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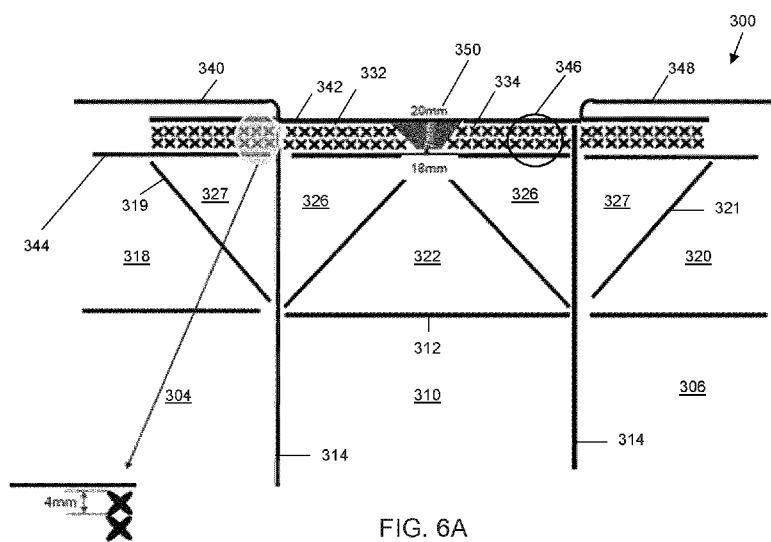


FIG. 6A

(57) Abstract: The present disclosure relates to the provision of carton blanks (300) for gable-top cartons comprising an embossed pattern (346) along a top portion providing a carton top opening. Embossing the top opening of cartons may reduce the force required to open the carton in both vertical and horizontal direction and minimize the amount of fibers remaining in the pouring spout after the carton has been opened.



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GABLE-TOP CARTON COMPRISING AN EMBOSSED PATTERN

BACKGROUND

Field of the Invention

[0001] Disclosed herein are methods and apparatuses for processing cartons that includes embossing the top opening of cartons for packaging liquid food.

Description of the Related Art

[0002] Paperboard cartons are commonly known in the art for containing and distributing milk and juice. Typically, paperboard cartons are present in the form of a laminate and formed from flat blanks that have a central layer of paperboard and outer layers of polyethylene. A gas barrier layer may be included in the laminate. A common form of these cartons is referred to as gable-top carton. The current process to make these types of cartons involves printing on the carton of the pre-laminated paperboard sheets, creasing the sheets in several locations, applying an adhesive to an area where a pouring spout of the carton will be later located, and cutting individual carton blanks from the sheets. These carton blanks are then folded to form four side walls and a flat bottom. The top of the carton is folded into a closing arrangement which resembles a roof. Along the ridge of the roof, a sealing fin projects upwardly. The laminate that forms the sealing fin is heated to soften the polyethylene. When opposing sections of the laminate then are pressed together along the sealing fin and cooled, the polyethylene layers form a secure bond.

[0003] In order to open the sealed carton, the sides of the roof are pulled apart to separate each half of the sealing fin between the end of the roof and the center of the ridge of the roof. The other half of the sealing fin not used as a pouring spout remains sealed. The second step in the opening process requires unsealing the inside layers of the sealing fin, and this is done by swinging the sides of the roof further away from each other past the middle of the roof ridge, and then to urge the two sides toward each other with sufficient force to break the seal between the inside layers of the seal fin, which then swing outwardly to form a pouring spout.

[0004] Although the gable-top carton is used extensively, the opening arrangement has been criticized by consumers for the difficulty in opening and forming the pouring spout. Often, in conventional cartons it is necessary to actually pull the spout away from the center of the sealing fin with sufficient force to break the seal between the layers of the seal fin. When the seal fin is torn apart, all of the polyethylene may adhere to one side of the seal and, as a result, the rough surface of the paper is exposed. This rough paper surface is not only visually objectionable, it may be the source of bacteria if the carton remains open for a long time after its first use.

[0005] Various attempts have been made to improve the opening arrangement. One suggestion for improving the opening arrangement is disclosed in U.S. Patent No. 4,712,727, incorporated by reference herein, which involves applying an adhesive-coated plastic strip on the inside of the carton blank overlapping the sealing fin. The plastic tape reduces the adhesion between the tape and the opposite polyethylene coating, thereby reducing the force required to open the sealing fin. The tape also strengthens the sealing fin so that in the second opening step in which the spout is formed, the sides of the sealing fin are able to withstand any tendency to buckle. This proposed arrangement provides an improvement of the previous solutions for gable top containers in carton-filling and sealing machines that are currently in use. However, it could be improved upon. The tape tends to move during the sealing operation, which prevents a hermetic seal and in some cases causes leakage of the contents of the carton to occur. Another problem with utilizing the tape is that in the sealing operation, the tape tends to wrinkle or become uneven. This may lead to an ineffective seal, which permits O₂ permeation or product penetration. For a practical commercial use, the cartons must remain sealed until opened by the customer. For example, if even a minute channel through the sealing fin results from the use of the tape, air may enter the carton and prematurely spoil the contents. Also, in transporting and handling the carton, the contents may leak, particularly along the crease lines at the center of the sealing fin. As a practical matter, the integrity of the seal is essential to providing a commercially-viable carton opening arrangement.

[0006] According to US-A-4,712,727 the tape strengthening the sealing fin is spaced apart with its upper edge from the free edge of the panel by preferably 0.38 cm. When

the space is more than 0.76 cm, an excessively strong sealing area may result. This strong seal requires an excessive opening force to break the seal. Furthermore, the US patent advises against extruding adhesive into an area above the panels of the pouring spout because excessive opening force would be required to break the seal.

[0007] There are various techniques for applying the tape to the surface of the carton blank. Typically, the tape has a coating of adhesive on one side and is bonded to the surface of the carton blank by the adhesive. The use of an adhesive at the location of the pouring spout obviously adds to the thickness of the sealing fin and requires modification of conventional carton sealing equipment to accommodate the presence of the tape. Another problem is that it is intended that the adhesive at least partially extrudes outward from the tape during the sealing operation. Due to the plastic nature of the adhesive, it may not provide a stable support for the tape, and may lead to displacement of the tape, wrinkling and distortion during the sealing operation.

[0008] Referring to FIGS. 1 and 2 which relate to the above prior art solution, in embodiments, a gable-top carton 2 has a front wall 4, a back wall 6, and opposite side walls 8 and 10. The carton 2 has a closed bottom (not shown) which is formed in a conventional manner. Such designs are disclosed in European patent EP0546383, incorporated by reference herein.

[0009] At the top of the carton 2, the front and back walls are folded along a crease line 12 which extends across the front wall and back wall and the two side walls. The various crease lines which are formed in the carton blank are shown in FIG. 2. Crease lines 14 are provided in the carton blank to form each of the corners of the carton 2. A sealing flap 16 is folded and sealed along the side wall 4 to form the carton as shown in FIG. 1.

[0010] The carton blank, as shown in FIG. 2, has main roof panels 18 and 20 which are extensions of the front and back walls 4 and 6. The carton blank has triangular end panels 22 and 24 and triangular back-folding panels 26. A crease line 28 in the carton blank is parallel to the crease line 12 and defines the sealing fin along the ridge of the sealed gable-top carton. On the opposite side of the crease line 28 from the triangular back-fold panels 26, the carton blank has rectangular fin panels 30 adjacent the end panel 24 and rectangular fin panels 32 adjacent the end panel 22. At the apex of the triangular end panel 24, a vertical

crease line 34 is provided between the rectangular panels 30. A similar vertical crease line 36 is provided between the rectangular panels 32 at the apex of the triangular end panel 22. The main roof panels 18 and 20 include rectangular portions 40 which extend above the edges 42 of the fin panels 30 and 32, as shown in FIG. 2.

[0011] As shown in FIGS. 1 and 2, a strip of tape 38 is applied over the fin panels 32 and over a portion of the fold-back panels 26. The tape 38 has an adhesive layer which bonds the tape to the polyethylene coating on the carton panels. The tape is formed of a material that is weakly bonded by heat sealing to the polyethylene coating of the carton blank, or is incapable of forming a bond with the polyethylene, so that the exposed side of the tape does not stick to the adjacent surfaces of the carton when the carton is being opened. The tape material is resistant to deformation under the heating conditions prevailing during the sealing process and be sufficiently stiff to facilitate the carton opening process. The adhesive that bonds the tape 38 to the carton blank has the ability to form a strong bond between the tape and the polyethylene surface of the carton blank, so that upon opening the carton, the tape remains bonded to the fin panels 32. For example, the tape may be formed of unoriented polypropylene, metallic foil, polyester film or polycarbonate film. Suitable adhesives for bonding the tape to the polyethylene of the carton blank include ethylene vinyl acetate (EVA) copolymer, medium density polyethylene, and pressure-sensitive adhesive (PSA). The tape 38 may also be formed of unoriented polypropylene, such as that used as a film backing in a pressure-sensitive adhesive tape marketed under the trademark "Y-8450" by Minnesota Mining and Manufacturing Company.

[0012] The spacing between the edge of the tape 38 and the edge 42 of the fin panels 32 is important in achieving a proper seal. If the edge of the tape 38 is too close to the edge 42, the tape will interfere with the flow of the adhesive over the edge 42. If the tape 38 is spaced too far from the edge 42, the adhesive will not fill the area along the edge 42. It has been found that the minimum gap between the edge of the tape and the edge 42 for an effective seal is 0.50 mm and the maximum gap is 1.5 mm.

[0013] Referring to FIGS. 3A-4 which relate to the prior art solution referred to earlier in the description, certain embodiments of a gable-top carton are shown. Such designs are disclosed in U.S. patent 4,744,467, incorporated by reference herein. The carton C has a

tubular main body 120, being of a configuration which is square or rectangular in cross-section, a bottom 121 and a gable-shaped cover 122. The gable-shaped cover comprises two inclined surface portions 124 and 125 and a double-layer cardboard strip comprising one layer 129 and an oppositely disposed layer 126.

[0014] As shown in FIG. 4, the tubular main body 120 is closed along the sealing seam 138. The laid-over gable surfaces 131 and 132 which are disposed approximately perpendicular to the wall surface portions 124 and 125 are laterally connected to triangular panels 134, 135 and 136, 137 respectively, while upwardly towards the opening side, there are panels 130, 141 and 142 for forming the ridge seam.

[0015] The entire carton comprises paper or cardboard which is coated with thermoplastic material on both sides so that, when the sealing tools are of a suitable configuration, it is possible for the gable-shaped cover of the carton to be completely fluid-tightly closed off.

[0016] However, in the regions 139, 140, 148 and 149, there should be produced a sealing area with a low level of adhesive force, for which reason those surfaces are provided with the specific pattern 146, 147 and 149 respectively.

[0017] After the sealing operation which is slighter or weaker in extent over those regions 139, 140, 148 and 149, in such a way that those areas have a lower level of adhesive force and are consequently peelable, the carton can be put into the condition shown in FIG. 3B by a first step.

[0018] In order to prevent the sealing areas 148, 149, 139 and 140 with a low level of adhesive force from possibly clinging together again, when the spout is reclosed, yet another prior art embodiment is shown in FIG. 5. Illustrated therein is a prefabricated cardboard material, that is to say, a broken-away blank portion as shown in FIG. 4, but with minor alterations so that the carton produced from the blank shown in FIG. 5 represents a slightly modified construction in comparison with the prior art carton which is produced from the blank shown in FIG. 4. The same areas and portions in FIG. 5 as those appearing in FIG. 4 are denoted by the same reference numerals, but they are additionally provided with a prime. In order further to reduce the adhesive force, the sealing areas 139' and 140' have been reduced in size, for example by cutting away a center portion 150 which in FIG. 5 is

represented by inclined hatching and with boundary lines extending in a triangular configuration. Although the configuration of such a cut-away portion 150 may be different, it is however particularly useful for the cut-away portion to be of a V-shaped configuration, with the lower tip of the "V", which is identified by reference numeral 151 in FIG. 5, being disposed on a vertical fold line 152 which extends from the point of intersection between the corresponding fold lines 153 and 154 in the upper wall panel portions 131' and 134' of the preformed cardboard material. The V-shaped portion 150 is preformed cardboard material. The V-shaped portion 150 is preferably in the form of an isosceles triangle whose apex 151 is disposed on the fold line 152. In accordance with a practical embodiment in that arrangement for example the hypotenuse or base may be about 25 mm and a corresponding height of the triangle may be 4 to 5 mm.

[0019] In the prior art embodiment of the cardboard material which is shown in FIG. 5 and which is modified in comparison with FIG. 4, the two panel portions 124' and 125' which are arranged at the top of the carton may further be provided with fold lines 155 and 156 respectively which are partially arranged within corresponding sealing areas 148' and 149' respectively with a lower level of adhesive force. The extra fold lines 155 and 156 preferably extend vertically upwardly in the view shown in FIG. 5 and represent extensions corresponding to the fold lines 157 and 158 within the panel portions 124' and 125' respectively. That arrangement forms another pouring spout which is more easily formed, when the filled and closed carton C is to be opened and the content thereof is to be poured out.

[0020] It will be seen from FIG. 3B that the peel-able sealing surface, in the region of the special pattern 146 (for example rhombic depressions arranged at a spacing from each other) can be opened in such a way that the two triangular panel portions 134 and 135 are pulled apart.

[0021] FIG. 3C then shows the condition after the pouring arrangement has been completely opened, specifically wherein the lip 145 of the pouring spout 144, which lip serves as the pouring spout means, has been folded out by releasing the pretreated sealing areas 147 and 149.

SUMMARY OF THE INVENTION

[0022] In some aspects of the disclosure, a carton blank for a gable-top carton is disclosed that comprises a pre-laminated paperboard sheet, a plurality of crease lines; and an embossed pattern printed along a top portion of the carton blank. The top portion can be configured to become a sealing fin on a folded packaging container. In some aspects, the pre-laminated paperboard sheet can further comprise a central layer comprising a paperboard material and an outer layer comprising a polyethylene material. The embossed pattern can comprise a plurality of rows and each row can comprise a plurality of x-shaped marks. The embossed pattern can have two rows. Each x-shaped mark in the plurality of x-shaped marks can have a height of approximately 4 mm.

[0023] In some aspects, the embossed pattern can comprise a plurality of rows and each row can comprise a plurality of ovals. Each oval of the plurality of ovals can have a height of approximately 2 mm and a width of approximately 45 mm.

[0024] In some aspects, the carton blank can further comprise a compressed spot that can be positioned approximately in the center of the embossed pattern. The compressed spot can comprise a triangular shape. The triangular shape can have a height of approximately 7 mm, a first dimension of approximately 20 mm, and a second dimension of approximately 18 mm.

[0025] In some aspects of the disclosure, a packaging container for packaging liquid food is disclosed that comprises a pre-laminated paperboard material, a container body, a top portion, and a sealing fin. The pre-laminated paperboard material can comprise an outer layer that can comprise a polyethylene material. The container body can comprise a closed bottom end. The top portion can extend from the container body opposite the closed bottom end and can form a roof-like configuration. The sealing fin can comprise a front sealing portion on a front side and a back sealing portion on a back side of the sealing fin. The front sealing portion can comprise an embossed pattern and the back sealing portion can comprise the polyethylene material.

[0026] In some aspects, the packaging container can further comprise a compressed spot that can be positioned approximately in the center of the embossed pattern. In some aspects, the packaging container can further comprise a central layer that can

comprise a paperboard material. In some aspects, the embossed pattern can have two rows and each row can comprise a plurality of x-shaped marks. In some aspects, the embossed pattern can have three rows and each row can comprise a plurality of ovals. In some aspects, the packaging container can further comprise a pouring spout. The pouring spout can be formed by opening the front side of the sealing fin along the embossed pattern while the back side of the sealing fin remains sealed.

[0027] In some aspects of the disclosure, a method for processing a gable-top carton is disclosed. The method can comprise: printing a plurality of carton blanks on a pre-laminated paperboard sheet, creasing each of the plurality of carton blanks such that each of the plurality of carton blanks can comprise a plurality of crease lines, printing an embossed pattern along a top portion of the plurality of creased carton blanks, and cutting a single carton blank from the plurality of creased carton blanks.

[0028] The method of the preceding paragraph can also include one or more of the following features. The method can further comprise compressing a compressed spot positioned approximately in the center of the embossed pattern. The compressed spot can comprise a triangular shape.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] FIG. 1 is a perspective view of a carton from the prior art showing the sealing fin area prior to closing and heat-sealing.

[0030] FIG. 2 is a plan view of a carton blank from the prior art.

[0031] FIG. 3A is a perspective view of a carton with a gable-shaped cover from the prior art in a closed condition.

[0032] FIG. 3B shows the same carton from the prior art as that illustrated in FIG. 3A, but illustrating the first step for opening the pouring opening.

[0033] FIG. 3C is a broken-away perspective top view onto the gable-shaped cover of the carton from the prior art after it has been completely opened.

[0034] FIG. 4 is a broken-away side view of the upper region of a blank from the prior art as shown in FIG. 3A, in a flat condition, with the fold lines and the sealing areas of low adhesive force.

[0035] FIG. 5 is a side view of another embodiment from the prior art, the view being similar to that shown in FIG. 4, in accordance with the above-described embodiment.

[0036] FIGS. 6A-6B depict a portion of an embodiment of a blank carton with an embossed pattern according to the present solution.

[0037] FIGS. 7A-7B depict a portion of another embodiment of a blank carton with an embossed pattern according to the present solution.

DETAILED DESCRIPTION

[0038] Embodiments of the solution disclosed herein are directed to various techniques for adhering surfaces in a carton, such as replacing the use of an adhesive surface at the top of the gable top carton, with a step of embossing this area to adhere the surfaces together. In some examples, the benefit of embossing may be twofold. First, the defined embossed marks (e.g., x-shaped marks, circular marks, oval marks) help reduce the force required to open the carton in both vertical and horizontal directions. Second, an area in the pouring spout can be fully compressed, as shown in FIGS. 6A and 7A, to ensure that little to no fibers remain in the pouring spout after the carton has been opened, which avoids contamination of the product.

[0039] In some embodiments, the method of embossing the carton may involve printing on cartons being in the form of pre-laminated sheets. The pre-laminated sheets can comprise a central layer of paperboard and outer layers of polyethylene. After being printed on, the cartons can be creased such that several crease lines are formed. The crease lines may be configured to be folded such that the top of the carton that is opposite a closed bottom, the top resembles a roof, the side walls are opposite each other, and the front wall is opposite the back wall. After the cartons are creased, the cartons can be embossed along the part of each rectangular section 340, 440 and along the length of the first and second rectangular fin panel 332, 334, 432, 434. The embossed patterns are described further below. Once the cartons are embossed, the pre-laminated sheets can be cut into individual carton blanks. In certain embodiments, each carton blank can comprise a sealing flap that includes a polyethylene material (e.g., low-density polyethylene (LDPE)). After the pre-laminated sheets are cut, the cartons can be folded along the crease lines and heat can be applied to the sealing flap to melt

the polyethylene material such that the sealing flap seals against the interior-facing surface of the front wall.

[0040] Referring to FIGS. 6A-6B, a portion of an embodiment of an embossed carton blank 300 according to the present solution is shown. The general structure of the carton blank may be similar to the prior art carton blank shown in FIGS. 4-5. When the carton blank 300 is folded, it may have a similar configuration as the prior art carton depicted in FIGS. 3A-3C. In certain embodiments, the embossed carton blank 300 can comprise front and back walls 304, 306, side walls 310, rectangular fin panels 332, 334, rectangular portions 340, 348, a plurality of crease lines 312, 314, 319, 321, 336, 344, triangular back-folding panels 326, and triangular end panels 322. In some embodiments, the plurality of crease lines may include vertical crease lines 336, two diagonal crease lines 319, 321 and a score 344. At the top of the carton 300, the front and back walls 304, 306 can be folded along a crease line 312 which extends across the front wall 304 and back wall 306 and the two side walls 310. The crease lines 314 can be configured to form each of the corners of the carton 300.

[0041] In some embodiments of the present solution, the carton blank can have main roof panels 318, 320 which can be extensions of the front and back walls 304, 306. The main roof panels 318, 320 may each comprise a diagonal crease line 319, 321 and a triangular folding panel 327. When opening the top of the carton, these diagonal crease lines 319, 320 can support and guide the carton to fold along the diagonal crease lines 319, 320, which can make it easier for the consumer to open the carton. The carton blank can have triangular end panels 322, 324 and triangular back-folding panels 326. A crease line or score 344 in the carton blank can be parallel to the crease line 312 and can define the sealing fin along the ridge of the sealed gable-top carton. In certain embodiments, on the opposite side of the crease line 344 from the triangular back-fold panels 326, the carton blank can have rectangular fin panels 332, 334 adjacent the end panel 322. At the apex of the triangular end panel 322, a vertical crease line 336 can be provided between the rectangular panels 332, 334. In some embodiments, a similar vertical crease line can be provided between the rectangular panels at the apex of the triangular end panel (not shown) opposite the other triangular end panel 322. The main roof panels 318, 320 can include rectangular portions 340, 348 which extend above the edges 342 of the fin panels 332, 334, as shown in FIGS. 6A-6B.

[0042] This embodiment of the embossed carton blank 300 according to the present solution may have an embossed pattern 346 that can comprise two rows of x-shaped marks. In certain embodiments, the embossed pattern 346 can extend from a portion of one rectangular portion 340 along the rectangular fin panels 332, 334 and to a portion of the other rectangular portion 348. In some embodiments, each x-shaped mark can have a height of approximately 4 mm, such that when the rows are printed on the rectangular panels 332, 334 and rectangular portions 340, 348 there is approximately 1 mm between the lowermost portion of the bottom row of x-shaped marks and the score 344. If the embossed portion 346 crosses the score 344, there is a risk of compromising the seal when the top of the carton is sealed in a filling machine. Although two rows of x-shaped marks are shown in FIGS. 6A-6B, there can be less or more than two rows embossed onto the carton. Additionally, the height of the x-shaped marks can be greater than or less than 4 mm.

[0043] FIG. 6A shows an embodiment of the embossed carton blank 300 according to the present solution with a fully compressed triangular area 350 that overlaps the vertical crease line 336 (FIG. 6B) between the two rectangular fin panels 332, 334. As described above, this fully compressed area 350 prevents fibers from contaminating the product when the carton is opened. In some embodiments, the fully compressed area 350 can comprise a height of approximately 7 mm, a first width of approximately 20 mm, and a second width of approximately 18 mm. Although the compressed area 350 is shown in a triangular shape with specific dimensions, the compressed area 350 can comprise different dimensions and/or different shapes.

[0044] Referring to FIGS. 7A-7B, another embodiment of an embossed carton blank 400 according to the present solution is shown. The embossed carton blank 400 may have a similar structure as the embodiment shown in FIGS. 6A-6B and the prior art embodiments shown in FIGS. 4-5. When the carton blank 400 is folded, it may have a similar configuration as the prior art carton shown FIGS. 3A-3C. In certain embodiments, the embossed carton blank 400 can comprise front and back walls 404, 406, side walls 410, rectangular fin panels 432, 434, rectangular portions 440, 448, a plurality of crease lines 412, 414, 419, 421 436, 444, triangular back-folding panels 426, triangular folding panels 427, and triangular end panels 422. In some embodiments, the plurality of crease lines may include

vertical crease lines 436, a score 444, and diagonal crease lines 419, 421. This embodiment of the embossed carton blank 400 may have an embossed pattern 446 that can comprise three rows of ovals. In certain embodiments, each oval may have a height of approximately 2 mm and a width of approximately 45 mm. These dimensions allow for the lowermost portion of the ovals to be 1 mm from the score 444.

[0045] As shown in FIG. 7A, this embodiment of the embossed carton blank 400 can also include a fully compressed area 450 overlapping the vertical crease line 436. Although three rows of ovals are shown in FIGS. 7A-7B, there can be less or more than three rows embossed onto the carton. Additionally, the height and width of the ovals can be greater than or less than 2 mm and 45 mm, respectively. Also, the compressed area 450 can comprise different dimensions and/or different shapes than shown in FIG. 4A.

[0046] Although an x-shaped embossed pattern and an oval embossed pattern are shown, the embodiments described herein can comprise a variety of suitable shapes for sealing a carton. Moreover, the embodiments/examples disclosed herein may comprise differently shaped compression areas with different dimensions and a different number of rows.

Terminology

[0047] Any patents and applications and other references noted above, including any that may be listed in accompanying filing papers, are incorporated herein by reference. Aspects of the disclosure can be modified, if necessary, to employ the systems, functions, and concepts of the various references described herein to provide yet further implementations.

[0048] Features, materials, characteristics, or groups described in conjunction with a particular aspect, embodiment, or example are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith. All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features or steps are mutually exclusive. The protection is not restricted to the details of any foregoing embodiments. The protection extends to any novel one, or any novel combination, of the features disclosed in

this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0049] While certain embodiments have been described, these embodiments have been presented by way of example only and are not intended to limit the scope of protection. Indeed, the novel methods and systems described herein may be embodied in a variety of other forms. Furthermore, various omissions, substitutions and changes in the form of the methods and systems described herein may be made. Those skilled in the art will appreciate that in some embodiments, the actual steps taken in the processes illustrated or disclosed may differ from those shown in the figures. Depending on the embodiment, certain of the steps described above may be removed, others may be added. For example, the actual steps or order of steps taken in the disclosed processes may differ from those shown in the figure. Depending on the embodiment, certain of the steps described above may be removed, others may be added. Furthermore, the features and attributes of the specific embodiments disclosed above may be combined in different ways to form additional embodiments, all of which fall within the scope of the present disclosure.

[0050] Although the present disclosure includes certain embodiments, examples and applications, it will be understood by those skilled in the art that the present disclosure extends beyond the specifically disclosed embodiments to other alternative embodiments or uses and obvious modifications and equivalents thereof, including embodiments which do not provide all of the features and advantages set forth herein. Accordingly, the scope of the present disclosure is not intended to be limited by the described embodiments, and may be defined by claims as presented herein or as presented in the future.

[0051] Conditional language, such as “can,” “could,” “might,” or “may,” unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain embodiments include, while other embodiments do not include, certain features, elements, or steps. Thus, such conditional language is not generally intended to imply that features, elements, or steps are in any way required for one or more embodiments or that one or more embodiments necessarily include logic for deciding, with or without user input or prompting, whether these features, elements, or steps are included or are to be performed in any particular embodiment. The terms “comprising,” “including,”

“having,” and the like are synonymous and are used inclusively, in an open-ended fashion, and do not exclude additional elements, features, acts, operations, and so forth. Also, the term “or” is used in its inclusive sense (and not in its exclusive sense) so that when used, for example, to connect a list of elements, the term “or” means one, some, or all of the elements in the list. Likewise the term “and/or” in reference to a list of two or more items, covers all of the following interpretations of the word: any one of the items in the list, all of the items in the list, and any combination of the items in the list. Further, the term “each,” as used herein, in addition to having its ordinary meaning, can mean any subset of a set of elements to which the term “each” is applied. Additionally, the words “herein,” “above,” “below,” and words of similar import, when used in this application, refer to this application as a whole and not to any particular portions of this application.

[0052] Conjunctive language such as the phrase “at least one of X, Y, and Z,” unless specifically stated otherwise, is otherwise understood with the context as used in general to convey that an item, term, etc. may be either X, Y, or Z. Thus, such conjunctive language is not generally intended to imply that certain embodiments require the presence of at least one of X, at least one of Y, and at least one of Z.

[0053] Language of degree used herein, such as the terms “approximately,” “about,” “generally,” and “substantially” as used herein represent a value, amount, or characteristic close to the stated value, amount, or characteristic that still performs a desired function or achieves a desired result. For example, the terms “approximately”, “about”, “generally,” and “substantially” may refer to an amount that is within less than 10% of, within less than 5% of, within less than 1% of, within less than 0.1% of, and within less than 0.01% of the stated amount. As another example, in certain embodiments, the terms “generally parallel” and “substantially parallel” refer to a value, amount, or characteristic that departs from exactly parallel by less than or equal to 15 degrees, 10 degrees, 5 degrees, 3 degrees, 1 degree, or 0.1 degree.

WHAT IS CLAIMED IS:

1. A carton blank for a gable-top carton, the carton blank comprising:
a pre-laminated paperboard sheet;
a plurality of crease lines; and
an embossed pattern printed along a top portion of the carton blank, the top portion configured to become a sealing fin on a folded packaging container.
2. The carton blank of Claim 1, wherein the pre-laminated paperboard sheet further comprises a central layer comprising a paperboard material and an outer layer comprising a polyethylene material.
3. The carton blank of Claim 1, wherein the embossed pattern comprises a plurality of rows, each row comprising a plurality of x-shaped marks.
4. The carton blank of Claim 3, wherein the embossed pattern has two rows.
5. The carton blank of Claim 3, wherein each x-shaped mark in the plurality of x-shaped marks has a height of approximately 4 mm.
6. The carton blank of Claim 1, wherein the embossed pattern comprises a plurality of rows, each row comprising a plurality of ovals.
7. The carton blank of Claim 6, wherein each oval of the plurality of ovals has a height of approximately 2 mm and a width of approximately 45 mm.
8. The carton blank of Claim 1, further comprising a compressed spot positioned approximately in the center of the embossed pattern.
9. The carton blank of Claim 8, wherein the compressed spot comprises a triangular shape.
10. The carton blank of Claim 9, wherein the triangular shape has a height of approximately 7 mm, a first dimension of approximately 20 mm, and a second dimension of approximately 18 mm.
11. A packaging container for packaging liquid food, the packaging container comprising:
a pre-laminated paperboard material, the pre-laminated paperboard material comprising an outer layer comprising a polyethylene material;
a container body, the container body comprising a closed bottom end;

a top portion, the top portion extending from the container body opposite the closed bottom end and forming a roof-like configuration; and

a sealing fin, wherein the sealing fin comprises a front sealing portion on a front side and a back sealing portion on a back side of the sealing fin, wherein the front sealing portion comprises an embossed pattern and the back sealing portion comprises the polyethylene material.

12. The packaging container of Claim 11, further comprising a compressed spot positioned approximately in the center of the embossed pattern.

13. The packaging container of Claim 11, further comprising a central layer comprising a paperboard material.

14. The packaging container of Claim 11, wherein the embossed pattern has two rows, each row comprising a plurality of x-shaped marks.

15. The packaging container of Claim 11, wherein the embossed pattern has three rows, each row comprising a plurality of ovals.

16. The packaging container of Claim 11, further comprising a pouring spout, the pouring spout formed by opening the front side of the sealing fin along the embossed pattern while the back side of the sealing fin remains sealed.

17. A method for processing a gable-top carton, the method comprising:
printing a plurality of carton blanks on a pre-laminated paperboard sheet;
creasing each of the plurality of carton blanks such that each of the plurality of carton blanks comprise a plurality of crease lines;
printing an embossed pattern along a top portion of the plurality of creased carton blanks; and
cutting a single carton blank from the plurality of creased carton blanks.

18. The method of Claim 17, further comprising compressing a compressed spot positioned approximately in the center of the embossed pattern.

19. The method of Claim 18, wherein the compressed spot comprises a triangular shape.

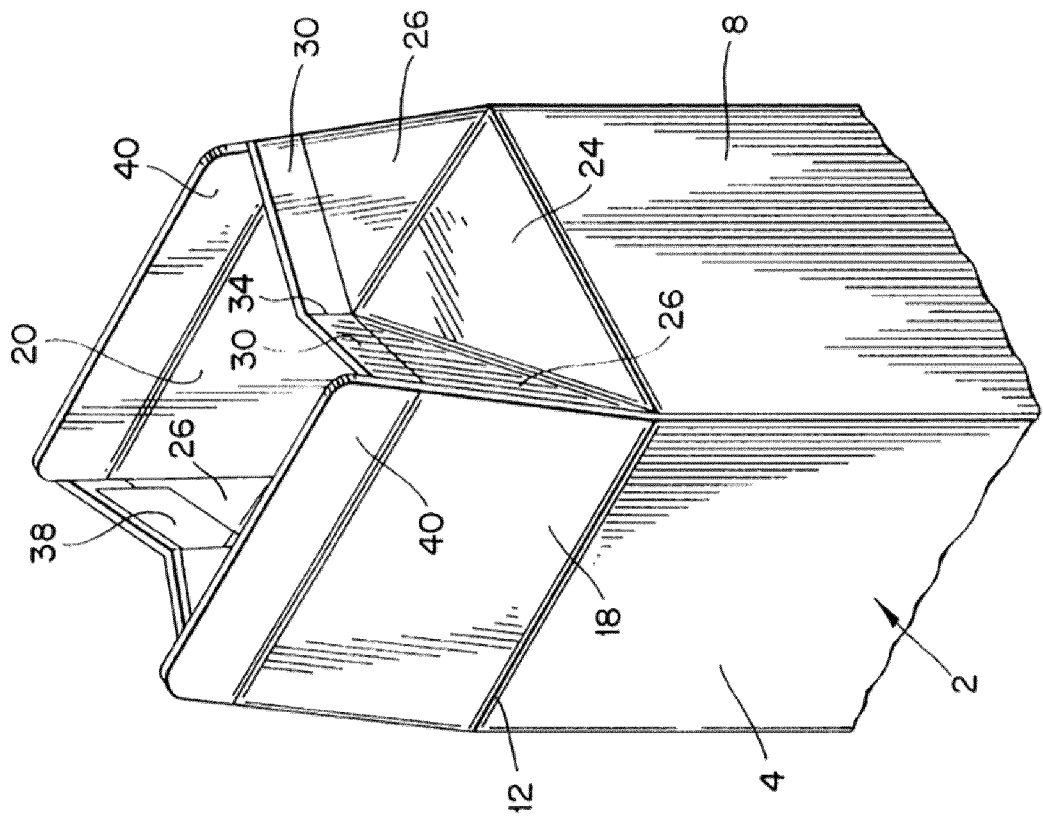


FIG. 1

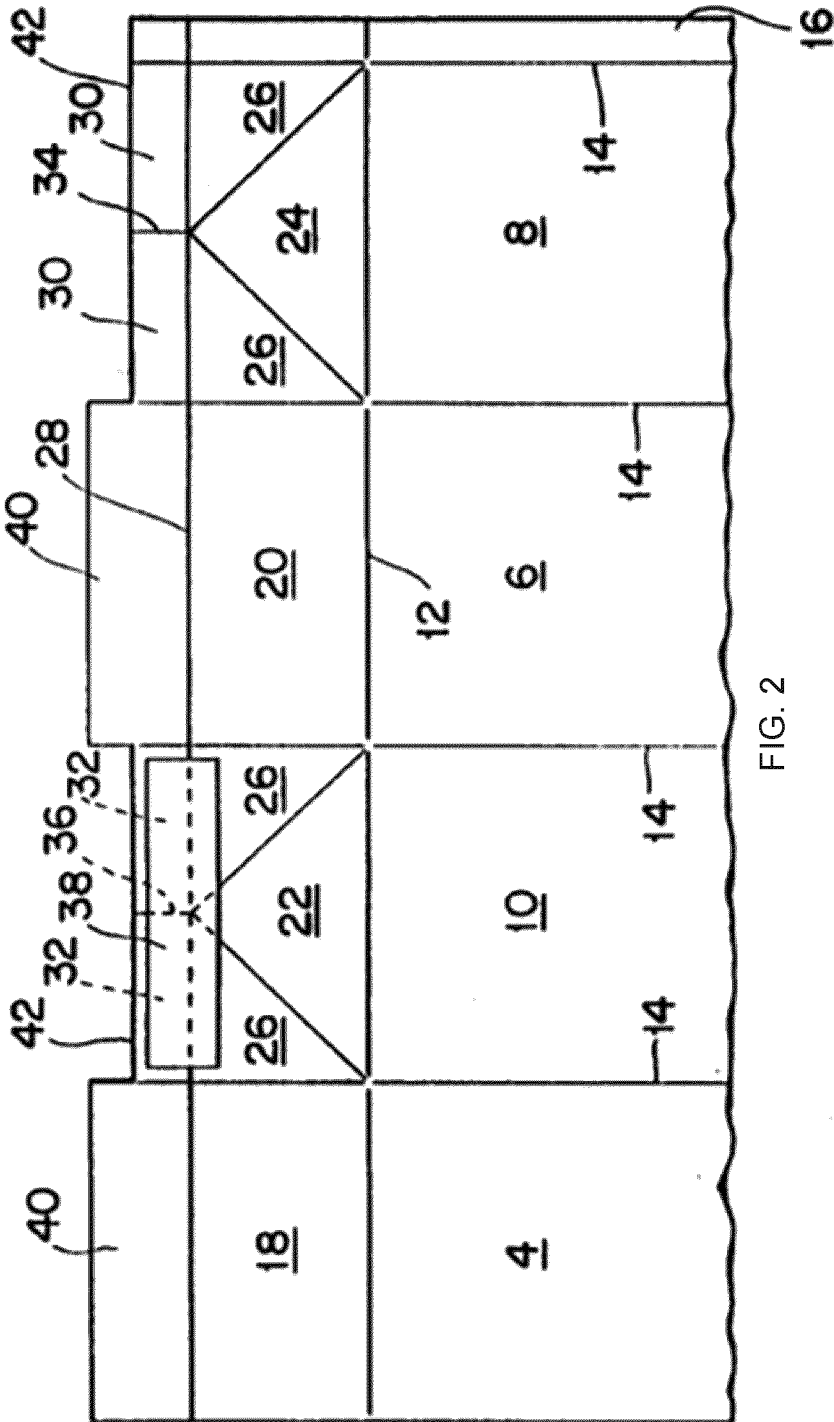


FIG. 2

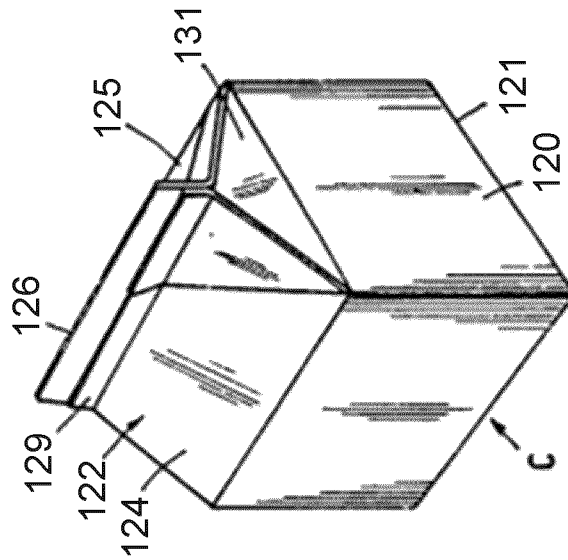


FIG. 3A

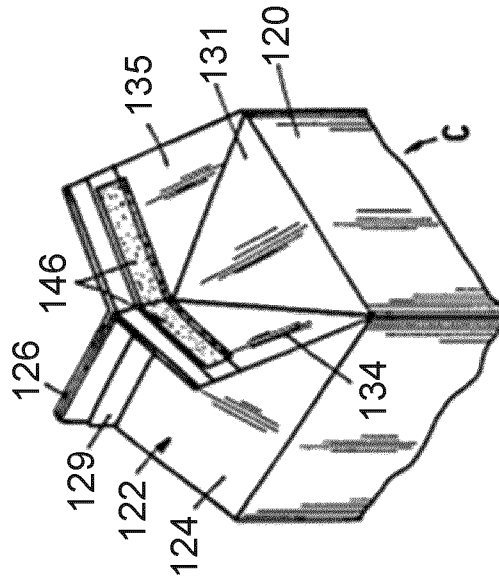


FIG. 3B

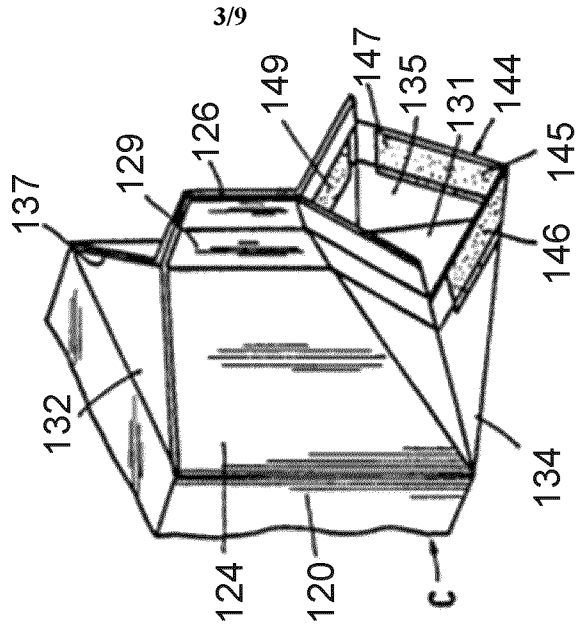


FIG. 3C

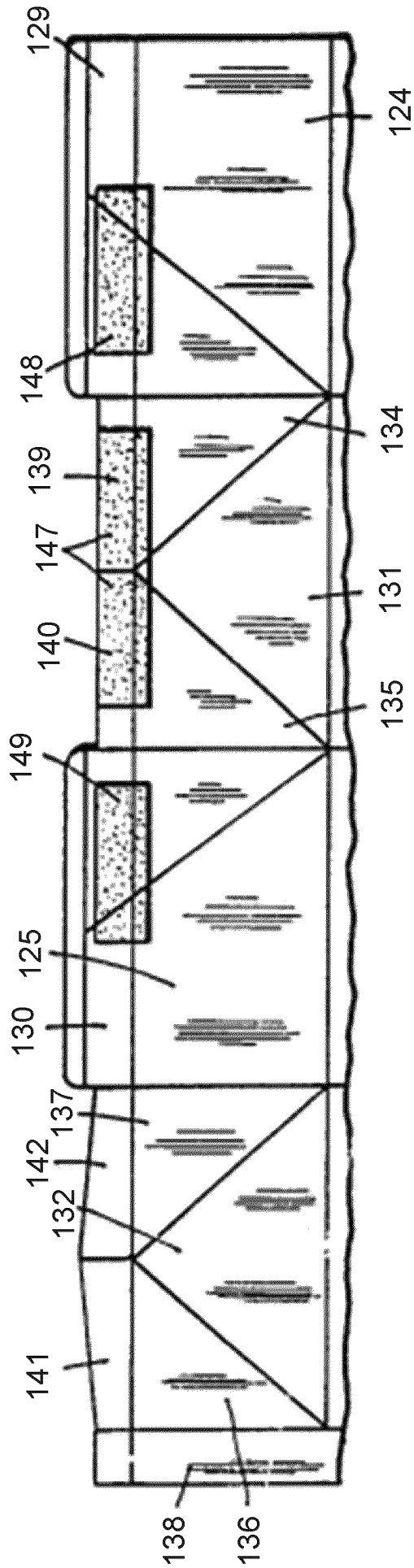


FIG. 4

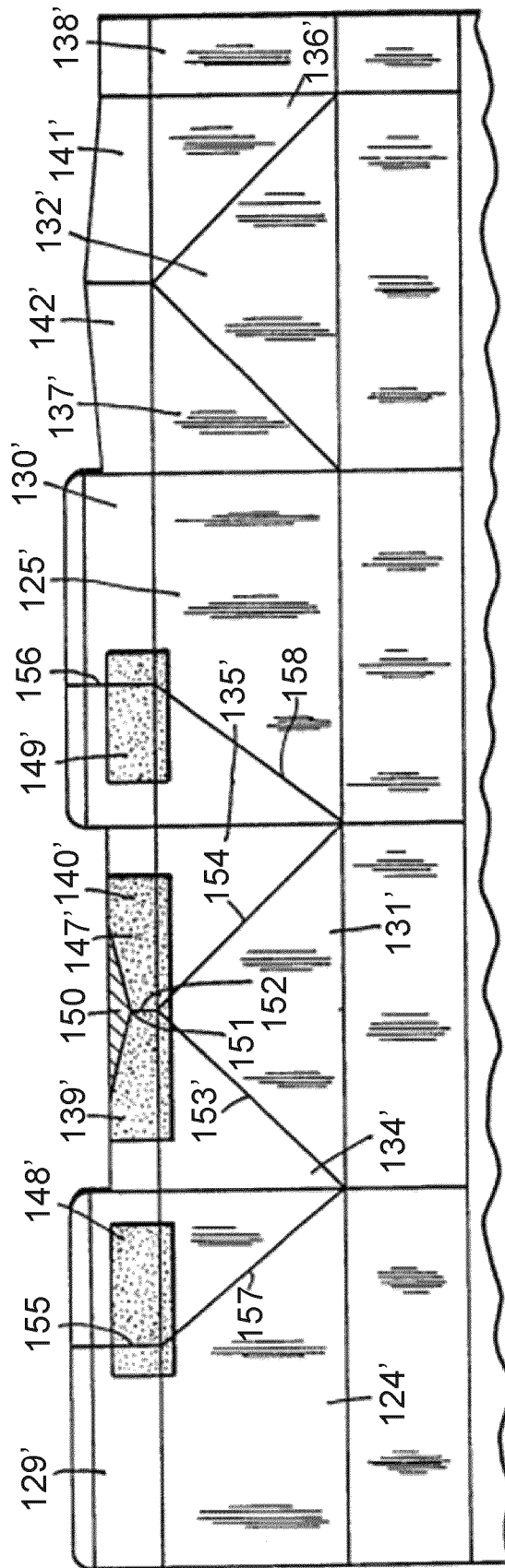


FIG. 5

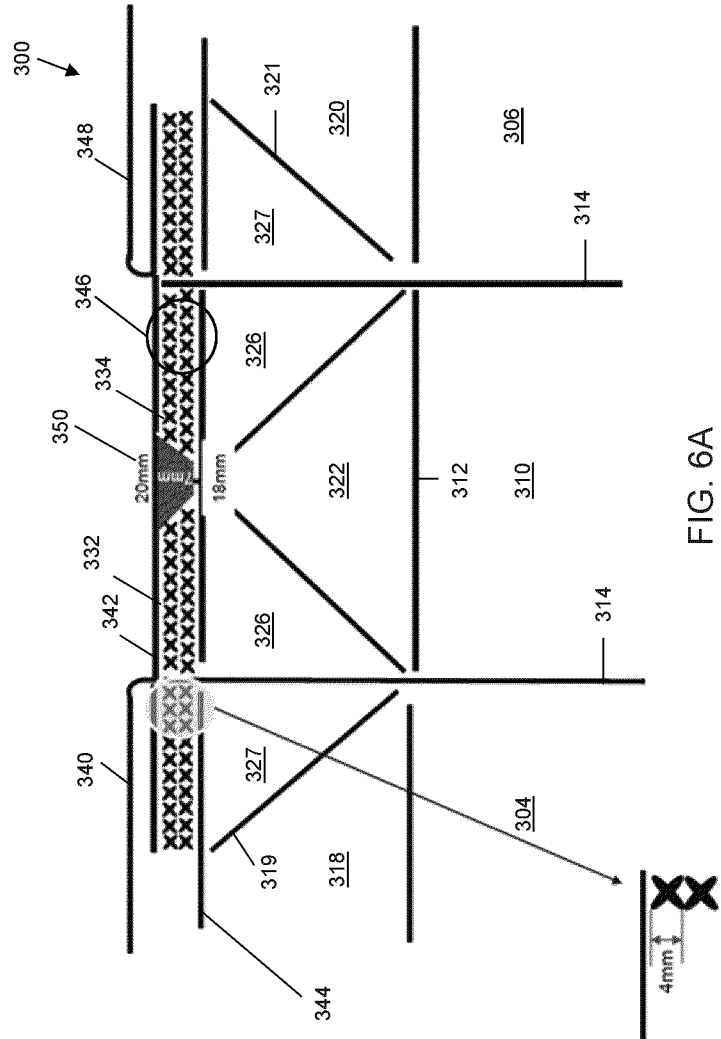


FIG. 6A

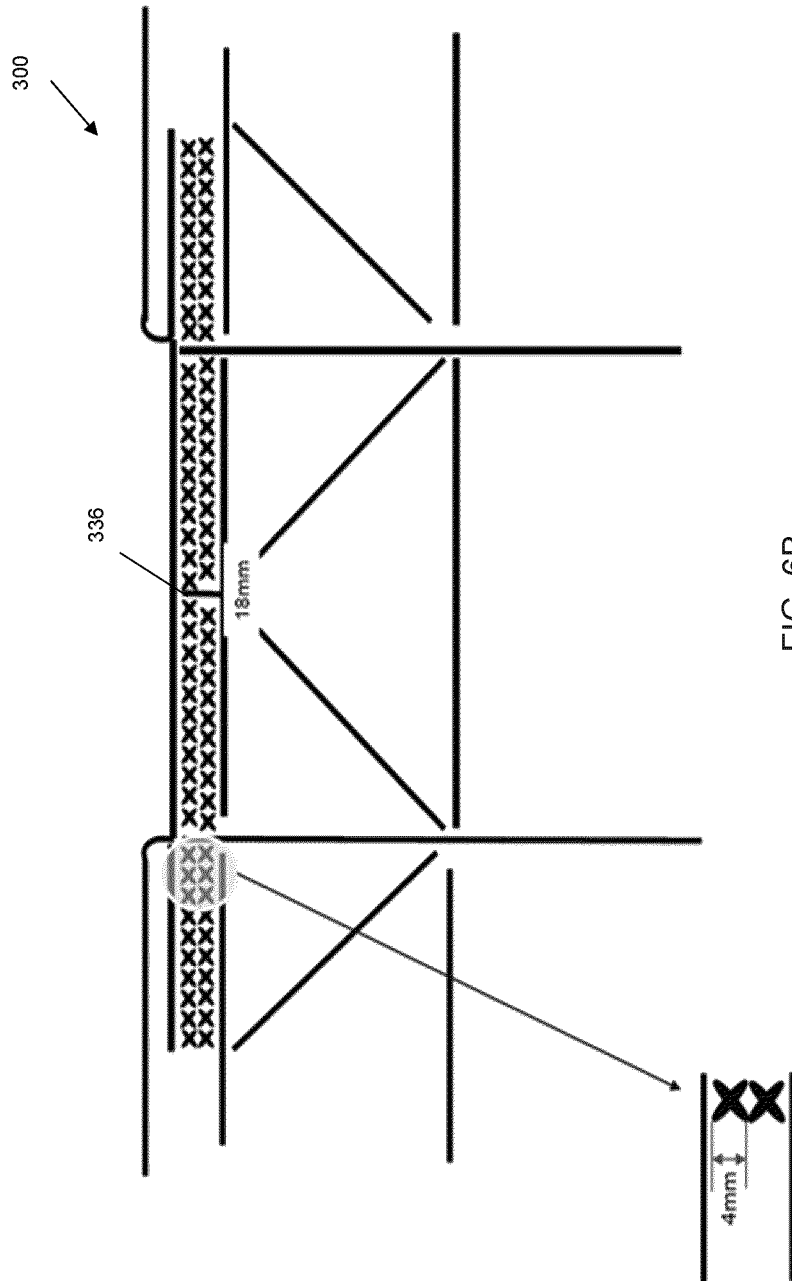


FIG. 6B

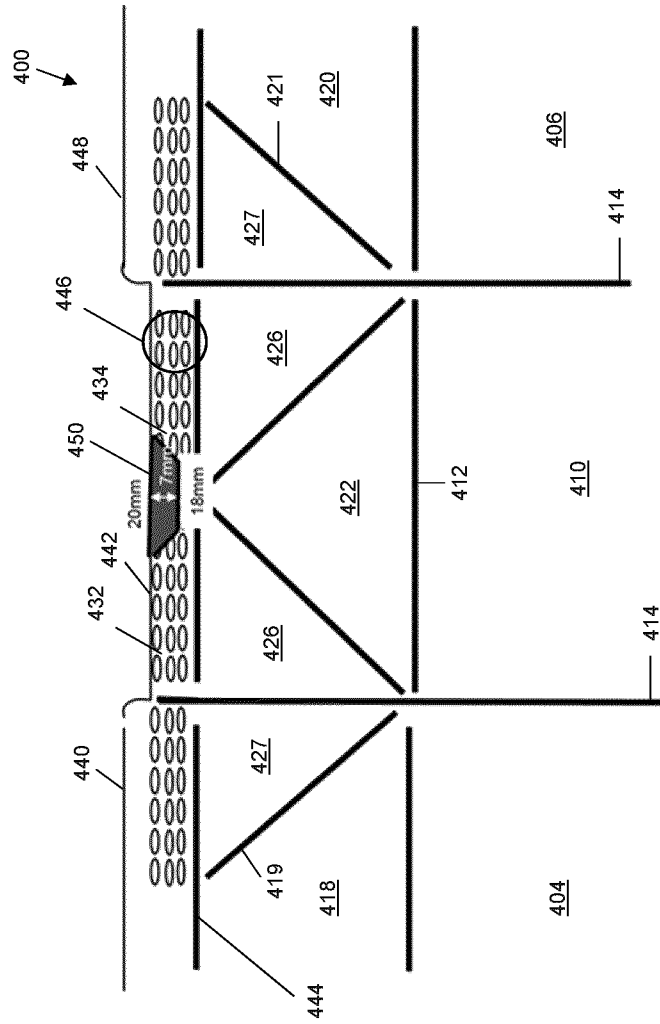


FIG. 7A

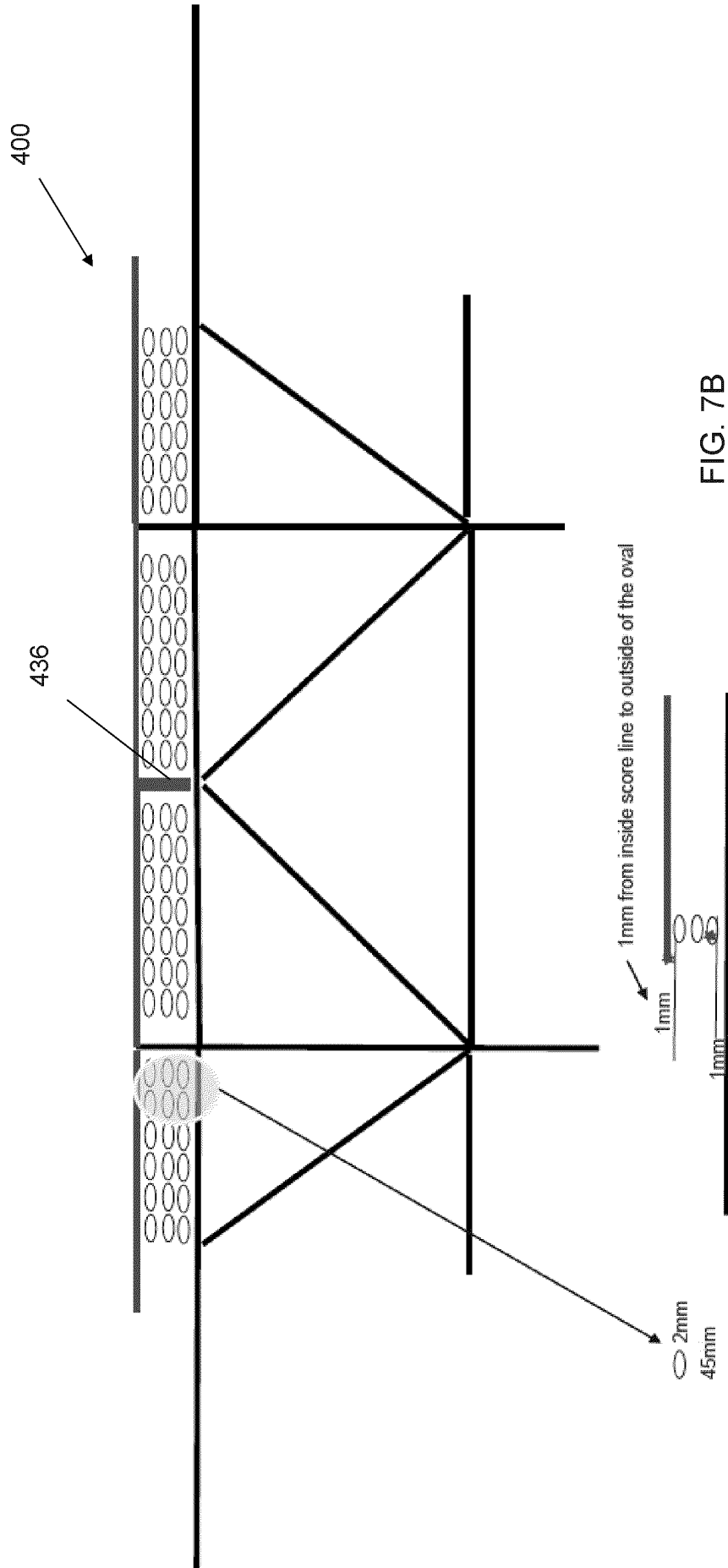


FIG. 7B

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2021/052310

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D5/06
ADD.

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

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
B65D

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 34 46 323 A1 (TETRA PAK INT [SE]) 26 June 1986 (1986-06-26) page 5, paragraph 3 - page 9, paragraph 5; figures 1-4,9	1-19
A	----- JP H08 324563 A (DAINIPPON PRINTING CO LTD) 10 December 1996 (1996-12-10) paragraph [0010]; figures 2a,2c,3a -----	1,8-12, 18,19

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

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- "E" earlier application or patent but published on or after the international filing date
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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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Date of the actual completion of the international search

31 March 2021

Date of mailing of the international search report

09/04/2021

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2021/052310

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