

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
2 August 2007 (02.08.2007)

PCT

(10) International Publication Number
WO 2007/087600 A2

(51) International Patent Classification: Not classified

(21) International Application Number:
PCT/US2007/061048

(22) International Filing Date: 25 January 2007 (25.01.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/761,965 25 January 2006 (25.01.2006) US

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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS,
JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS,
LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY,
MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS,
RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

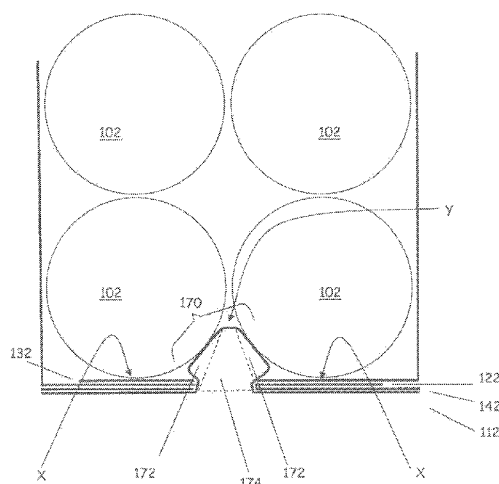
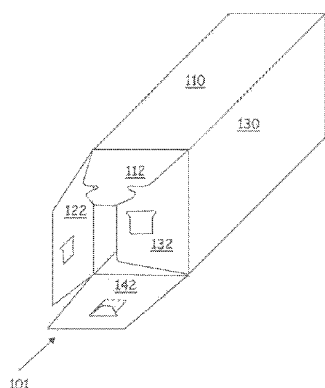
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,
RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,
GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished
upon receipt of that report

[Continued on next page]

(54) Title: CARTON HAVING LOCKING FEATURES SUITABLE FOR HAND-PACKING



(57) Abstract: A carton having a mechanism for securely closing and
locking the end of said carton by a locking tab without the use of adhesive.

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CARTON HAVING LOCKING FEATURES SUITABLE FOR HAND-PACKING

CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit of priority under 35 U.S.C. §119(e) of provisional application serial number 60/761965 filed on January 25, 2006, which is hereby incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

This invention relates generally to cartons for packaging articles such as beverage cans, and more particularly to a carton with a feature formed in a carton end wall to provide for a locking closure suitable for manual packing of said carton.

Cartons having closure mechanisms are well known in the art. An example of a locking mechanism is disclosed in International Application PCT/US03/04484 in which a carton is illustrated as having a tab-and-aperture locking mechanism in a top closure over contents such as bottles. In this mechanism, the locking tab is hingedly connected to a panel, and the locking tab itself remains essentially flat during the locking operation. Another locking mechanism is disclosed in U.S. Patent 2,959,337, where the locking tab has a different shape but remains essentially flat during the locking operation. Yet another locking mechanism is disclosed in U.S. Patent 4,077,095, where the locking tab cooperates with an adjoining support flap. Another locking mechanism is disclosed in U.S. Patent 3,746,245, where the locking tab is folded, but closure is achieved by using two locking tabs along with an adhesive.

Locking closure mechanisms allow cartons to be closed by machinery or by manual operation, sometimes with the added use of adhesives. What is needed is a carton having an integral, easily-operated feature for manual closure and locking of the carton, without needing adhesives in the closure step, and with a secure locking capability that is not easily opened.

SUMMARY OF THE INVENTION

The present invention provides a carton including a top panel, a pair of side panels hingedly connected to the top panel, and a bottom panel hingedly connected to the side panels. The carton, partially erected, forms a tubular structure to be filled with containers such as beverage cans or bottles. The top, side, and bottom panels have end panels at each end, which may be folded in overlapping arrangement to close the respective ends. The end panels comprise apertures and tabs for providing a locking closure of the filled carton.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a plan view of a blank as viewed from its inner surface, from which a carton according to this invention is formed;

FIG. 2 is a perspective view of a completed carton erected from the blank of FIG. 1.

FIG. 3 is a further view of a completed carton, showing containers within the carton.

FIGs. 4 through 7 are further views of a completed carton, showing end flaps folded over during closing of the carton.

FIGs. 8 and 9 are end views of a completed carton, showing structural details.

FIGs. 10 through 12 are perspective views of portions of the end panels in overlapped arrangement, showing their spatial relationship before and during the locking step.

FIG. 13 is a cross-section side view of the end panels after the locking step.

FIG. 14 is a cross-section top view of the carton end after the locking step.

FIG. 15 is a view of a locking tab from within the carton.

FIG. 16 is an end view of the carton showing a tear-open feature.

FIG. 17 shows a plan view of a blank as viewed from its inner surface, from which another carton according to this invention is formed.

FIG. 18 is a perspective view of a completed carton erected from the blank of FIG. 15, showing the side end flaps folded over during closing of the carton.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. 1, there is shown a blank 100 which when constructed, forms a carton 101 shown in FIG. 2 for packaging a plurality of articles such as beverage cans or bottles. In this embodiment, the carton 101 is a fully enclosed carton designed to accommodate eight cans in two rows each containing four cans, but the blank or carton may be modified for any number of cans, bottles, or other articles.

The blank 100 has a top panel 110, a pair of side panels 120 and 130 hingedly connected thereto along fold lines 117 and 118 respectively, and bottom panel 140 hingedly connected to side panel 120 along fold line 127. Bottom panel 140 also is hingedly connected to longitudinal glue flap 150 along fold line 147. The fold lines 117, 118, 127, and 147 may be simple score lines, partially cut score lines, perforated lines or other suitable means.

The top, side, and bottom panels each have hingedly attached end panels connected thereto along fold lines 152 and 154. The bottom panel 140 has lower end flaps 141 and 142 which in use are folded to partially close the carton. The top panel 110 has top end flaps 111 and 112 which in use are folded down. Hingedly connected to the side panels 120 and 130 along fold lines are side end flaps 121, 122, 131, and 132 which are folded inwardly. The end flaps when thus folded overlap certain other end flaps and are locked together as described herein so as to fully enclose the ends of the carton 101.

Formed into end flap 112 are provided a plurality of cut or score lines 180 which define a perforated or partially perforated region for tearing open a finished carton, as described later. Score lines 182 may be provided to define a flap for grasping during such a tearing operation.

On the end flaps are provided certain features which upon closing the carton will overlap to allow for locking of the end flaps. The top end flaps 111 and 112 are provided with locking tabs 170 that include central regions 170 and side wings 172. The side end panels 121, 122, 131, and 132 are provided with apertures 155 that include a wider edge 158 suitable for readily receiving locking tab 170, and narrower shoulder regions 156 for helping retain locking tab 170.

The bottom end panels 141, 142 are provided with apertures 160 suitable for receiving locking tab 170, and also yielding flaps 162 that are bounded by the apertures 160, cut or score lines 164, and fold lines 166.

Also shown are regions demarcated by dotted lines, as exemplified by region 148, which during assembly of the carton may be provided by adhesive to close or help close the carton. In particular, longitudinal glue flap 150 may be thus adhesively attached to side panel 130, to form a tubular structure prior to filling the carton. However, for manual filling operations, closure of the end flaps may preferably be accomplished without the use of an adhesive.

FIG. 2 shows the carton 101 being assembled from blank 100, into a tubular arrangement where securing tab 150 has been glued to join bottom panel 140 with side panel 130. One or both ends of the carton may be open at this point. For simplicity, only the “near” end of the carton will be described, which includes four end flaps considered to be “adjacent” to one another (as opposed to the “far” end of the carton, which has an additional four end flaps not adjacent to the near end flaps.)

At this stage the carton could be filled with product, for example with beverage containers such as cans 102 as shown in FIG. 3. For simplicity in illustration, the cans 102 are omitted from some of the following figures.

FIG. 4 shows the carton 101 being assembled with an end partially closed as side end flap 132 has been folded inward. FIG. 5 shows a further step as side end flap 122 has been folded inward. The side end flaps 122 and 132 overlap, and apertures 155 of the side end flaps become superimposed as shown.

FIG. 6 shows the further step of bottom end flap 142 having been folded upward, with its aperture 160 and yielding flap 162 now overlapping the apertures 155 (not shown) of the side end flaps. FIG. 7 shows the further step of top end flap 112 having been folded downward. At this point, the carton is closed and ready for locking using locking tab 170.

FIG. 8 provides a detailed end view of the carton at this point, also showing for reference the approximate location of beverage cans 102 which are shown artificially shifted upward for clarity. FIG. 9 shows an end view of the carton, as it would appear if the side wings 172 of locking tab 170 are folded toward the viewer. When the locking tab 170 is pressed inward as shown in the following steps, the unfolded side wings 172 are too wide to pass through apertures 160 and 155 on the bottom end flap and side end flaps respectively, and the side wings 172 will thus yield or fold outward as the central portion 174 of locking tab 170 moves inward into the carton.

FIG. 10 shows an “exploded” perspective view of portions of the overlapping end flaps, including side end flaps 132 and 122 (each having an aperture 155), bottom end flap 142 (having an aperture 160 and yielding tab 162) and top end flap 112 (having locking tab 170).

FIG. 11 is a view from the same vantage point, except that the side and bottom end flaps are shown brought together, which superimposes apertures 155 and 160. At this point, all the flaps may still be considered to lie essentially in parallel planes.

FIG. 12 shows the locking action starting as the central portion 174 of locking tab 170 is pushed inward into the carton. Yielding flap 162 begins to bend inward along fold line 166, and side wings 172 of locking tab 170 begin to fold outward along fold lines 176, thus reducing the effective width of locking tab 170 and allowing it to move inward and start to pass through the superimposed aperture 160 and the two apertures 155. As this occurs, the locking tab 170 bends inward from top end flap 112, bending along fold line 178. Once the locking tab 170 goes through apertures 155 and 160, the wider shoulder area 163 helps retain the locking tab 170 within the carton.

FIG. 13 is a cross section side view showing how pushing inward on central portion 174 had moved locking tab 170 through apertures 160 and 155, that is, through the planes of bottom end flap 142, side end flap 122, and side end flap 132 respectively. Once the side wings 172 of locking tab 170 have passed through, the elasticity of the carton material (paperboard or other material) allows the side wings 172 to move sideways again, helping hold locking tab 170 within

the carton. The dihedral angle 175 between central portion 174 and top end flap 112 is preferably between 30 and 150 degrees, and more preferably between 60 and 120 degrees.

FIG. 14 shows a cross section top view showing how locking tab 170 is positioned within the carton, along with cans 102 that cooperate with the locking action, bracing the overall area of the end flaps 112, 122, 132, and 142 by their contact along lines X, and providing space Y for the locking tab 170 to fit between the cans 102.

FIG. 15 shows a view of the locking tab from inside the carton. Here the locking tab as depicted by central region 174 and side wings 172 has been pushed through an aperture 155A in an outer flap and an aperture 155B in an inner flap. Yielding tab 160 from another outer flap is also shown. In this example, the inner aperture 155B is slightly larger than the outer aperture 155A. This creates a ledge area 173 that may help retain the wings 172 in a folded arrangement. The dihedral angle 177 between central region 174 and each side wing 172 is preferably between 60 and 120 degrees, and more preferably between 75 and 105 degrees.

FIG. 16 shows a tear-open feature of carton 101. On top end flap 112, a score of fold line 182 defines a peripheral or corner area 183 that may be grasped by a consumer, and used to start a tearing action 184 across score lines 180, which will separate the lower part of top end flap 112 from the upper part thereof. Once this separation occurs, cans may be removed from the carton through the now-open top corner, or the locking mechanism may be pulled apart to open the entire end of the carton.

FIG. 17 shows a different blank 200 that when constructed, forms another carton 201 shown in FIG. 18 for packaging a plurality of articles such as beverage cans or bottles. In this embodiment, the carton 201 is a fully enclosed carton designed to accommodate six cans in two rows each containing three cans, but the blank or carton may be modified for any number of cans, bottles, or other articles. Except for differences described below, the features of blank 200 and carton 201 are similar to the features of blank 100 and carton 101 previously described. The numbering is also similar, differing only in the first digit.

Where blank 100 had apertures 155 in the side end flaps 121, 122, 131, and 132, blank 200 has cutouts 255 in the side end flaps 221, 222, 231, and 232.

FIG. 18 shows the carton 201 being assembled with an end partially closed as side end flaps 222 and 232 have been folded inward. Cutouts 255 of the side end flaps adjoin one another to form an opening similar to that formed by the overlapping apertures 155 for carton 101. The closing and locking action of carton 201 is otherwise similar to that of carton 101. The side end flaps may not overlap (as shown in FIG. 18) or they may partly overlap.

The locking feature disclosed here is preferably located, as shown in the examples, adjacent to an open interior region of the carton, for example such as occurs when the contents are cylindrical containers. For example, when cylindrical containers are placed upright in a regular array in a rectangular carton, the resulting void spaces between containers and carton walls are approximately triangular columns at the wall between each pair of containers. Other types of containers may leave non-uniform void spaces at the walls, such as occur if "hourglass" shaped containers are used, as with sport drinks, baby bottles, detergent containers, etc. With two rows of cylindrical containers as depicted in the examples herein, an open interior region of the carton occurs along a vertical centerline at each end of the carton. If there are three rows of containers, two such open interior regions would occur at each end of the carton. The carton may in such a case be designed so that the locking tab 170 and the apertures 155 and 160 (or the locking tab 270, aperture 260, and cutouts 255) were located along either or both of said interior regions. If there are four rows of containers, three open interior regions would occur at each end of the carton, and the carton locking features could be located along any of said interior regions. Preferably the end flap locking feature(s) will be located near the center of a carton.

The examples shown here depict an end closure and locking mechanism at one end of a carton, comprising adjacent end flaps, that is, end flaps at the same end of the carton. It should be understood that the opposite end of the carton could be closed and locked in the same manner, that is, the disclosed end closure could be at either or both ends of the carton.

What is claimed is:

1. A carton comprising a top panel, a pair of side panels, a bottom panel, and opposed end closure walls each formed from a plurality of overlapping end flaps, each of said end flaps being hingedly connected to said panels respectively, said carton further comprising a locking tab connected to one of said end flaps and means for receiving said locking tab, said receiving means being provided in at least one of the other end flaps, said locking tab when received in said receiving means being disposed in a locked position to retain said end flaps in a closed position wherein said end flaps form said each end closure wall.
2. The carton of claim 1, wherein said locking tab is hingedly connected to said one end flap.
3. The carton of claim 1, wherein said locking tab comprises a central portion and two side wings.
4. The carton of claim 3, wherein said two side wings are hingedly connected to said central portion.
5. The carton of claim 3, wherein said central portion of said locking tab in said locked position defines an angle between thirty and one hundred fifty degrees with respect to said one end flap to which said locking tab is hingedly connected.
6. The carton of claim 5, wherein said angle is between sixty and one hundred twenty degrees.
7. The carton of claim 3, wherein said side wings of said locking tab in said locked position each define an angle between sixty and one hundred twenty degrees with respect to said central portion.

8. The carton of claim 7, wherein said angle is between seventy five and one hundred five degrees.
9. The carton of claim 1, wherein said receiving means in said at least one of said other end flaps comprises an aperture having a wider edge for passing said locking tab, said aperture also having adjacent to said wider edge, a narrower shoulder for retaining said locking tab.
10. The carton of claim 1, wherein said receiving means in said at least one of said other end flaps comprises an aperture with a yielding flap to assist in retaining said locking tab in said locked position.
11. The carton of claim 1, wherein said receiving means in said at least one of said other end flaps comprises a cutout in a periphery of said at least one of said other end flaps.
12. The carton of claim 1, wherein said receiving means in said at least one of said other end flaps comprises an aperture within the interior of said at least one of said other end flaps.
13. The carton of claim 1, wherein said each end closure wall comprises no adhesively secured portion.
14. The carton of claim 1, wherein said each end closure wall comprises said one end flap overlying said other end flaps and providing an outermost layer of said each end closure wall.
15. The carton of claim 14, wherein said other end flaps, when in said closed position, comprises three overlapping inner layers through which said locking tab passes.
16. The carton of claim 14, wherein said other end flaps, when in said closed position, comprises two overlapping inner layers through which said locking tab passes.

17. The carton of claim 15, wherein said receiving means in an innermost one of said three layers is slightly larger than said receiving means in a next outer layer, creating thereby an interior ledge to retain said side wings.
18. The carton of claim 1, further comprising containers accommodated in said carton, said containers defining one or more spaces therebetween, said one or more spaces being disposed along said each end closure wall, wherein said locking tab in said locked position is located in said one or more spaces.
19. The carton of claim 18, wherein each of said spaces is generally triangular in a cross section.
20. The carton of claim 1, further comprising a tear line formed in said one end flap to facilitate separation of said locking tab from said one end flap.

FIG. 1

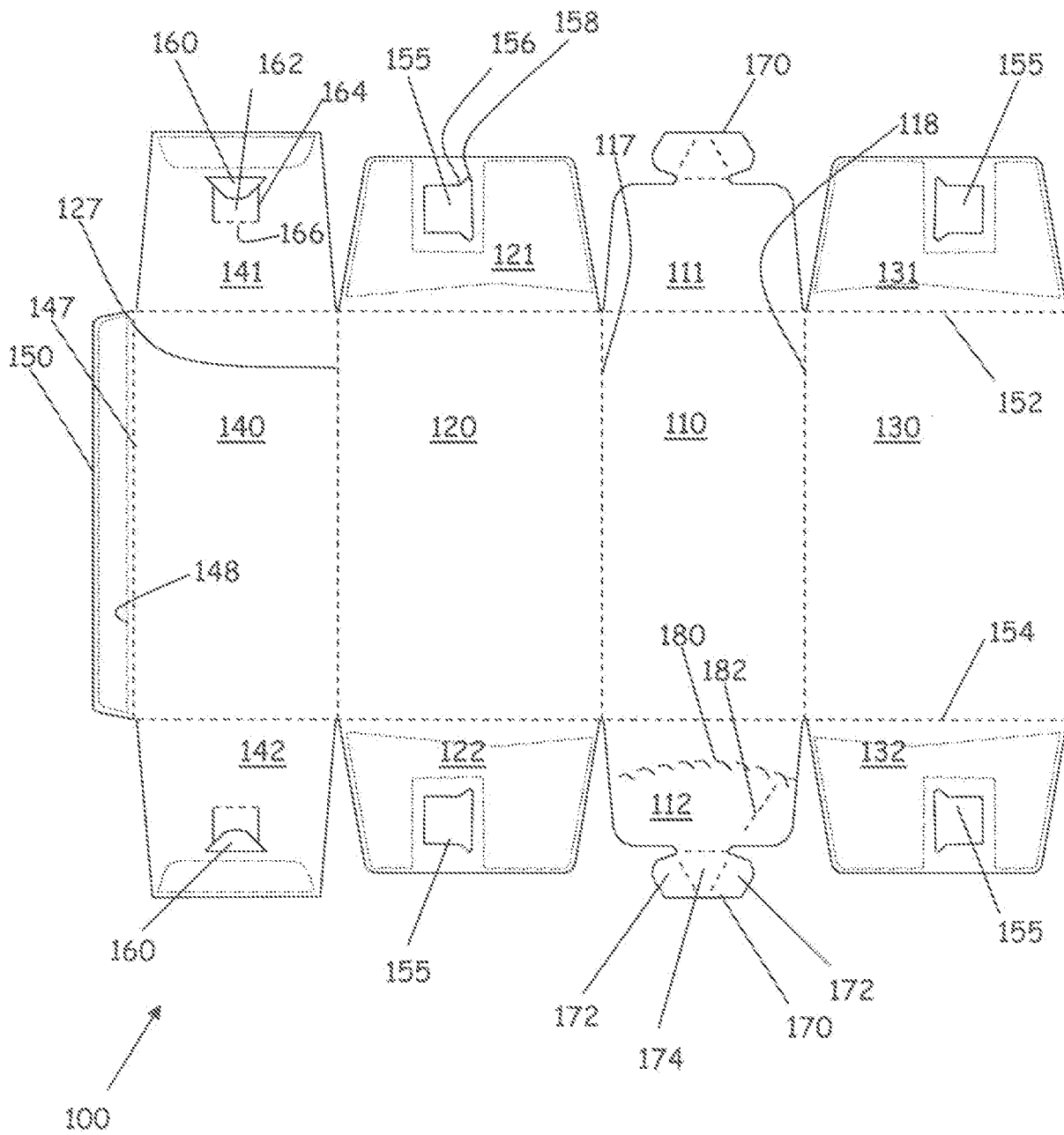


FIG. 2

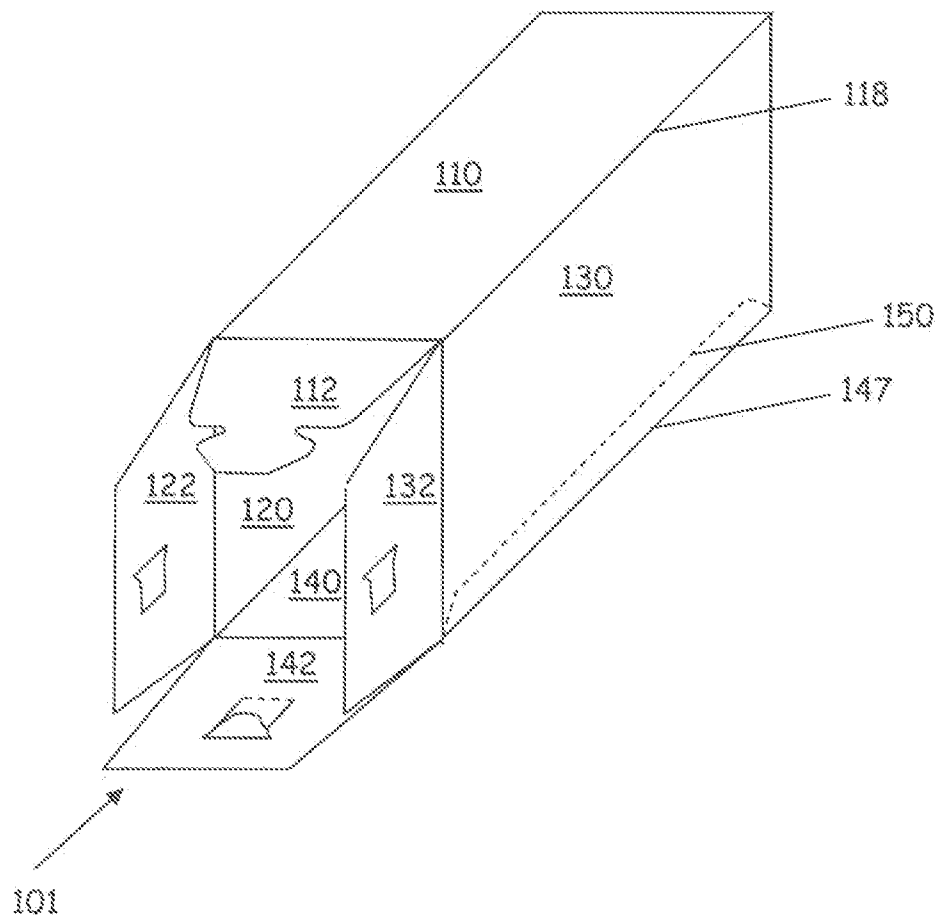


FIG. 3

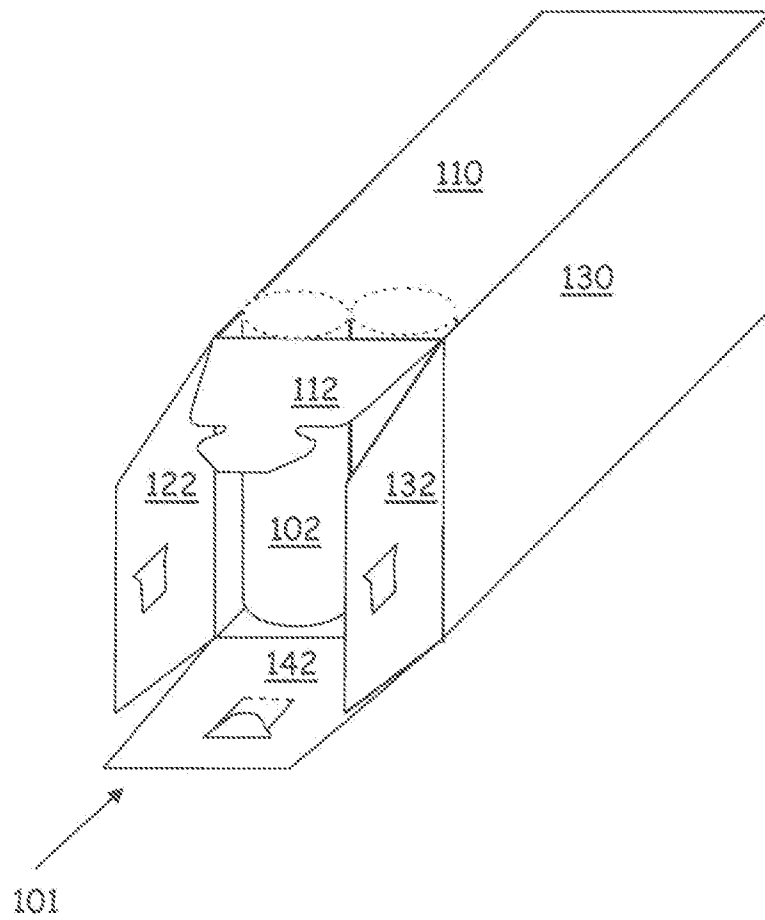


FIG. 4

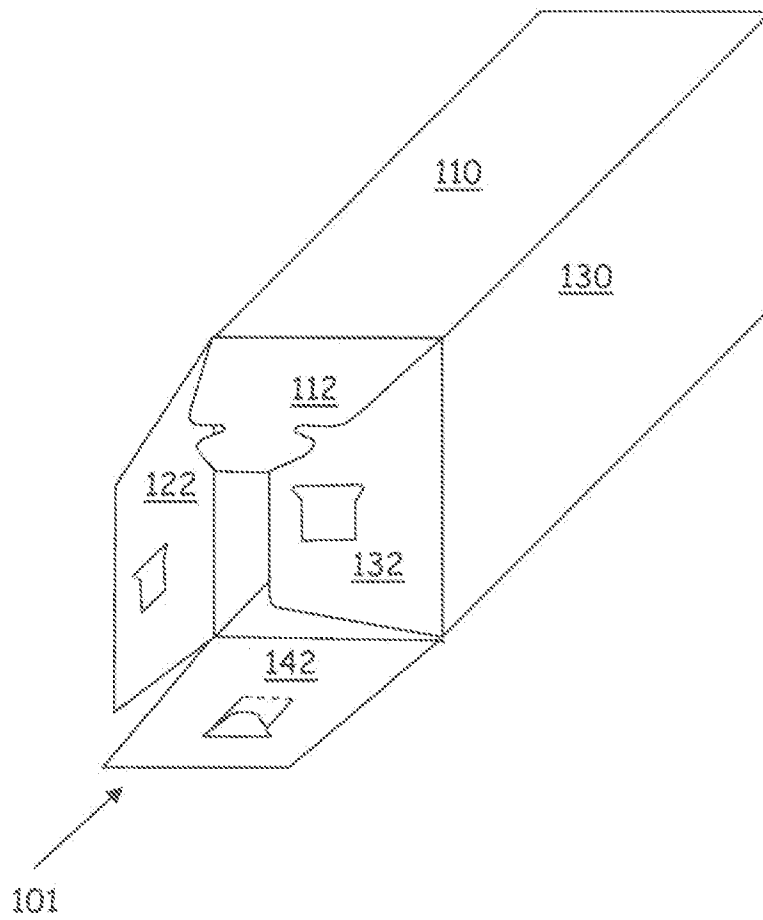


FIG. 5

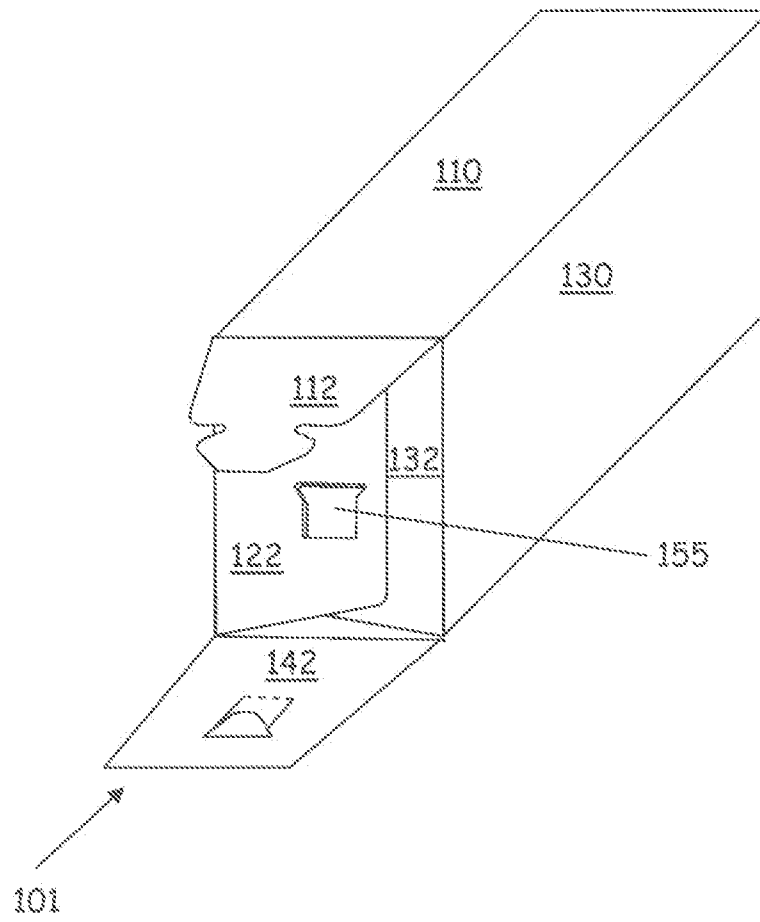


FIG. 6

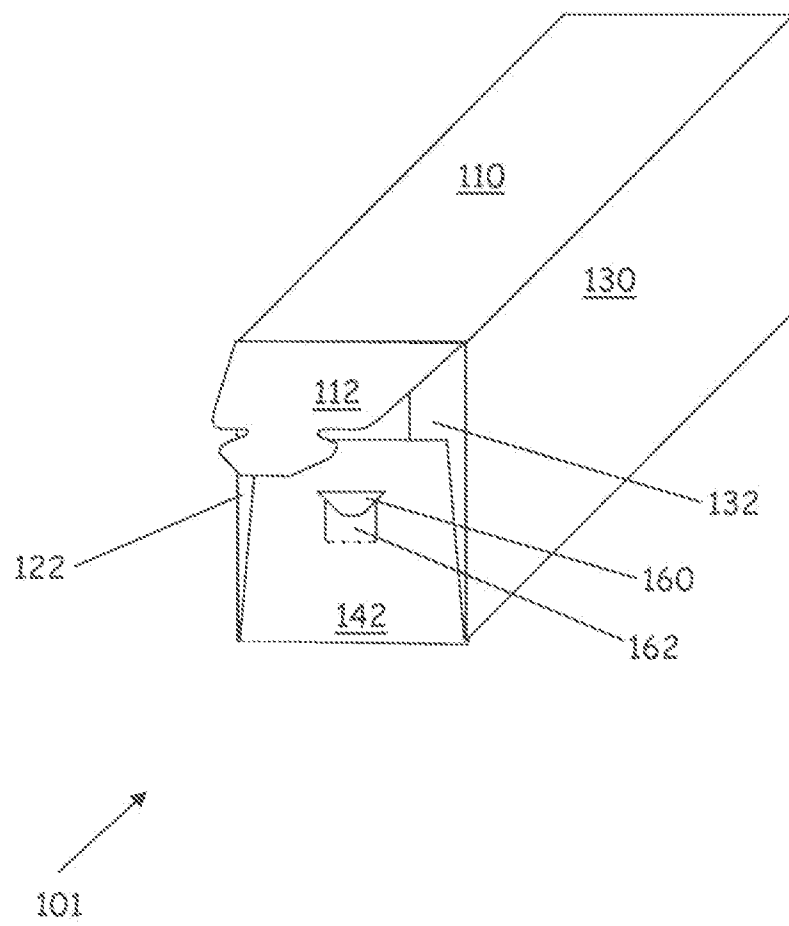


FIG. 7

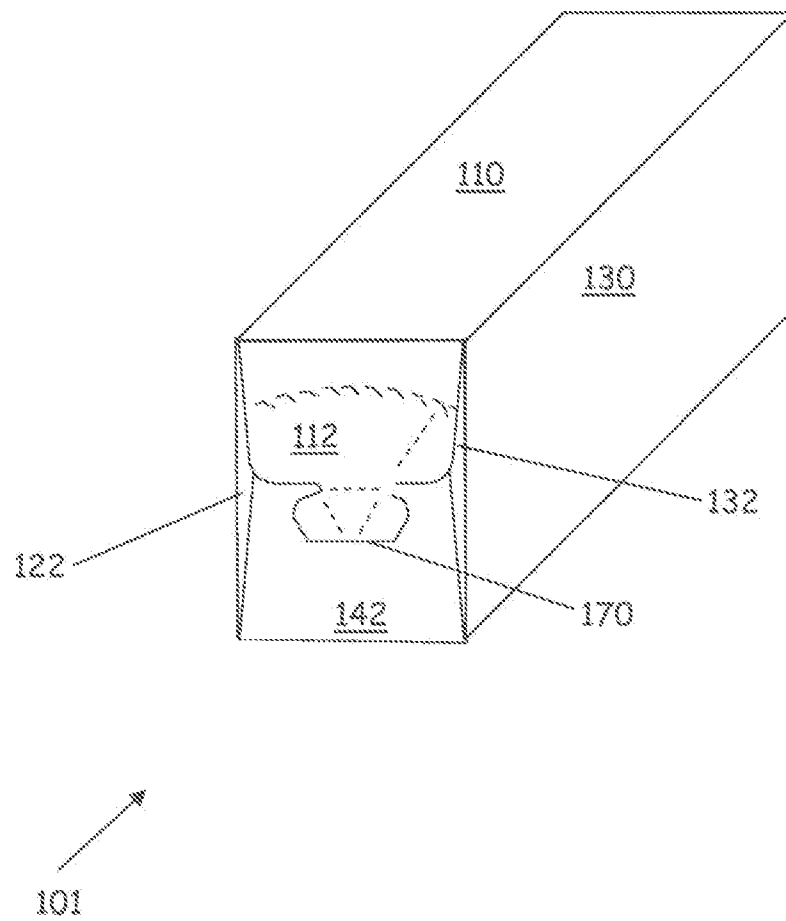


FIG. 8

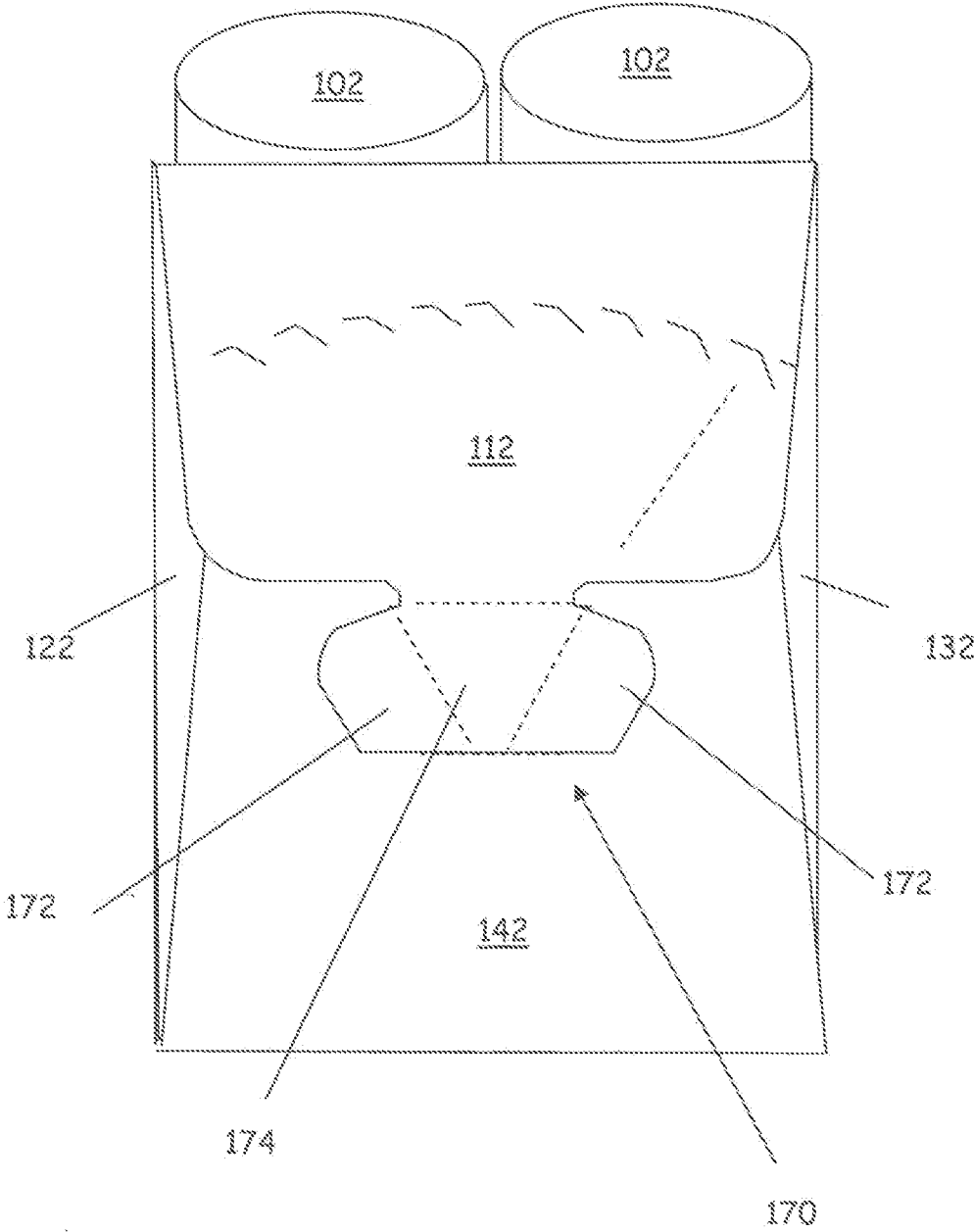


FIG. 9

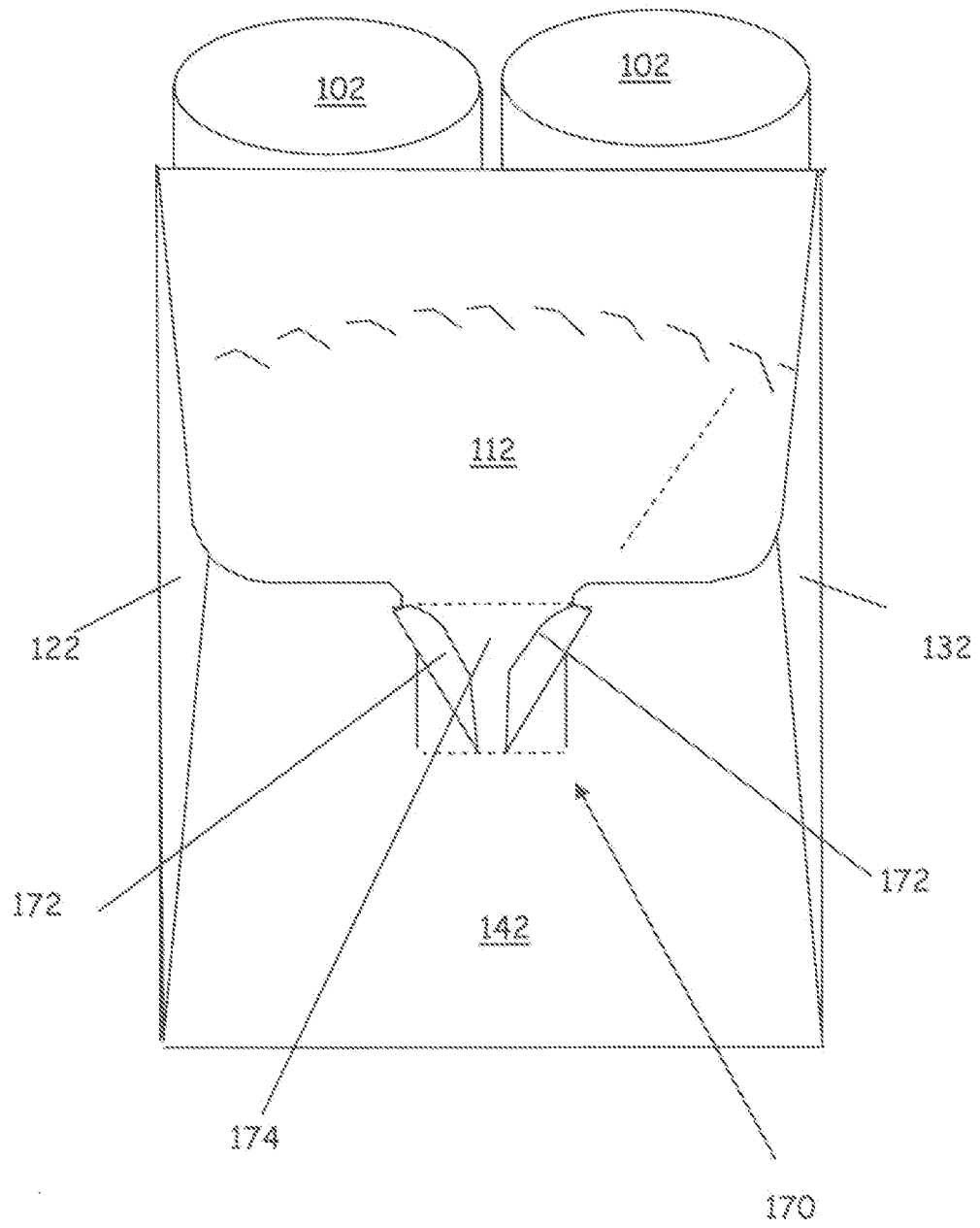


FIG. 10

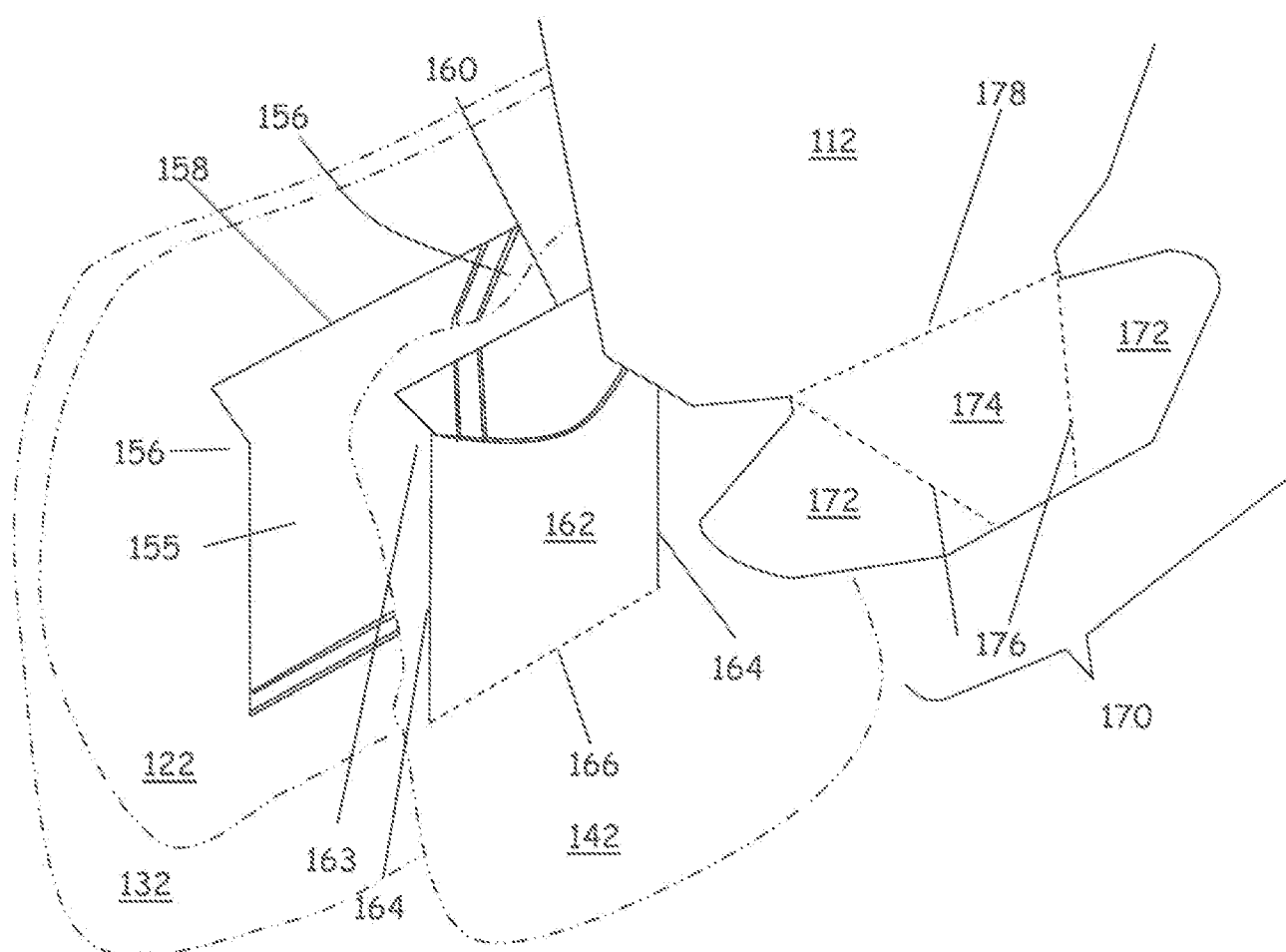


FIG. 11

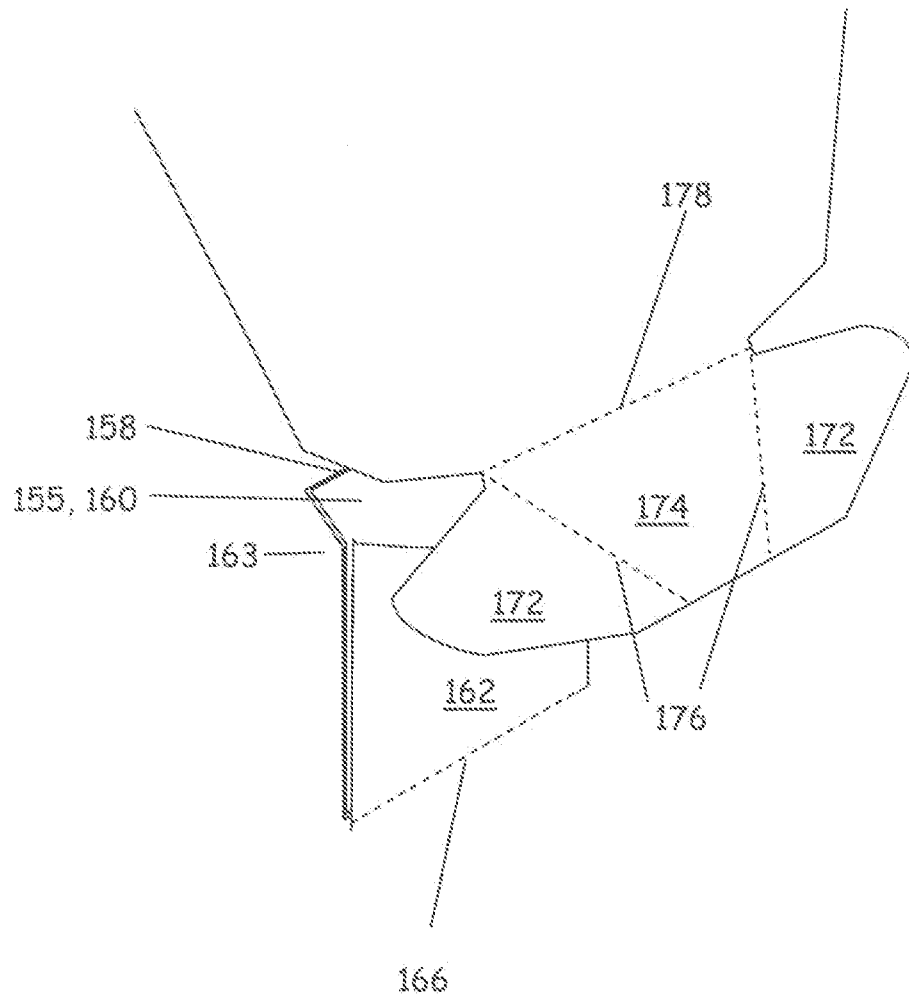


FIG. 12

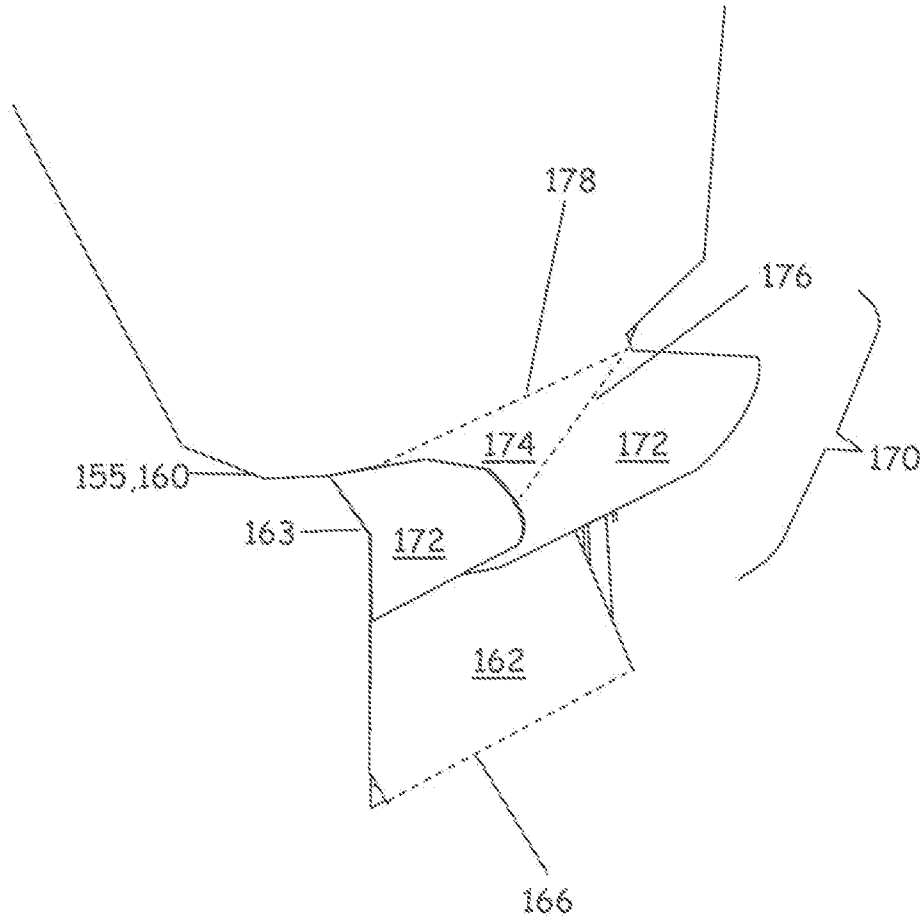


FIG. 13

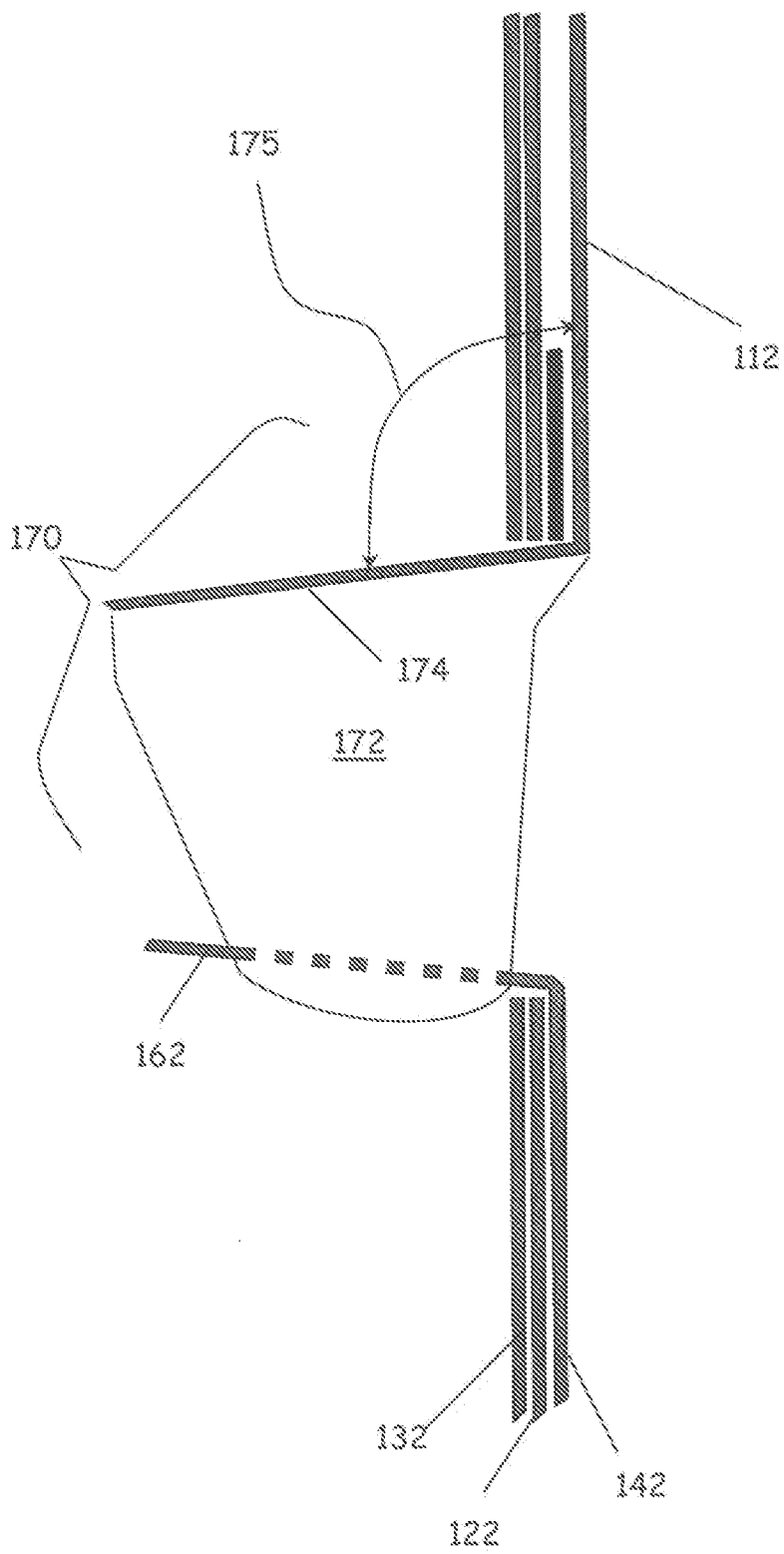


FIG. 14

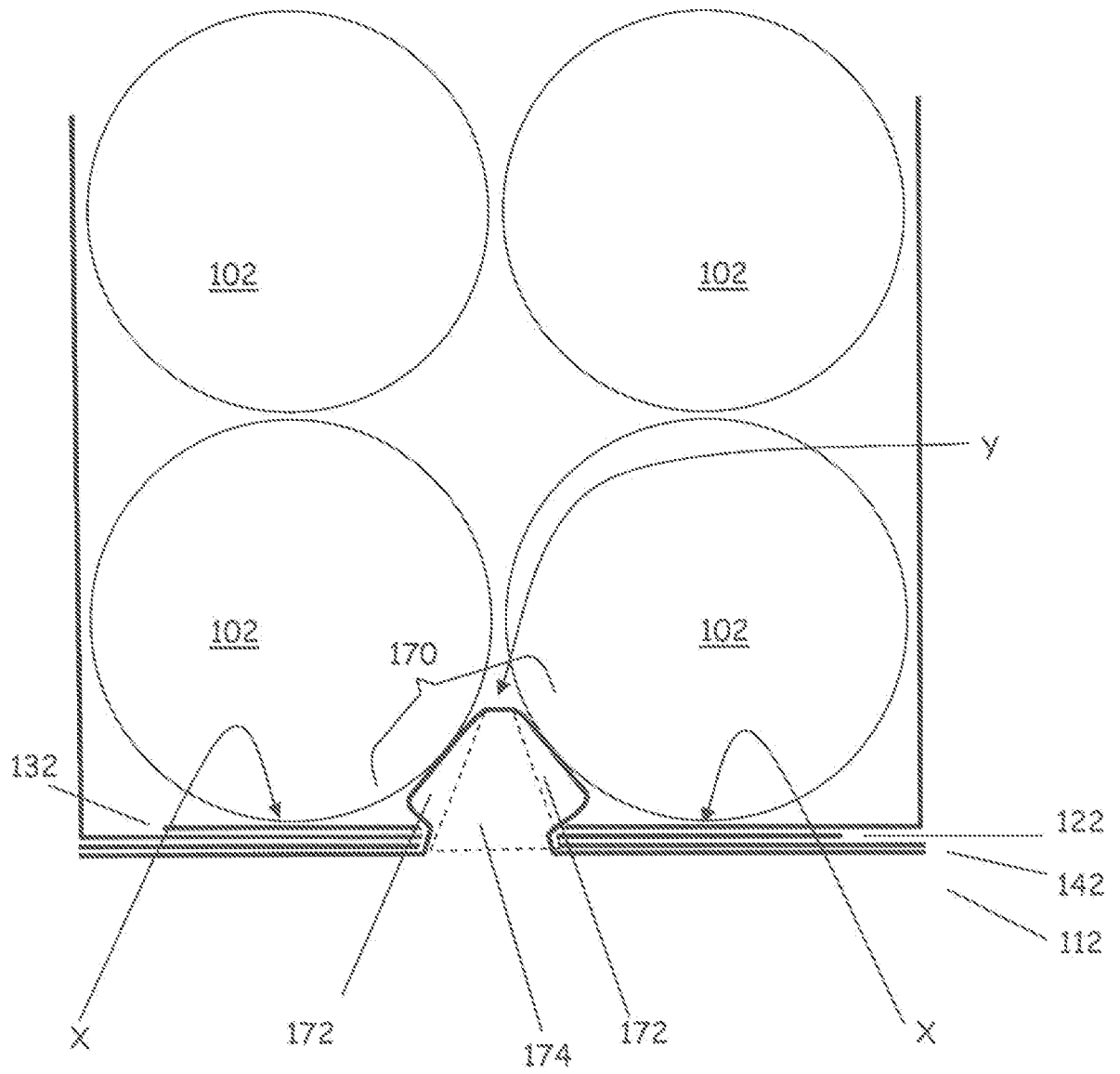


FIG. 15

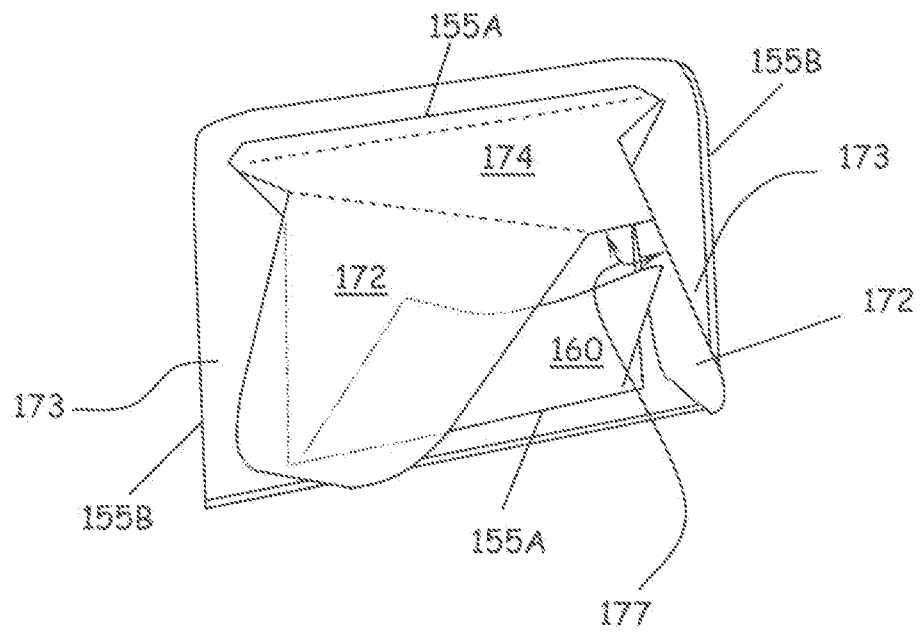


FIG. 16

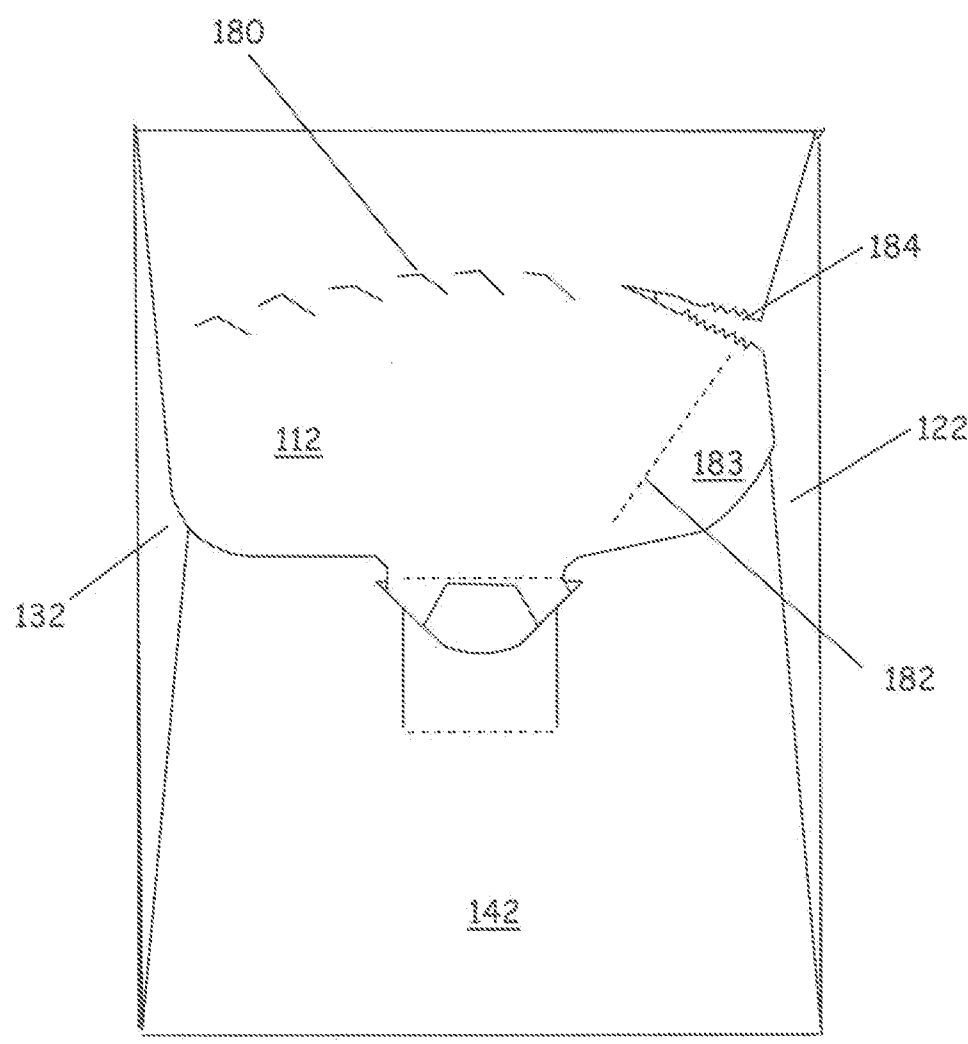


FIG. 17

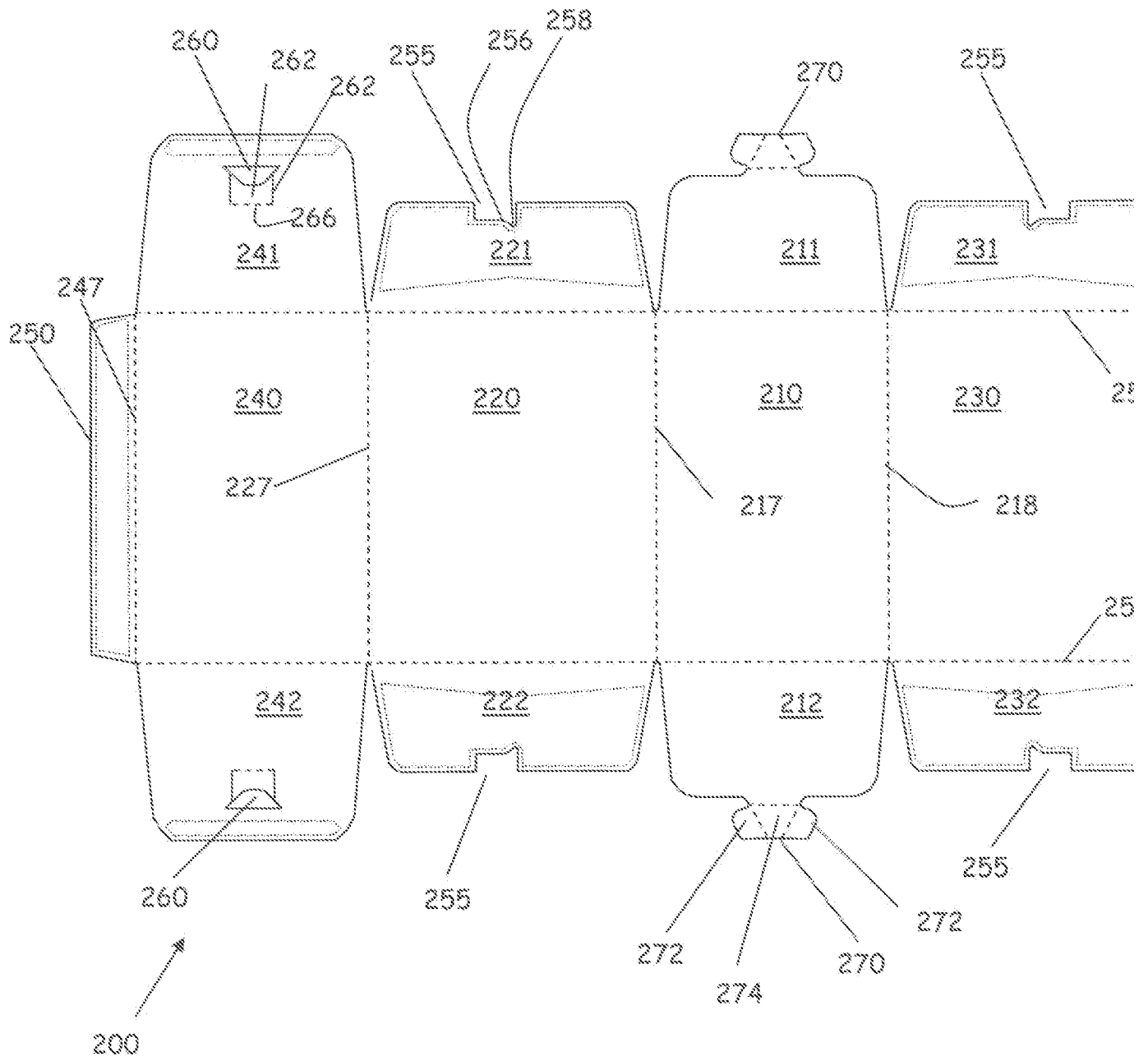


FIG. 18

