top panel **820** defined by the area between the fold lines **859b** and **863b** is separated from the top panel **820** by a cut line **27** and forms the drop down gusset **90.** In accordance with the fifth embodiment of the present invention, the cut line **27** is a slit in the top panel **820** that extends continuously between the fold lines **25, 29** by way of which the top panel **820** is respectively foldably connected to the side panels **50, 60.**

[0052] A first rear tuck-in panel **852b** is foldably connected to the rear end of the first side panel **50** at a fold line **551b.** A second rear tuck-in panel **862b** is foldably connected to the rear end of the second side panel **60** at a fold line **661b.**

[0053] The area between the first rear tuck-in panel **852b** and the drop down gusset **90** is divided into two foldably connected portions **92** and **94** along a fold line **91.** The portion **92** is foldably connected to the first rear tuck-in panel **852b** at a fold line **857b.** The portion **94** is foldably connected to the drop down gusset **90** at the fold line **859b.** Similarly, The area between the drop down gusset **90** and the second rear tuck-in panel **862b** is divided into two foldably connected portions **96** and **98** along a fold line **97.** The portion **96** is foldably connected to the drop down gusset **90** at the fold line **863b.** The portion **98** is foldably connected to the second rear tuck-in panel **862b** at a fold line **865b.**

[0054] Cut out **884d** is formed at an area that is generally between the first rear tuck-in panel **852b,** the panels **92, 94** and the first side panel **50.** Cut out **884f** is formed at an area that is generally between the second rear tuck-in panel **862b,** the panels **96, 98** and the second side panel **60.** In addition, cut outs **84a-c, e, g, h** are respectively formed between each retaining panel and associated side panel.

[0055] As part of erecting the carrier package **950** from the blank **808,** the tuck-in panels **852b, 862b** are respectively tucked inwardly about the fold lines **551b, 661 a.** As part of this process, folding respectively occurs along fold lines **857b, 91, 859b, 863b, 97, 865b** so that the drop down gusset **90** and portions **92, 94, 96, 98** become arranged as illustrated in **FIGS. 25-27.**

[0056] **FIG. 25** is a rear view of a carrier package **950** erected from the blank **808** showing the drop down gusset **90. FIG. 26** is a rear perspective view of the carrier package **950** showing the drop down gusset **90.** The drop down gusset **90** runs across the top of containers **C** and thus further restrains the containers **C.** In addition, the drop down gusset **90** as a unique design feature can be utilized to display information. **FIG. 27** is a top view of the erected carrier package **950** resting on its first side panel, and this view illustrates that the drop down gusset **90** function to at least partially retain containers **C** (e.g., **FIG. 27)** in the carrier package **950** after the removal of the dispensing feature **70** (e.g., **FIGS. 24** and **27).** Referring to **FIG. 26,** the drop down gusset **90** can also be folded inwardly so that the outwardly facing side of the gusset **90** shown in **FIG. 26** abuts the containers **C.**

[0057] In summary and generally described, **FIGS. 1-12** illustrate a first aspect of the present invention that relates to the dispensing feature **70. FIG. 13** illustrates

a second aspect of the present invention, wherein the pulling tab of the dispensing feature does not have an extension pulling tab. **FIGS. 14- 18** illustrate a third aspect of the present invention, wherein an alternative type of locks are used to additionally form divider guards. **FIGS. 19-23** illustrate a fourth aspect of the present invention wherein push-in tabs as a portion of the rear ends of the top panel and the outer bottom panel are used to further secure the containers inside the carrier packages. **FIGS. 24-27** illustrate a fifth aspect of the present invention wherein a drop down gusset is used to further secure the containers inside the carrier package and as a site to display information. Although specific examples of aspect of the present invention are identified in the foregoing, it is to be understood that there are other aspects of the present invention. In addition, these and other aspects of the present invention can be combined in various combinations to create other blanks and packages that are within the scope of the present invention. For example, a blank utilizing locks disclosed in the blank **408 (FIG. 14)** can be combined with the dispensing feature from the blank **208 (FIG. 13)** and can also have the drop down gusset feature from the blank **808 (FIG. 24),** with the rest of the features being the same as in the blank **8 (FIG. 1).** As another example, a blank utilizing the drop down gusset feature from the blank **808 (FIG. 24)** can be combined with a push-in tab on the outer bottom panel as in the blank **608 (FIG. 19),** with the rest of the features being the same as in the blank **8.**

[0058] It is also understood that although only exemplary types of locking systems are discussed in the specification, the inner bottom panel and the outer bottom panel can be locked together using other known locking systems. Although pluralities of cut outs, panels, gussets, fold lines, flaps, slits, cuts, or openings may appear identical in size in the accompanying drawings, it is to be understood that the sizes of the cut outs, panels, gussets, fold lines, flaps, slits, cuts, or openings can vary.

[0059] In the above embodiments, the carrier packages are shown as accommodating beverage containers. Other types of containers, however, can be accommodated within a carrier package according to the present invention. The dimensions of the blank **8** may also be altered, for example, to accommodate various container forms. In addition, various numbers of containers **C** can be accommodated in a carrier package according to principles of the present invention, for example, by adjusting the size of the blank **8.** For example, the top panel 20 and the first and second bottom panel **50, 60** can be enlarged or reduced in order to accommodate additional or less containers **C.** In one such embodiment, a carrier may be constructed to accommodate four containers arranged in two columns and two rows (2 x 2). In another embodiment, a carrier may be constructed that accommodates eight containers arranged in two columns and four rows (2 x 4). In a preferred embodiment, a carrier may be constructed that accommodates six contains arranged in two columns and three rows (2 x 3).

[0060] The blanks according to the present invention can be, for example, formed from coated paperboard and similar materials. For example, the interior and/or exterior sides of the blanks can be coated with a clay coating. The clay coating may then be printed over with product, advertising, price coding, and other information or images. The blanks may then be coated with a varnish to protect any information printed on the blanks. The blanks may also be coated with, for example, a moisture barrier layer, on either or both sides of the blanks.

[0061] In accordance with the exemplary embodiments, the blanks may be constructed of paperboard of a caliper such that it is heavier and more rigid than ordinary paper. The blanks can also be constructed of other materials, such as cardboard, hard paper, or any other material having properties suitable for enabling the carrier package to function at least generally as described above. The blanks can also be laminated to or coated with one or more sheet-like materials at selected panels or panel sections. Also according to the first embodiment, the carrier can be constructed from a blank that occupies less area than conventional carriers, and the blank may be stagger nested with similar blanks during production.

[0062] In accordance with the exemplary embodiments of the present invention, a fold line can be any at least somewhat line-like arranged, although not necessarily straight, form of weakening that facilitates folding therealong; and a tear line can be any at least somewhat line-like arranged, although not necessarily straight, form of weakening that facilitates tearing therealong. More specifically, but not for the purpose of narrowing the scope of the present invention, conventional fold lines include: a crease, such as formed by folding; a score line, such as formed with a blunt scoring knife, or the like, which creates a crushed portion in the material along the desired line of weakness; a slit that extends partially into the material along the desired line of weakness, and/or a series of spaced apart slits that extend partially into and/or completely through the material along the desired line of weakness; or various combinations of these features. More specifically, but not for the purpose of narrowing the scope of the present invention, conventional tear lines include: a slit that extends partially into the material along the desired line of weakness, and/or a series of spaced apart slits that extend partially into and/or completely through the material along the desired line of weakness, or various combinations of these features.

[0063] As a more specific example, one type of conventional tear line is in the form of a series of spaced apart slits that extend completely through the material, with adjacent slits being spaced apart slightly so that a nick (e.g., a small somewhat bridging-like piece of the material) is defined between the adjacent slits for typically temporarily connecting the material across the tear line. The nicks are broken during tearing along the tear line. The nicks typically are a relatively small percentage of the tear line, and alternatively the nicks can be omitted from or torn in a tear line such that the tear line is a con-

tinuous cut line. That is, it is within the scope of the present invention for each of the tear lines to be replaced with a continuous slit, or the like.

[0064] It will be understood by those skilled in the art that while the present invention has been discussed above with reference to exemplary embodiments, various additions, modifications and changes can be made thereto without departing from the spirit and scope of the invention as set forth in the following claims.

Claims

1. A carrier package, comprising:

a carrier, comprising
a top panel,
a first side panel adjacent to the top panel,
a second side panel adjacent to the top panel and disposed on a side of the carrier package opposite to the first side panel,
a bottom panel adjacent to each of the first and second side panels and opposite from the top panel,
a first upper gusset at least partially closing an upper part of a first end of the carrier,
a first lower gusset at least partially closing a lower part of the first end of the carrier,
a second upper gusset at least partially closing an upper part of a second end of the carrier,
a second lower gusset at least partially closing a lower part of the second end of the carrier, and
a dispenser pattern extending at least partially across each of the top panel, the bottom panel, and at least one of the first and second side panels, with the dispenser pattern defining a dispenser flap that is at least partially removable from a remainder of the carrier so that a dispenser opening is defined by the remainder of the carrier in response to the dispenser flap having been at least partially removed from the remainder of the carrier; and
a plurality of containers located within the carrier,

wherein the dispenser flap is configured so that, when the dispenser flap is at least partially removed so that the dispenser opening is defined by the remainder of the carrier, the containers can be dispensed through a dispenser opening in the carrier.

2. The carrier package according to claim 1, wherein the dispenser pattern comprises at least one tear line.

3. The carrier package according to claim 1, further comprising a retention panel, wherein the carrier includes opposite first and second ends that are each open, the retention panel extends completely across the first end, and the dispenser flap is adjacent the second end.

4. The carrier package according to claim 1, further comprising a retention flap that is not in contact with either of the first and second side panels and extends downwardly from the top panel to partially obstruct an open end of the carrier.

5. The carrier package according to claim 1, further comprising a retention flap that is not in contact with either of the first and second side panels and extends upwardly from the bottom panel to partially obstruct an open end of the carrier.

6. A blank for erecting into a wrap-around carrier, the blank comprising:

a top panel;
a first side panel foldably connected to the top panel;
a second side panel that is opposite from the first side panel and is foldably connected to the top panel;
a first bottom panel foldably connected to the first side panel; and
a second bottom panel foldably connected to the second side panel,

wherein the first bottom panel and the second bottom panel are for being secured together when the blank is erected into the wrap-around carrier, and
wherein a dispenser pattern extends at least partially across each of the top panel, at least one of the first and second side panels, and at least one of the first and second bottom panels, with the dispenser pattern defining a dispenser flap for being at least partially removable from a remainder of the blank.

7. The blank according to claim 6, wherein the dispenser pattern comprises at least one tear line.

8. The blank according to claim 6, wherein the first bottom panel includes securing features for operatively interacting with securing features of the second bottom panel to secure the first and second bottom panels together when the blank is erected into the wrap-around carrier.

9. The blank according to claim 8, wherein:

the securing features of the first bottom panel includes at least one locking flap, and
the securing features of the second bottom panel include at least one opening for at least partially holding the locking flap.

10. The blank according to claim 9, further comprising at least one retaining flap in the second bottom panel, wherein the retaining flap is for being held in an erected configuration by the locking flap when the carrier is erected from the blank.

11. The blank according to claim 6, further comprising a push-in tab defined by at least one cut in a rear end of the top panel.

12. The blank according to claim 6, further comprising a push-in tab defined by at least one cut in a rear end of the top panel.

13. The blank according to claim 6, further comprising:

a first front tuck-in panel connected to a front end of the first side panel;
a first rear tuck-in panel connected to a rear end of the first side panel;
a second front tuck-in panel connected to a front end of the second side panel;
a second rear tuck-in panel connected to a rear end of the second side panel;
a first front retaining panel foldably connected between the first front tuck-in panel and a right front truncated corner of the first bottom panel;
a first rear retaining panel foldably connected between the first rear tuck-in panel and a right rear truncated corner of the first bottom panel;
a second front retaining panel foldably connected between the first front tuck-in panel and a left front truncated corner of the top panel;
a second rear retaining panel foldably connected between the first rear tuck-in panel and a left rear truncated corner of the top panel;
a third front retaining panel foldably connected between the second front tuck-in panel and a right front truncated corner of the top panel;
a third rear retaining panel foldably connected between the second rear tuck-in panel and a right rear truncated corner of the top panel and;
a forth front retaining panel foldably connected between the second front tuck-in panel and a left front truncated corner of the second bottom panel; and
a fourth rear retaining panel foldably connected between the second rear tuck-in panel and a left rear truncated corner of the second bottom panel.

14. The blank according to claim 13, further comprising a dividing fold line that divides the second rear retaining panel into two foldably connected portions along the dividing fold line.

15. The blank according to claim 13, further comprising a dividing fold line that divides the third rear retaining panel into two foldably connected portions along the dividing fold line.

16. The blank according to claim 13, further comprising a cut line separating a portion of the top panel defined by the area between the second rear retaining panel and the third rear retaining panel from the top panel to form a drop down gusset.

17. A carrier package, comprising:

a carrier, comprising
a top panel,
a first side panel adjacent to the top panel,
a second side panel adjacent to the top panel and disposed on a side of the carrier package opposite to the first side panel,
a bottom panel adjacent to each of the first and second side panels and opposite from the top panel, the bottom panel comprising a first bottom panel joined to a second bottom panel by at least primary male and primary female locking elements,
at least one first gusset at least partially closing a first end of the carrier,
at least one second gusset at least partially closing a second end of the carrier, and
a dispenser pattern extending at least partially across each of the top panel, the bottom panel, and at least one of the first and second side panels, with the dispenser pattern defining a dispenser flap that is at least partially removable from a remainder of the carrier so that a dispenser opening is defined by the remainder of the carrier in response to the dispenser flap having been at least partially removed from the remainder of the carrier; and
a plurality of containers located within the carrier,

wherein the dispenser flap is configured so that when the dispenser flap is at least partially removed, the containers can be dispensed through the dispenser opening.

18. The carrier package according to claim 17, wherein the first and second bottom panels are further secured by secondary male and secondary female locking elements.

19. The carrier package according to claim 17, wherein the dispenser pattern comprises at least one tear line.

20. The carrier package according to claim 19, further comprising a retention panel, wherein the carrier includes opposite first and second ends that are each open, the retention panel extends completely across

the first end, and the dispenser flap is adjacent the second end.

21. The carrier package according to claim 19, further comprising a retention flap that is not in contact with either of the first and second side panels and extends downwardly from the top panel to partially obstruct an open end of the carrier.

22. The carrier package according to claim 19, further comprising a retention flap that is not in contact with either of the first and second side panels and extends upwardly from the bottom panel to partially obstruct an open end of the carrier.

23. A carrier package, comprising:

a carrier, comprising
a top panel,
a first side panel adjacent to the top panel,
a second side panel adjacent to the top panel and disposed on a side of the carrier package opposite to the first side panel,
a bottom panel adjacent to each of the first and second side panels and opposite from the top panel, the bottom panel comprising a first bottom panel joined to a second bottom panel, and
a dispenser pattern extending at least partially across each of the top panel, the bottom panel, and at least one of the first and second side panels, with the dispenser pattern defining a dispenser flap that is at least partially removable from a remainder of the carrier so that a dispenser opening is defined by the remainder of the carrier in response to the dispenser flap having been at least partially removed from the remainder of the carrier; and
a plurality of containers located within the carrier,

wherein the dispenser flap is configured so that when the dispenser flap is at least partially removed so that the dispenser opening is defined by the remainder of the carrier, the containers can be dispensed through the dispenser opening.

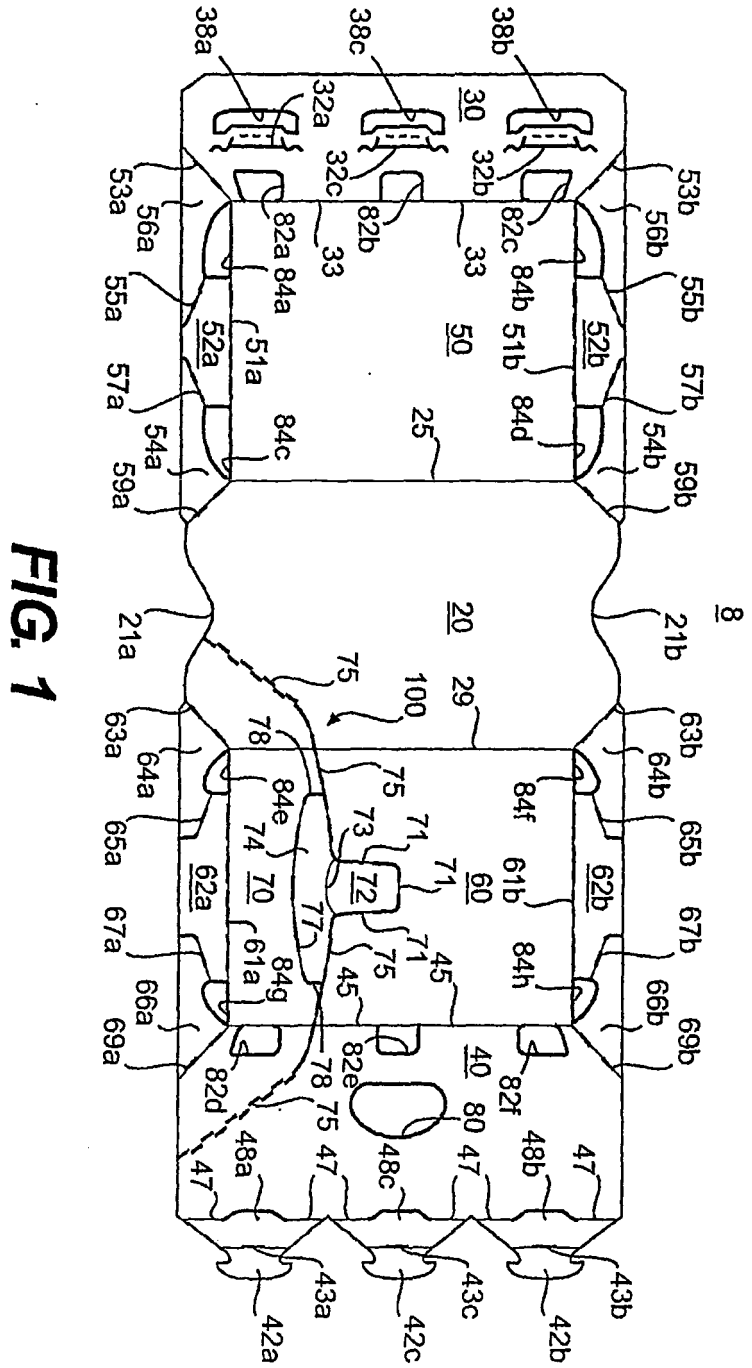
24. The carrier package according to claim 23, wherein the first and second bottom panels are secured by primary male and primary female locking elements.

25. The carrier package according to claim 24, wherein the first and second bottom panels are further secured by secondary male and secondary female locking elements.

26. The carrier package according to any of claims 24-35, further comprising a retention panel, wherein the carrier includes opposite first and second ends that are each open, the retention panel extends completely across the first end, and the dispenser flap is adjacent the second end.

27. The carrier package according to any of claims 24-36, further comprising a retention flap that is not in contact with either of the first and second side panels and extends downwardly from the top panel to partially obstruct an open end of the carrier.

28. The carrier package according to any of claims 24-26, further comprising a retention flap that is not in contact with either of the first and second side panels and extends upwardly from the bottom panel to partially obstruct an open end of the carrier.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53a
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56a
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84a
51b
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55a
52b
52a
51a
57b
57a
84d
54b
54a
84c
59b
59a
25
50
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21a
21b
75
100
29
78
63b
63a
64b
64a
84f
84e
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70
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62b
62a
65b
65a
67b
67a
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61a
84g
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69b
69a
82e
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43c
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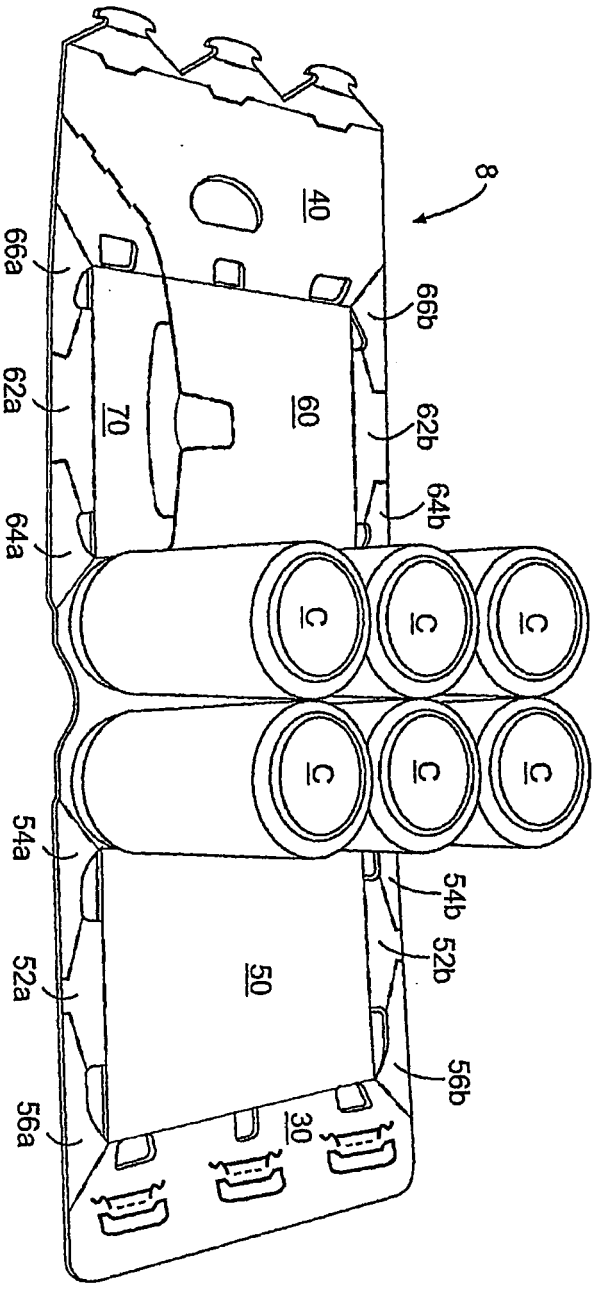
42a
42c
42b

FIG. 1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66b
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70
60
62b
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56b
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56a

FIG. 2

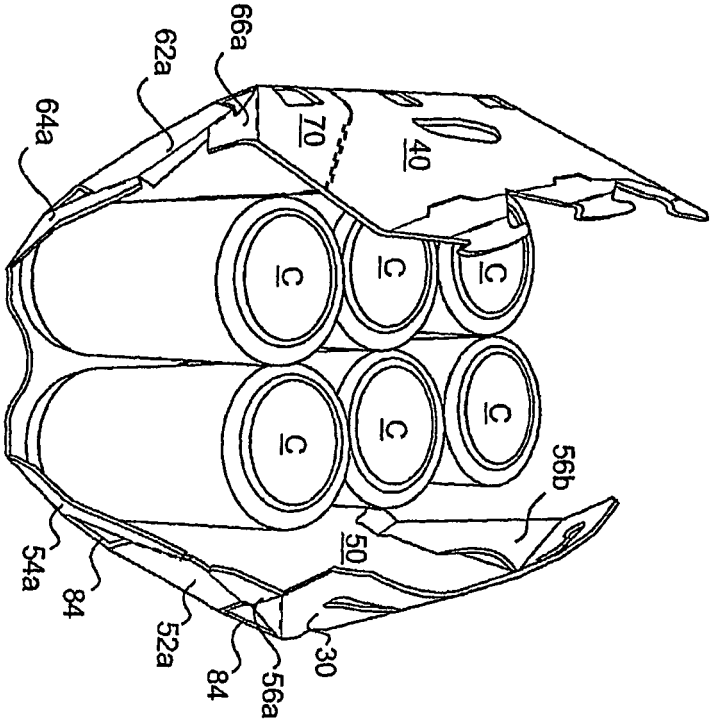


FIG. 3

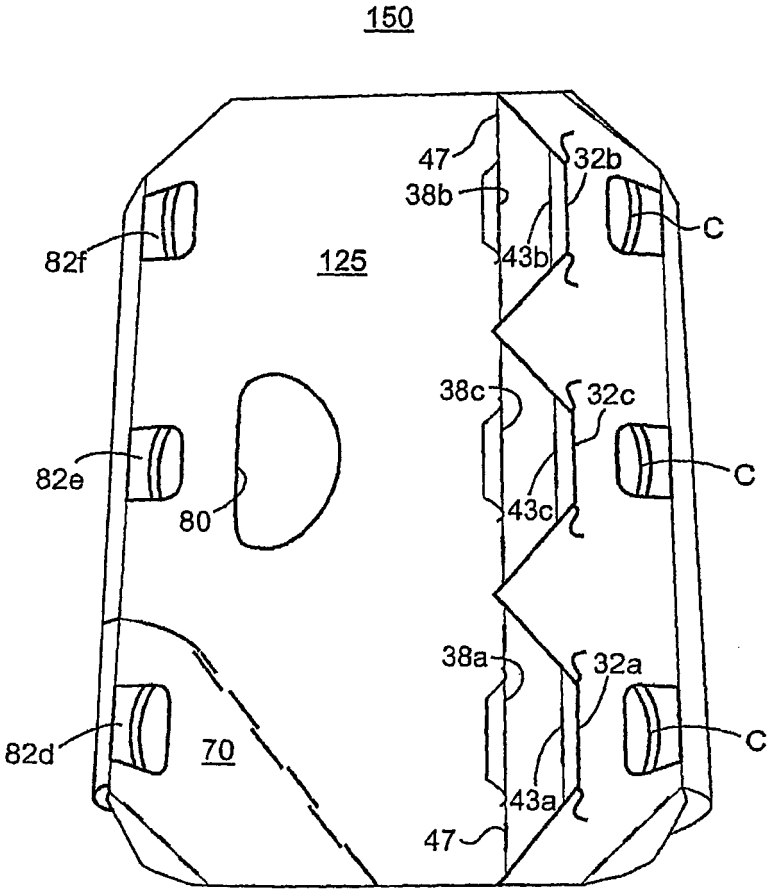

150
47
32b
38b
C
82f
125
43b
38c
32c
82e
C
80
43c
38a
32a
82d
70
C
43a
47

FIG. 4

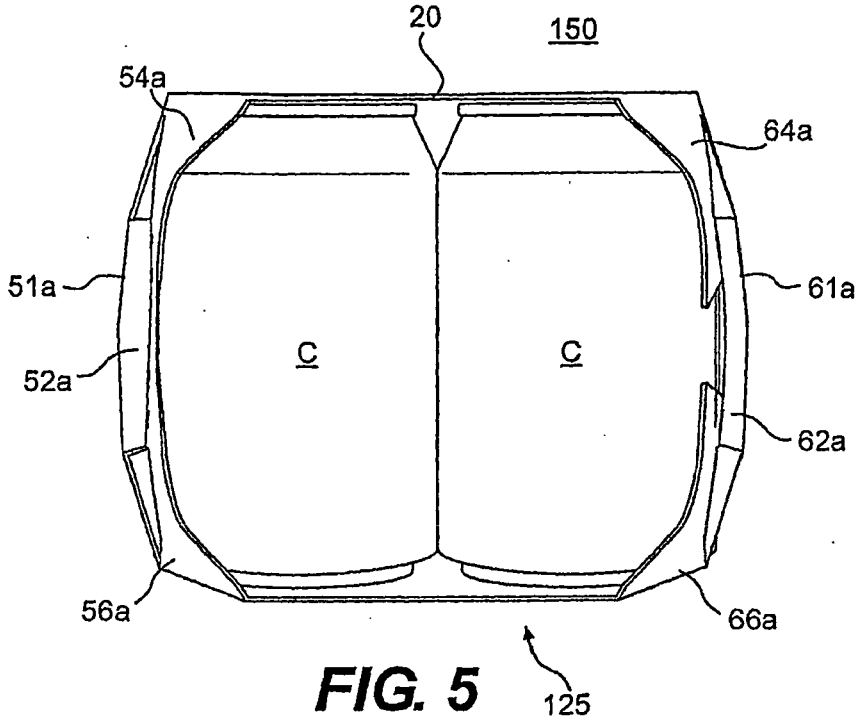

20
150
54a
64a
51a
61a
C
C
52a
62a
56a
66a
125

FIG. 5

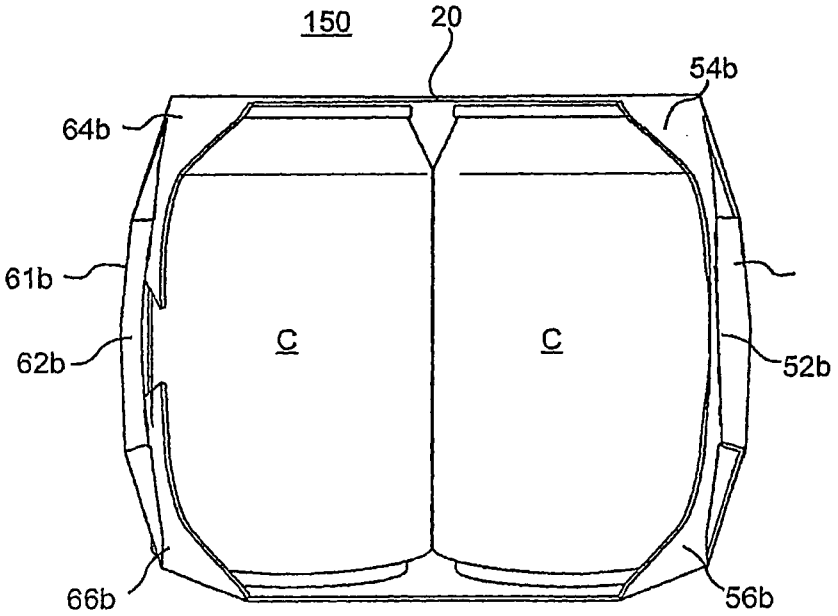

150
20
54b
64b
61b
C
C
62b
52b
66b
56b

FIG. 6

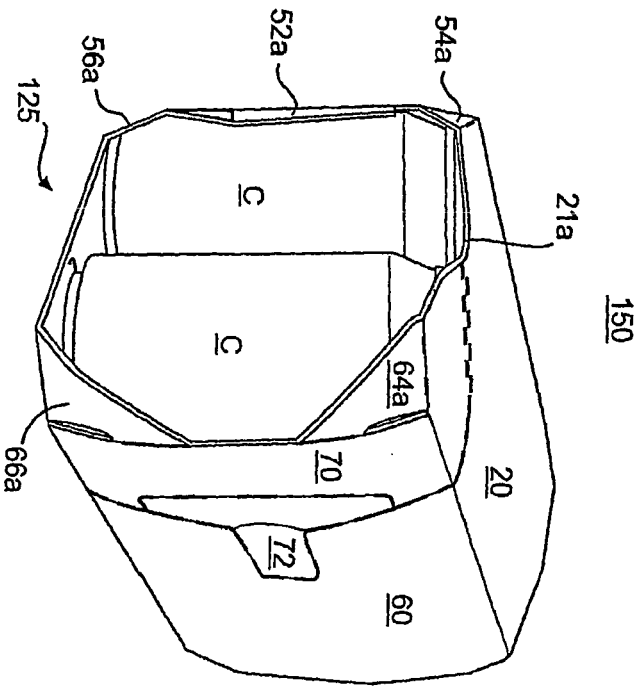
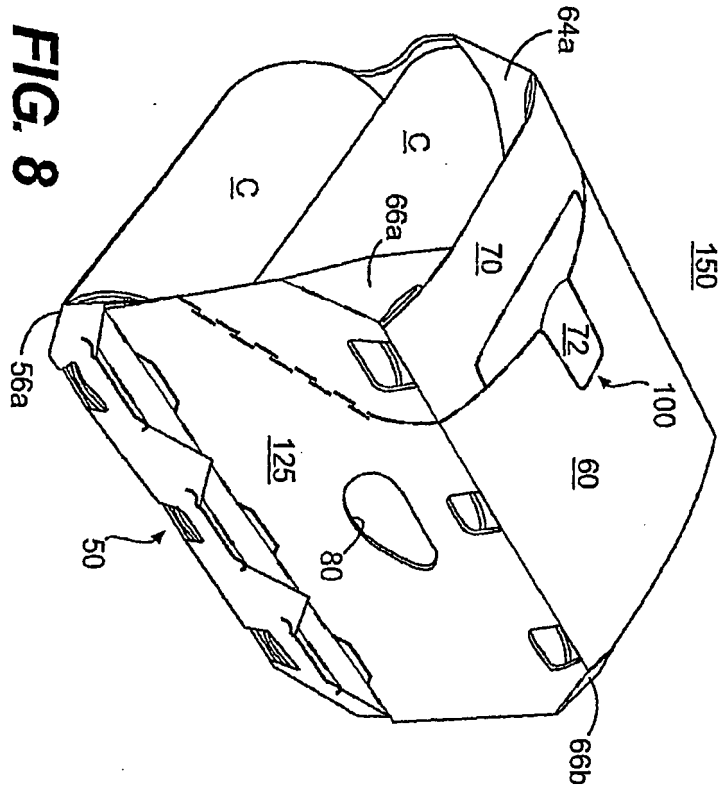


FIG. 7

FIG. 8



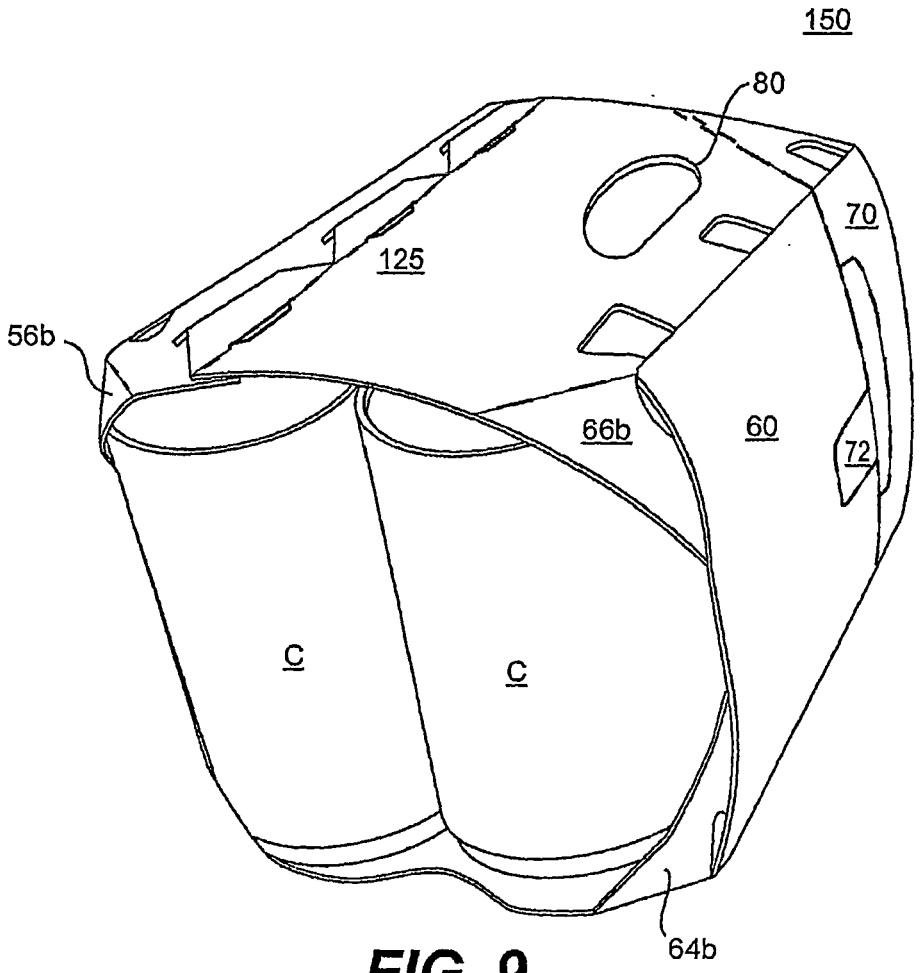


FIG. 9

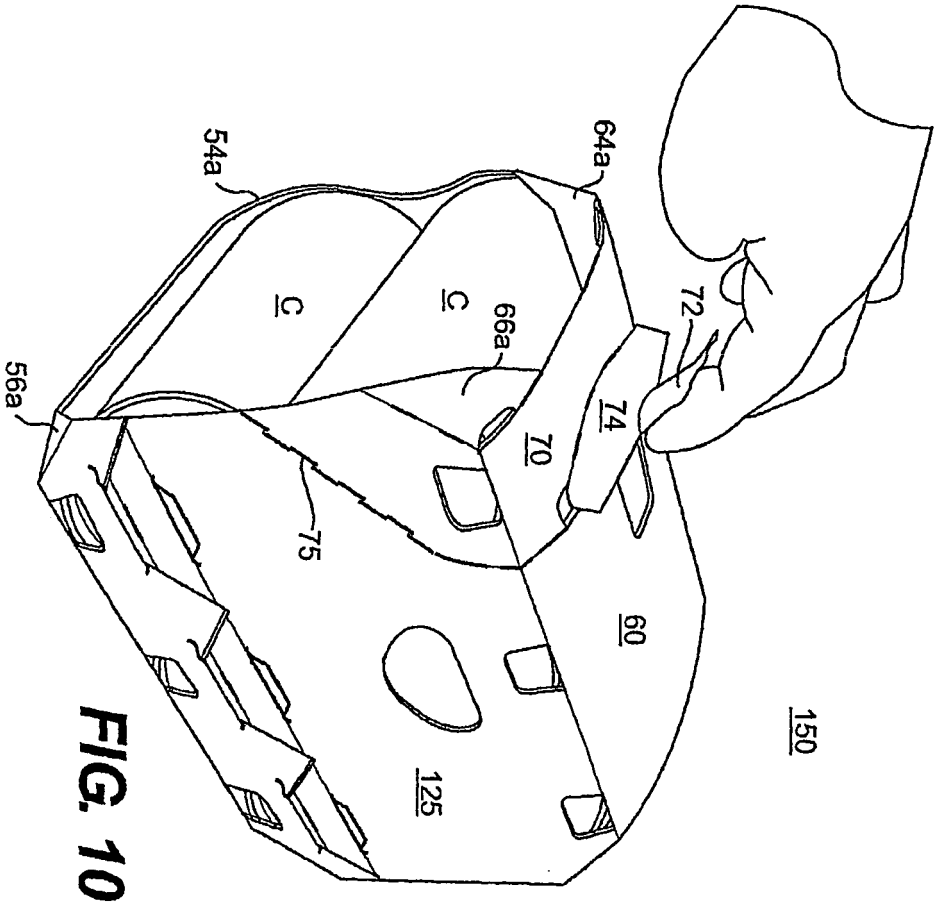


FIG. 10

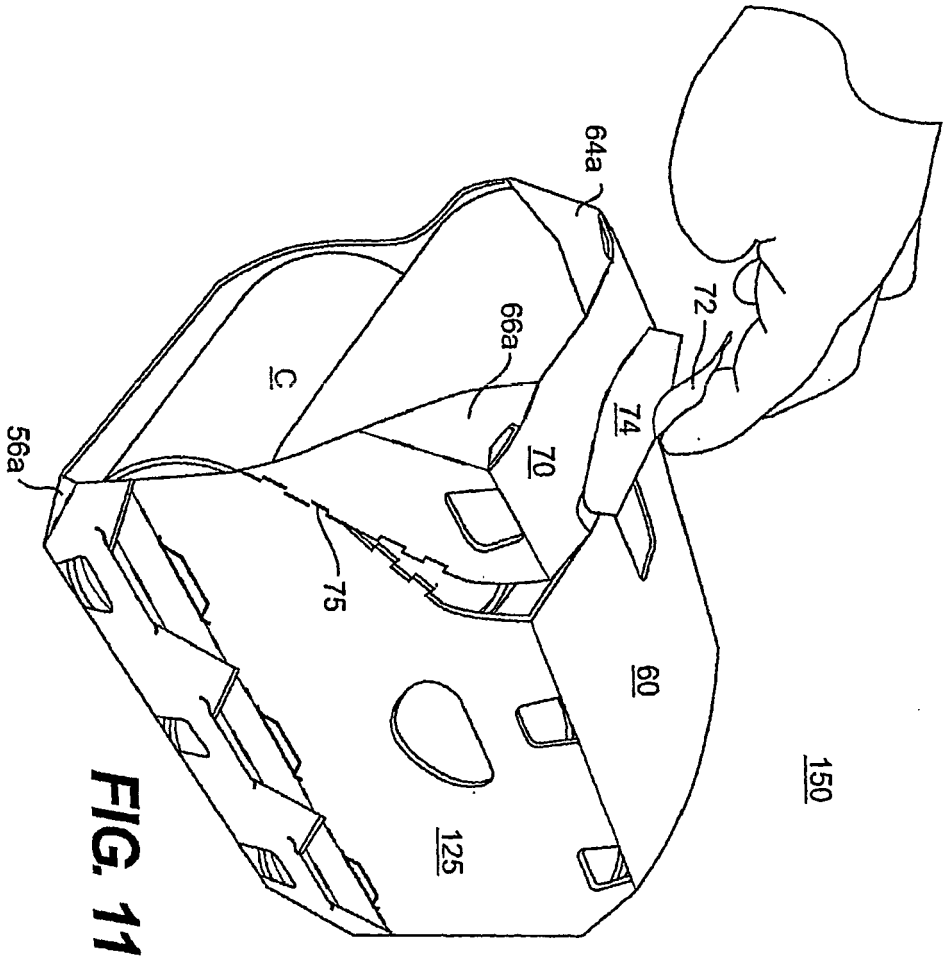


FIG. 11

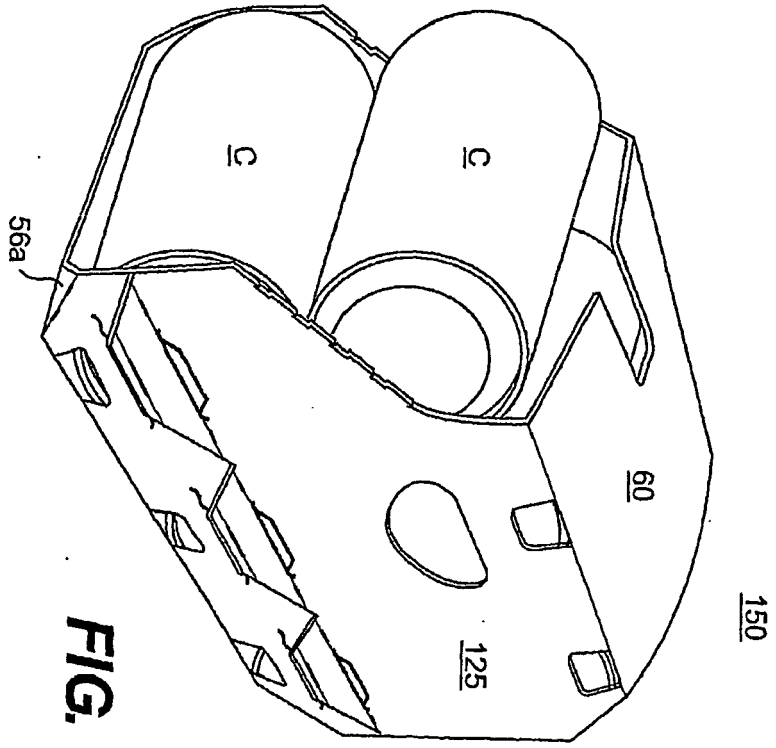
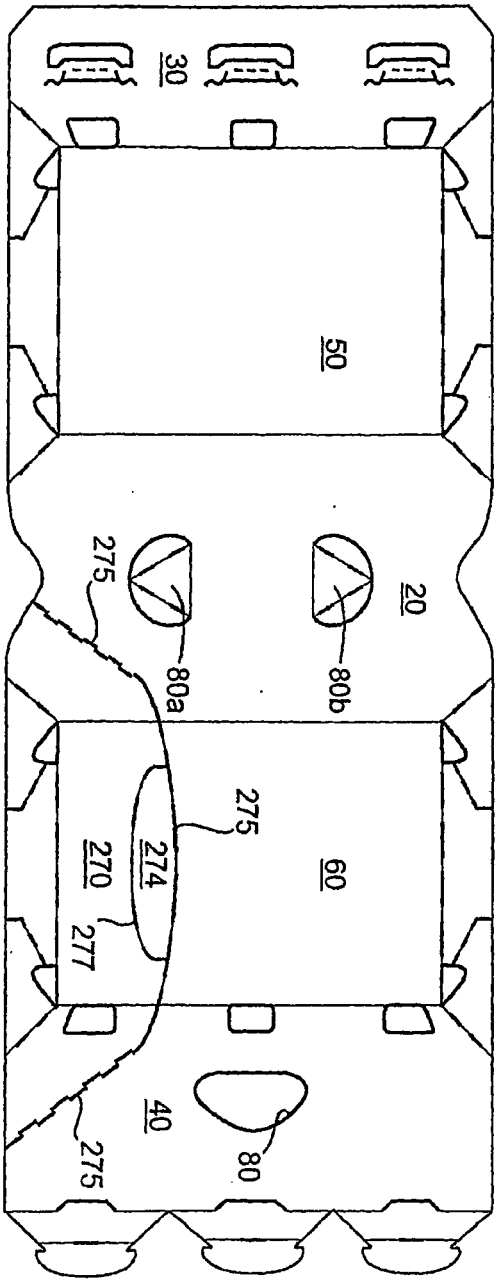


FIG. 12

FIG. 13



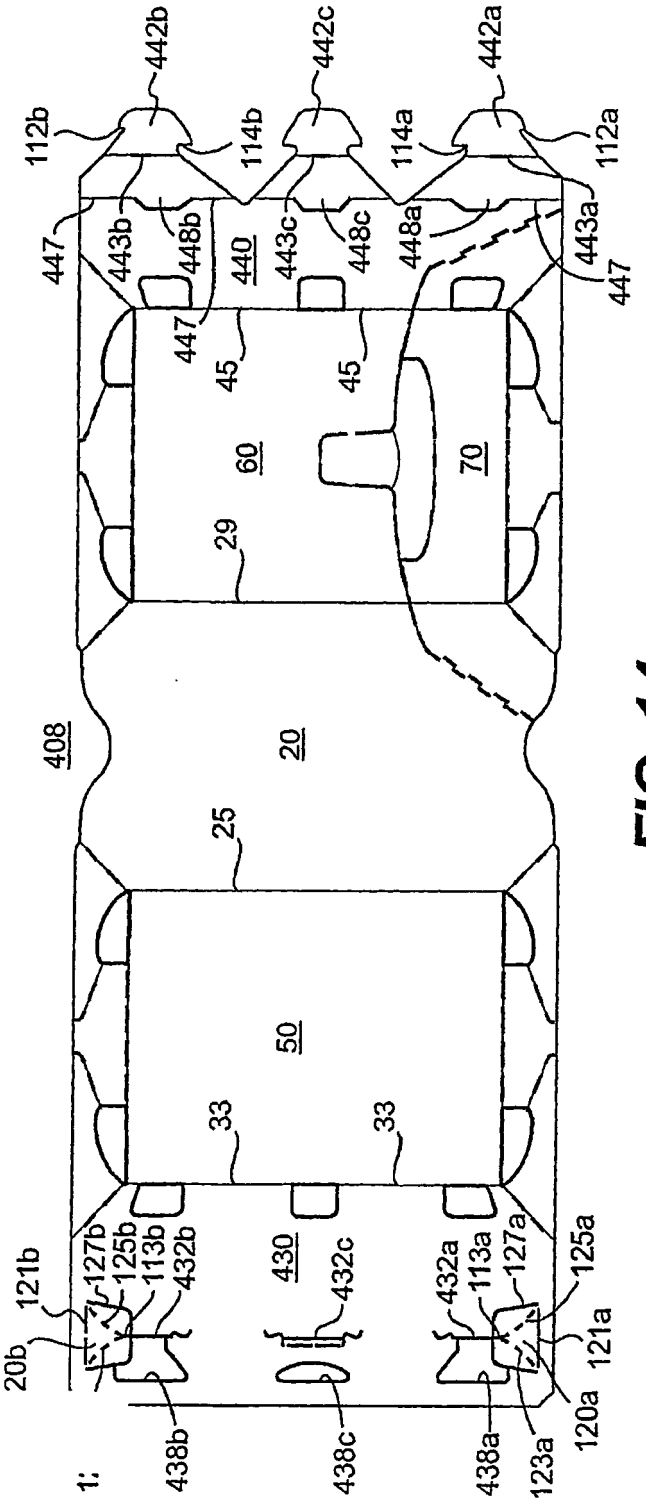

112b
442b
442c
442a
114b
114a
112a
447
443b
448b
440
443c
448c
448a
443a
447
447
45
45
60
70
29
408
20
25
50
33
33
121b
127b
125b
113b
432b
430
432c
432a
113a
127a
125a
20b
121a
438b
438c
438a
123a
120a

FIG. 14

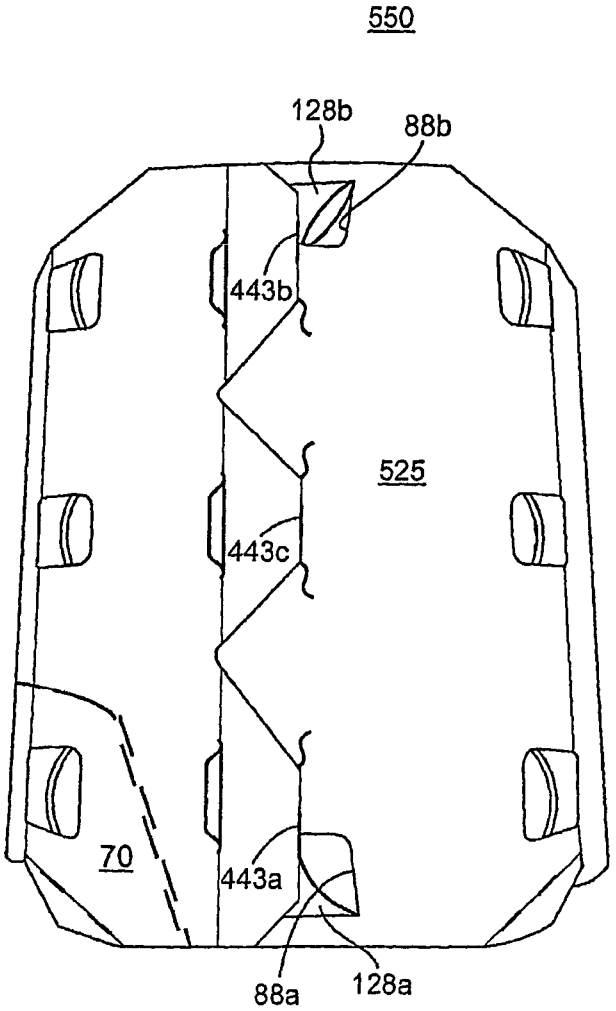


FIG. 15

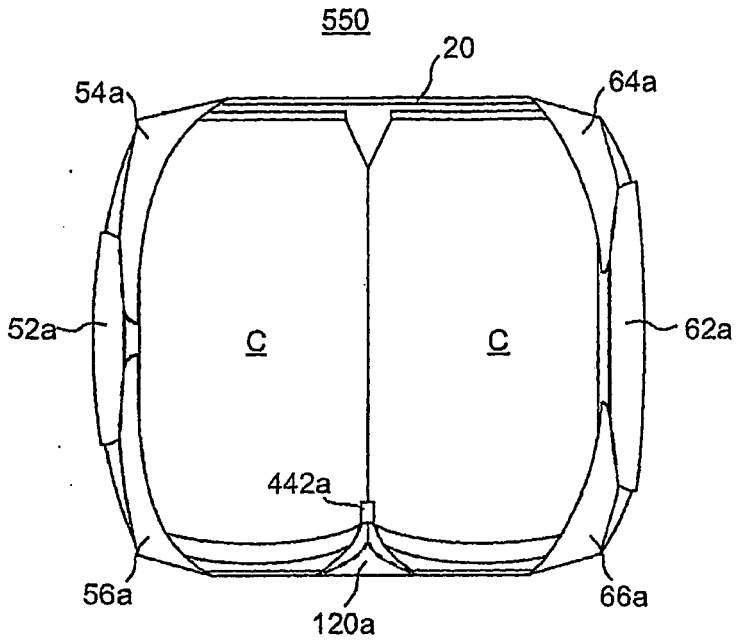

550
20
54a
64a
52a
C
C
62a
442a
56a
66a
120a

FIG. 16

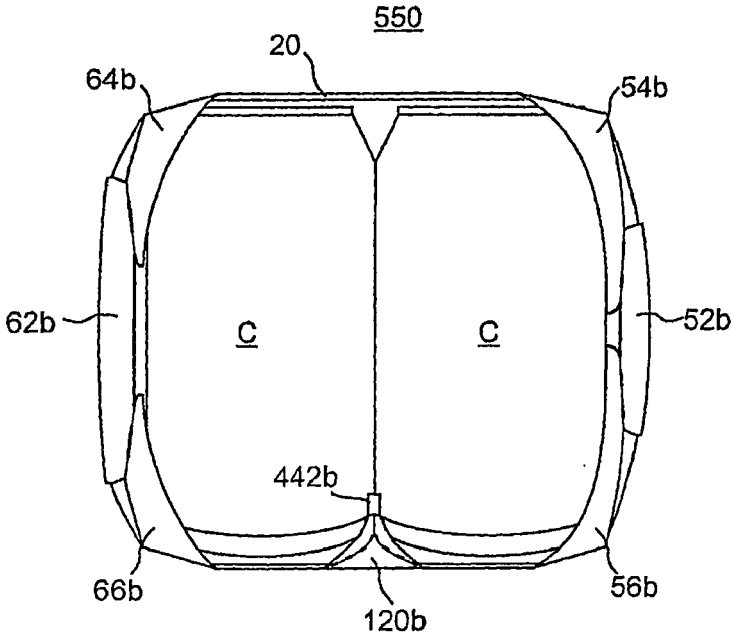

550
20
64b
54b
62b
C
C
52b
442b
66b
56b
120b

FIG. 17

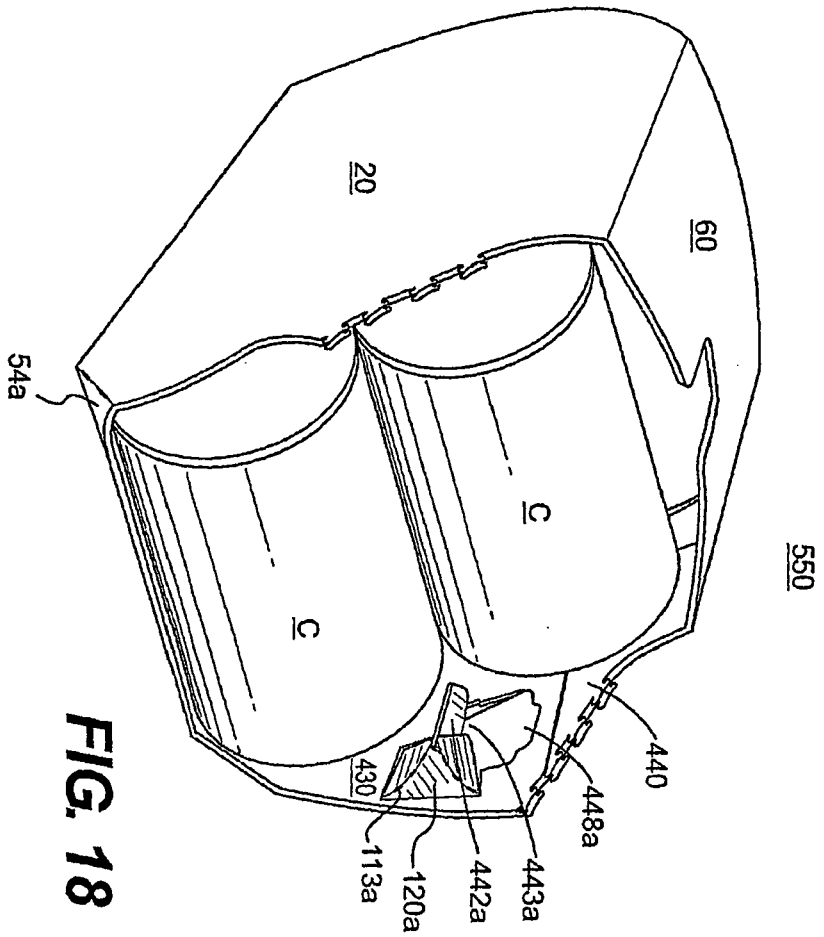
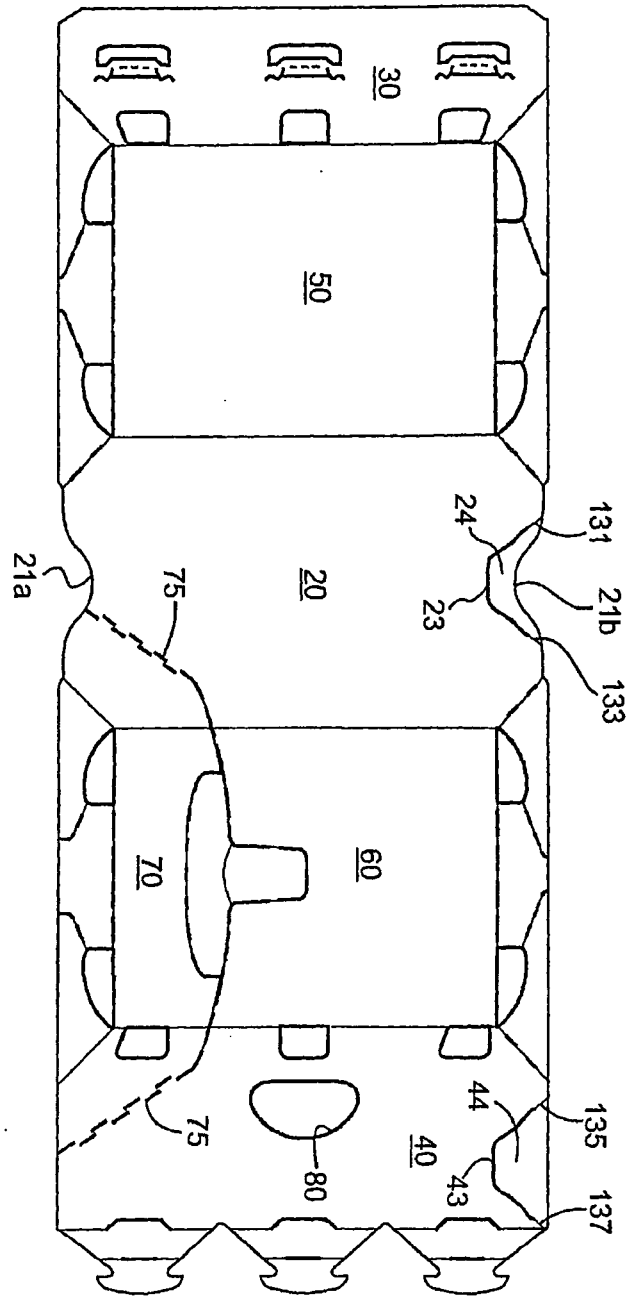


FIG. 18

FIG. 19



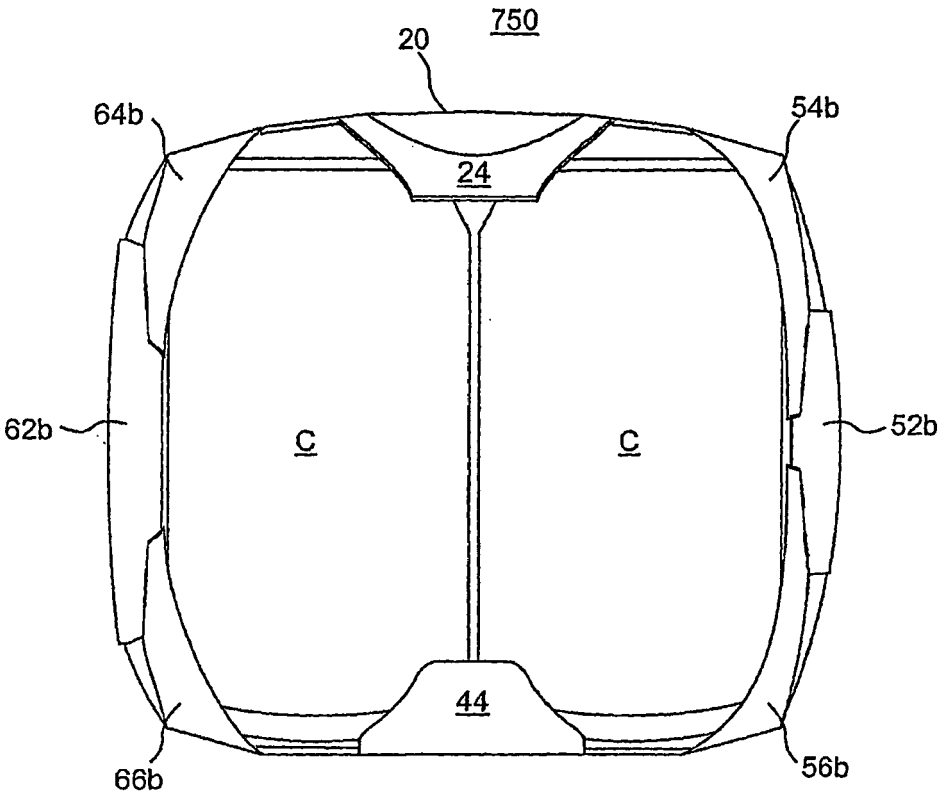
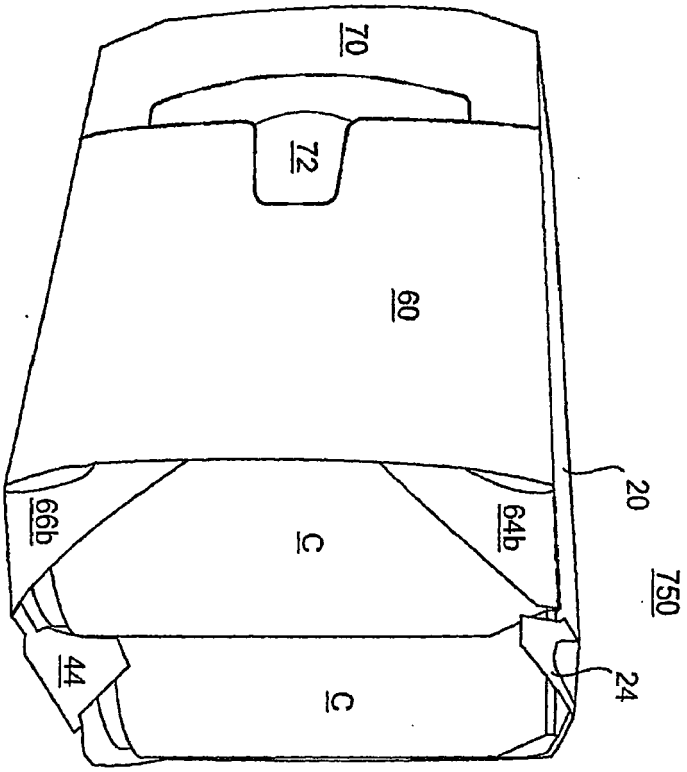


FIG. 20

FIG. 21



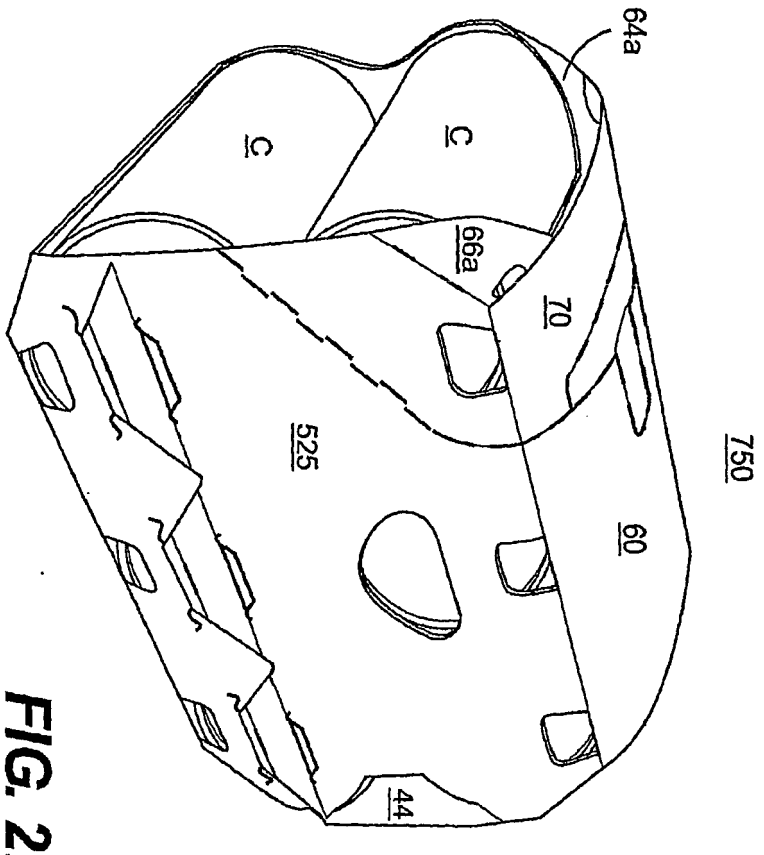
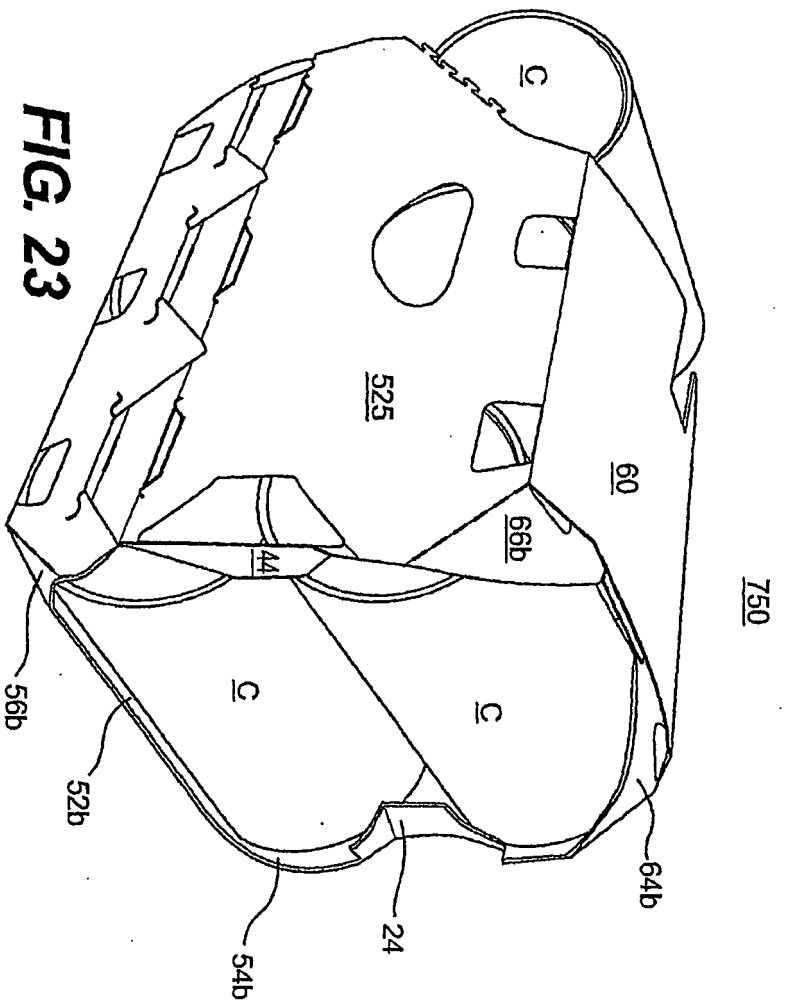


FIG. 22

FIG. 23



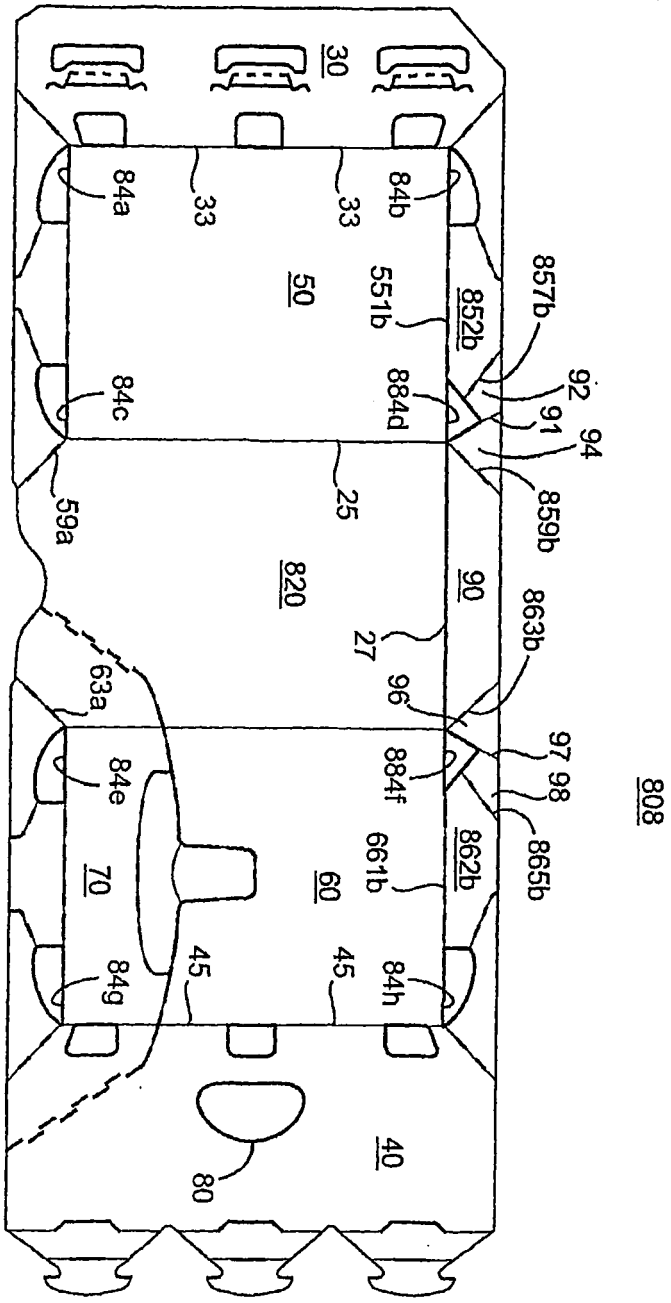

808
30
84a
33
33
84b
857b
50
551b
852b
92
91
94
84c
884d
25
859b
59a
820
90
863b
27
96
63a
97
98
84e
884f
862b
865b
661b
70
60
45
45
84h
84g
40
80

FIG. 24

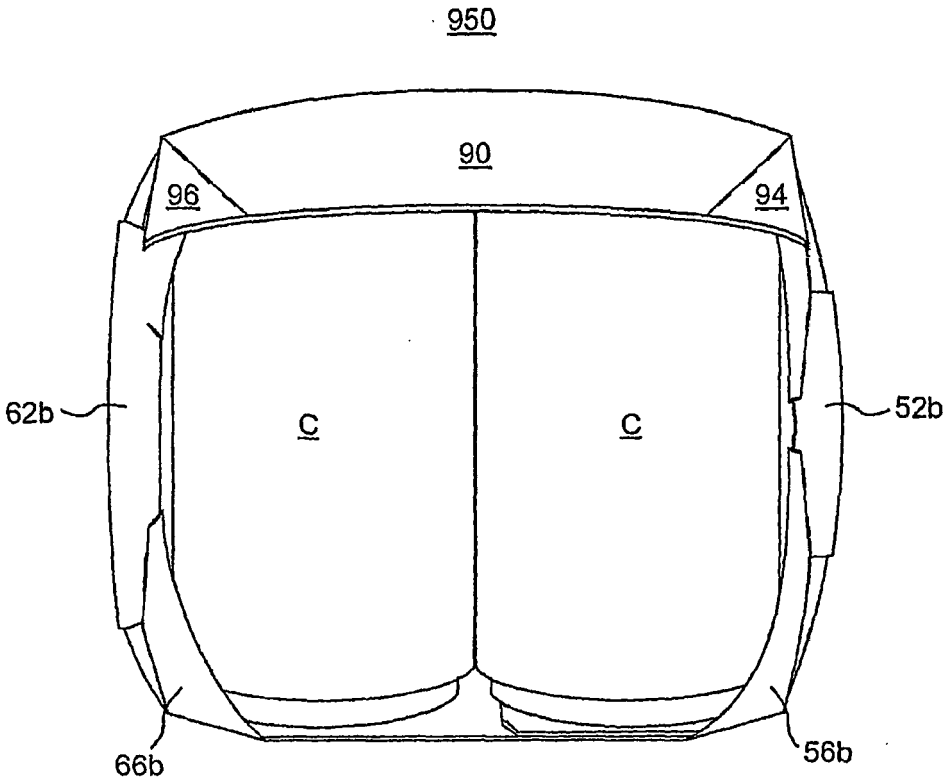


FIG. 25

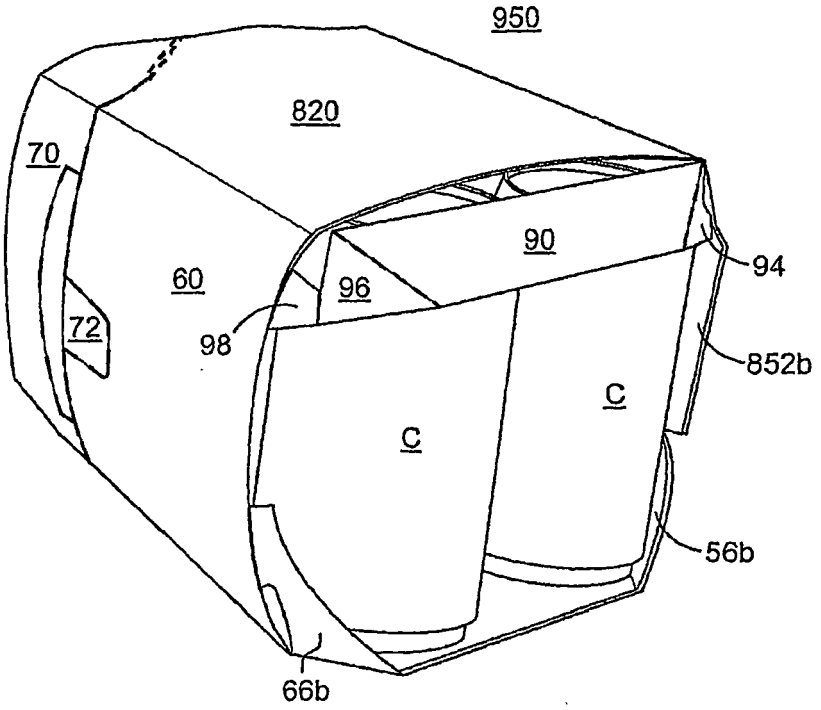


FIG. 26

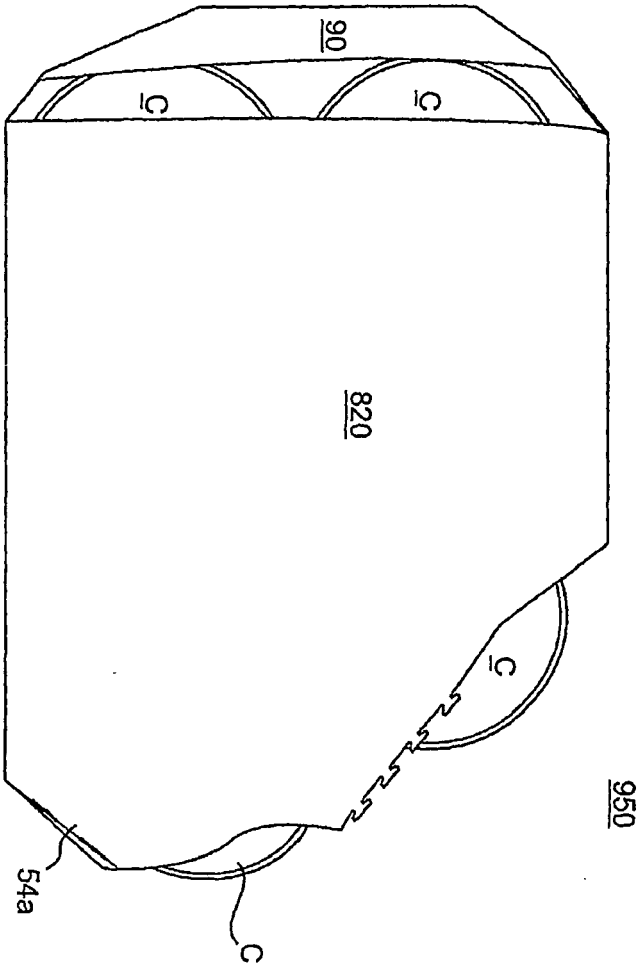


FIG. 27

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 65713305 P **[0001]**
- US 68361205 P **[0001]**