

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(10) International Publication Number

WO 2014/123748 A1

(43) International Publication Date  
14 August 2014 (14.08.2014)

(51) International Patent Classification:  
*B65D 75/28* (2006.01)    *B65D 75/30* (2006.01)

(21) International Application Number:  
PCT/US2014/013826

(22) International Filing Date:  
30 January 2014 (30.01.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
61/762,065    7 February 2013 (07.02.2013)    US

(71) Applicant: KRAFT FOODS GROUP BRANDS LLC  
[US/US]; Three Lakes Drive, Northfield, Illinois 60093  
(US).

(72) Inventor: TILAHUN, Muluken; 1705 Blue Ridge Trail,  
Waunakee, Wisconsin 53597 (US).

(74) Agents: KRATZ, Rudy et al.; Fitch, Even, Tabin & Flan-  
nery, 120 S. LaSalle Street, Suite 1600, Chicago, Illinois  
60603 (US).

(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,  
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,

DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,  
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,  
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,  
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,  
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,  
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,  
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,  
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,  
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,  
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,  
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,  
KM, ML, MR, NE, SN, TD, TG).

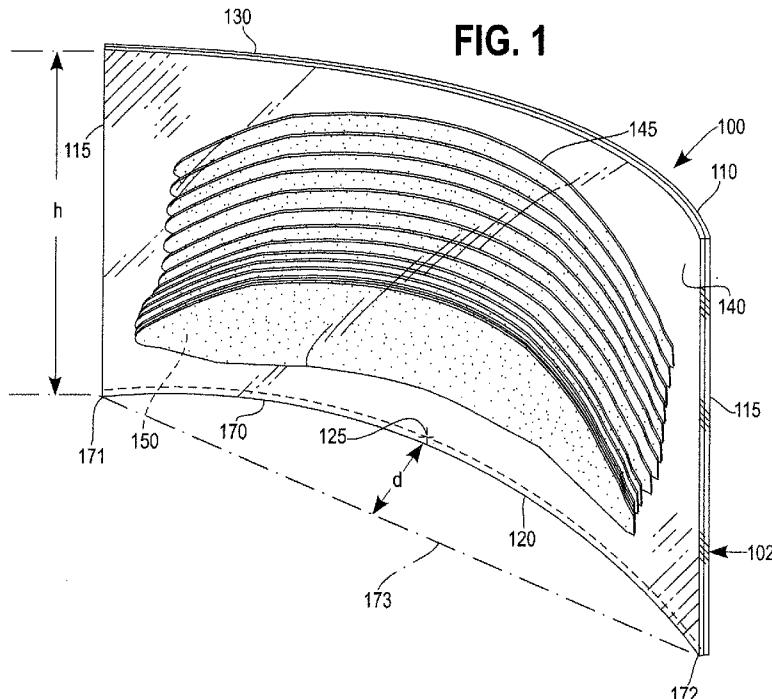
**Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

**Published:**

- with international search report (Art. 21(3))

(54) Title: PACKAGED FOOD PRODUCT



(57) **Abstract:** There is provided a packaged food product that provides improved visibility in a retail setting by having the capability to stably support itself in an upright position, i.e., to be self-standable. In some embodiments, the packaged food product comprises a lightweight, rigid first wall capable of being stably supported on edge on a horizontal surface, having a pair of generally vertical end edges at opposite ends thereof, and curved top and bottom edges extending therebetween; a second wall having a peripheral portion engaging the first wall, and at least one interior portion defining at least one product-containing region; and at least one quantity of food product disposed within the at least one product-containing region.

**PACKAGED FOOD PRODUCT****FIELD**

**[0001]** This invention relates generally to packaging and, in particular, to a packaged food product that is capable of standing in an upright position.

**BACKGROUND**

**[0002]** Meal kits and containers for retail packaging of grocery products such as meats and cheeses often comprise a clear plastic pouch or a combination of a rigid component and a transparent flexible film cover to provide a hermetically sealed enclosure. Such packaging is often vacuum sealed or gas flushed, and often includes additional components beyond the basic package structure for the purpose of facilitating display of the product to consumers in a retail setting. Such components may include, e.g., (1) a hang tab or other device to facilitate hanging the product on a peg display; or (2) a back card, outer carton, or other device that enables the product to be displayed with enhanced visibility. Some products are displayed at the point of sale with the assistance of trays or shelf-ready display shippers. While these options can be effective, they require additional material and can tend to increase the cost of the product, as well as its volume and weight. The increased volume and weight can add cost to shipping and handling, and can also be undesirable from the standpoint of a retailer with limited display space available and from the standpoint of the consumer with limited space for food storage in the home. Moreover, the additional material, as well as the increased weight, may be undesirable from an environmental standpoint.

**[0003]** A further disadvantage of outer cartons and other structures that cover or partially cover inner package

components is that they come between the consumer and the product in the retail setting. That is, although they may enhance the product's appearance in some ways, they may restrict the consumer's ability to view the product, and may detract from the consumer's tactile experience, e.g. by making it difficult or impossible for the consumer to feel the product through the flexible inner packaging material.

#### SUMMARY

**[0004]** There is provided a packaged food product that provides improved visibility in a retail setting by having the capability to stably support itself in an upright position, i.e., to be self-standable. In some embodiments, the packaged food product comprises a lightweight, rigid first wall capable of being stably supported on edge on a horizontal surface, having a pair of generally vertical end edges at opposite ends thereof, and nonlinear top and bottom edges extending therebetween; a second wall having a peripheral portion engaging the first wall, and at least one interior portion defining at least one product-containing region; and at least one quantity of food product disposed within the at least one product-containing region.

**[0005]** The packaged food product may have a concave first surface and a complementary convex second surface configured so that the product is nestable with other like products. The concave and convex surfaces may be front and back surfaces, with either of the front or back being convex, and the other being concave. This may enable the packaged food product to be nestable and/or stackable with other like packaged food products.

**[0006]** The packaged food product may have a bow formed therein so that it is bowed between the end edges so that the bottom edge is nonlinear and has a stabilizing point between

the end edges, and a depth defined by a distance between (1) a first line extending between the ends of the bottom edge, and (2) the stabilizing point. The bow may comprise, for example, a smooth, continuous curve having a constant radius; a curve of varying radius; or a segmented shape, comprising a series of flat portions that are angled relative to one another. In one particular embodiment, six flat surfaces are connected to form the bow. In other embodiments, other numbers of flat surfaces may be employed.

**[0007]** The packaged food product may have a center of mass disposed rearward of the first line and forward of the stabilizing point of the bottom edge such that, when the packaged food product is standing on edge on a horizontal surface, a second line extending from the first line to the center of mass in a plane perpendicular to the first line forms an angle  $\alpha$  to the horizontal, and a third line extending from the stabilizing point to the center of mass in a plane perpendicular to the first line forms an angle  $\beta$  with the horizontal, and each of  $\alpha$  and  $\beta$  is less than 90°.

**[0008]** The bottom edge may extend through an arc such that a pair of lines tangent to the arc at its ends intersect at an angle  $\theta$  of about 40° to about 100°. The packaged food product may have a height of about 4 in. to about 7 in., a depth of about 0.6 in. to about 2.3 in. and a width of about 6 in. to about 12 in. The width may be greater than both the height and the depth. The packaged food product may have a width-to-depth ratio of between about 2:1 and about 20:1, and may have a height-to-depth ratio of between about 4:2.3 and about 7:0.6.

**[0009]** The packaged food product thus has a configuration that enables it to be stably supported on a horizontal surface on a nonlinear thin edge that would not be wide enough to

stably support the product in a linear configuration. Thus, the packaged food product can be displayed on a supermarket shelf without leaning against other products or against a wall or other structure. Preferably, the configuration of the packaged food product enables it to remain stable in an upright position even when subjected to external forces such as minor jostling due to customers removing other products from a shelf, and the like.

**[0010]** The packaged food product may comprise slices or strips of a food product such as meat or cheese; diced meat or cheese; snack foods; or other food products. In some embodiments, the food product may be a shingled sliced deli meat product. The packaged food product may have a single interior region, or may have two or more separate sealed interior regions arranged so that one of the interior regions may be opened while one or more other regions remain sealed. The front wall and/or the back wall may be at least partially transparent.

**[0011]** The first wall may comprise a lightweight, rigid board. The second wall may comprise a flexible film that conforms to the shape of the food product, and that permits a consumer to palpate the product and obtain tactile feedback as to, e.g., the hardness or softness of the product. The food product may be hermetically vacuum sealed in the package. The rigid first wall may be constructed from polyester (such as amorphous polyethylene terephthalate or APET), polypropylene (PP), polystyrene (such as HIPS), polyvinyl chloride (PVC), styrene-butadiene-styrene copolymer (SBS copolymer) coextruded with barrier and sealant layers, and/or other materials. The second flexible film wall may be constructed from coextruded polyethylene based films with oxygen and moisture barrier layers, and additional adhesive, sealant, ink, easy peel, or

anti-fogging layers, and/or other suitable materials. In some embodiments, the package may have a thickness of about 0.1 in. to about 1 in., and preferably from about 0.3 in. to about 0.6 in.

**[0012]** The packaged food product may be joined to one or more similar packaged food products along its end edges. The similar joined packaged food products in some embodiments are oriented in the same way. In other embodiments, they alternate such that every other package is reversed, front to back, such that two joined packages together have a generally S-shaped configuration as viewed in plan, which may contribute greater stability when the packages are standing on edge. This arrangement also may have an additional advantage relating to the consumer's visual perception of the product. The packages may have different graphics or information printed on their front and back surfaces respectively. Also, the front and back may offer somewhat different views of the food product within the packaging, due opaque portions of the front and/or back wall partially obscuring the consumer's view. The embodiments wherein alternate packages are reversed provides the advantage of enabling consumers to view a back panel and a front panel simultaneously in a retail display setting.

**[0013]** In some embodiments, the packaged food product may include top and/or bottom walls to facilitate stacking with other like packaged food products. Where both top and bottom walls are provided, the bottom wall of one packaged food product may be placed on the top wall of another. Where the packaged food product includes only a top wall or a bottom wall but not both, a top or bottom edge of each package may engage a top or bottom wall of an adjacent package above or below it.

**[0014]** In some embodiments, the packaged food product may have a back wall that is made of a thin, flexible material and is substantially vertical from top to bottom, and a front wall made of a rigid material, with the front wall having substantially vertical top and bottom portions, and one or more cavities formed therebetween to define the product-containing regions.

**[0015]** In other embodiments, the front wall may be made of a thin, flexible material and may be substantially vertical from top to bottom, and the back wall may be made of a rigid material, with the back wall having substantially vertical top and bottom portions, and one or more rigid cavities formed therebetween. In these embodiments, the one or more rigid cavities may function both as product-containing regions and as one or more alternative supports for the package. To function as alternative supports, the one or more rigid cavities may define a back surface that is capable of supporting the packaged food product in an alternative orientation. In the alternative orientation, rather than being supported on an edge of a rigid front or back wall, the packaged food product may be placed on its back, supported on the back(s) of the one or more rigid cavities. The one or more rigid cavities may have generally coplanar planar back surfaces to provide stable support in this orientation.

**[0016]** In some embodiments, methods of providing the above-described packaged food products may comprise forming a lightweight, rigid wall; placing a food product on the rigid wall so that the food product generally conforms to the bowed shape of the rigid wall; placing a first flexible film over the food product and over the rigid wall; and vacuum sealing the food product between the rigid wall and the flexible film so that the flexible film conforms to the shape of the food

product and rigid wall to form a packaged food product which has a bowed configuration.

**[0017]** In some embodiments, forming the nonplanar lightweight, rigid wall may comprise thermoforming or mechanically forming a roll stock rigid material into a generally planar configuration, wherein the rigid wall and the packaged food product are provided with a bowed shape after vacuum sealing the food product between the rigid wall and the flexible film.

**[0018]** Vacuum sealing the food product may comprise sealing the flexible film to the wall along two or more dimensions of the wall, then drawing a vacuum, then making a final seal between the flexible film and the wall.

**[0019]** In some embodiments, the rigid wall may be curved or bowed early in the process, and vacuum sealing the food product between the rigid wall and the flexible film may comprise use of sealing heads that are curved similarly to the rigid wall so that the rigid wall remains bowed during sealing. In other embodiments, vacuum sealing the food product between the rigid wall and the flexible film comprises temporarily straightening the packaged food product.

**[0020]** The method may further comprise placing a second flexible film on the opposite side of the rigid wall from the first flexible film. Vacuum sealing the food product between the rigid wall and the flexible film may comprise partially sealing the first flexible film to the second flexible film, then drawing a vacuum to remove air from around the food product, then finishing the seal between the first flexible film and the second flexible film. The method may further comprise trimming the edges of the first and second flexible films after finishing the seal, which may involve use of straight cutting edges and temporarily straightening the

packaged food product, or may involve using curved cutting implements without straightening the packaged food product.

**[0021]** The method may further comprise providing means to facilitate initial opening of the package and/or reclosing of the package, such as a peelable seal, a resealable peelable seal, a zipper, or other features.

**[0022]** In some embodiments, to facilitate display of brand information, product information, attractive graphics, or other content, pre-printed flexible film is provided on at least one side of the packaged food product, or pressure-sensitive labels may be applied on at least one side of the packaged food product.

**[0023]** The above-described method is preferably a high-speed commercial packaging operation in a food plant, suitable for mass production of packaged food products in a refrigerated environment. In some embodiments, a plurality of the packaged food products may be nested together for transport to distribution locations and retail stores, where they may be displayed standing upright on a bowed edge of the nonplanar lightweight, rigid wall on a horizontal surface in a retail display without external support. The packaged food products may remain nested in the retail display, or may be de-nested for display purposes.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0024]** FIG. 1 is a perspective view of a packaged food product in accordance with a first embodiment;

**[0025]** FIG. 2 is a plan view thereof;

**[0026]** FIG. 3 is a perspective view of a packaged food product in accordance with a second embodiment;

[0027] FIG. 4 is a plan view of a third embodiment;

[0028] FIG. 5 is a front elevation of the packaged food product of FIG. 1;

[0029] FIG. 6 is a rear elevation thereof;

[0030] FIG. 7 is a left side elevation thereof;

[0031] FIG. 8 is a right side elevation thereof;

[0032] FIG. 9 is a schematic right side elevation thereof;

[0033] FIG. 10 is a plan view of a fourth embodiment;

[0034] FIG. 11 is a plan view of a fifth embodiment;

[0035] FIG. 12 is a plan view of a sixth embodiment;

[0036] FIG. 13 is a perspective view of a seventh embodiment;

[0037] FIG. 14 is a perspective view of an eighth embodiment;

[0038] FIG. 15 is a perspective view of a ninth embodiment;

[0039] FIG. 16 is a perspective view of a tenth embodiment;

[0040] FIG. 17 is a flow chart illustrating a method of making a packaged food product.

[0041] FIG. 18 is a flow chart illustrating a method of making, shipping and displaying packaged food products.

[0042] FIG. 19 is a top plan view of an eleventh embodiment.

[0043] Elements in the figures are illustrated for clarity and have not necessarily been drawn to scale. Certain actions and/or steps may be described or depicted in a particular order of occurrence while specificity with respect to sequence is not actually required.

## DETAILED DESCRIPTION

**[0044]** FIG. 1 illustrates a packaged food product 100 that includes a package 102 comprising a lightweight, rigid first wall or back wall 110 capable of stably supporting the package on edge on a horizontal surface. The packaged food product 100 has a pair of generally vertical end edges 115 and a curved bottom edge 120 and top edge 130 extending therebetween. A second wall or front wall 140 has a peripheral portion that engages the back wall 110, and at least one central portion spaced from the back wall to define at least one interior product-containing region 145. A quantity of food product 150 is disposed within the product-containing region 145.

**[0045]** The packaged food product 100 has a width  $w$  defined by the distance between the end edges 115, and a height  $h$  defined by the lengths of the end edges 115. In some embodiments, the food package 100 may have a height of about 4 inches to 7 inches and a width of about 6 inches to about 12 inches. In some embodiments, the food package 100 may have a depth of about 0.6 inches to about 2.3 inches. These dimensions are provided only for purposes of example, and the actual dimensions of the package 100 may be different than those described.

**[0046]** The packaged food product may be described with reference to a front, back, top and bottom for convenience in explaining the relationship of various surfaces and dimensions relative to one another. However, the use of terms such as "top," "bottom," "front," "back," "backwards," etc. is not intended to be limiting with regard to display. That is, the packaged food product may be displayed in various orientations with a front, back, top, end, or other surface facing the

front of a shelf, and any surface(s) may have graphics thereon or otherwise be designed for display to the consumer.

**[0047]** In some embodiments, the front surface of the packaged food product may be concave, and the complementary back surface may be convex. In some other embodiments, the front surface may be convex and the back surface may be concave. Either configuration may allow the product 100 to be nestable with other like products, such that a large number of products 100, e.g., 10, 20, 40 or more products, may be nested in a shipper or in a display with the front surface of each product contacting the back surface of an adjacent product, to reduce the overall footprint and volume of packages being shipped or displayed.

**[0048]** As shown in Fig. 1, the product 100 may have a bow 170 formed therein so that it is bowed backward between the end edges 115. In this configuration, the product 100 has a depth "d" defined by a distance between a line 173 extending between the endpoints 171, 172 of the bottom edge 120 and the most distant point on the bottom edge from the line, i.e., rearmost point 125, which may be referred to as a stabilizing point.

**[0049]** In some examples, the bow 170 may comprise a smooth, continuous curve having a constant radius as seen in Figs. 1 and 2, a curve of varying radius, a segmented shape comprising a series of flat portions that are angled relative to one another as seen in Fig. 4, or a combination of a series of flat and curved portions that are angled relative to one another. In one particular embodiment shown in Fig. 4, six flat surfaces 128 are connected to form the bow 170. In other embodiments, fewer or greater numbers of flat surfaces 128 may be used.

**[0050]** Referring to Figs. 1, 2, and 9, the food package 100 may have a center of mass 160 disposed rearward of the line 173 extending between the bottom corners 171, 172 and forward of the stabilizing point 125 such that, when the food package 100 is standing on edge on a horizontal surface, a second line 174 extending from line 173 to the center of mass 160 in a plane perpendicular to the first line 173 forms an angle  $\alpha$  to the horizontal, and a third line 176 extending from the stabilizing point 125 to the center of mass 160 in a plane perpendicular to the first line forms an angle  $\beta$  with the horizontal, and each of  $\alpha$  and  $\beta$  is less than  $90^\circ$ . As shown in Fig. 1 and Fig. 2, the bottom edge 120 may extend through an arc such that a pair of lines tangent to the arc at its ends intersect at an angle  $\theta$  of about  $40^\circ$  to about  $100^\circ$ .

**[0051]** In some embodiments, the package 100 may have a width dimension that is greater than both the height and the depth dimensions. For example, in some embodiments, the packaged food product may have a width-to-depth ratio of between about 2:1 and about 20:1, and may have a height-to-depth ratio of between about 4:2.3 and about 7:0.6.

**[0052]** The packaged food product 100 may comprise slices or strips of a food product 150 such as meat or cheese; diced meat or cheese; snack foods; or other food products. In some embodiments, and as seen in Figs. 1-8 and 12, the food product 150 may be a shingled sliced deli meat product. The food package 100 may have a single product-containing region 145, or as shown in Fig. 3, may have two or more separate sealed product-containing regions 145 arranged so that one of the interior regions may be opened or separated from the package 100 while one or more additional product-containing regions 145 remain sealed. In some embodiments, the food package 100 has a line of weakness 146 such as a laser score or a

perforation between the product-containing regions 145 to facilitate separating them.

**[0053]** The front wall 140 and/or the back wall 110 may be at least partially transparent, and may contain graphics suitable for presentation in a display setting. In some embodiments, one of the front and back wall may be transparent, while the other may present relevant information that may be easily viewed by a consumer in a retail setting. In such configurations, either the front wall 140 or back wall 110 may be displayed to the consumer.

**[0054]** The first wall 110 may comprise a lightweight, rigid material such as a board or the like formed as a portion of a cylinder. The front wall 140 may comprise a flexible film that conforms to the shape of the food product 150 thus permitting a consumer to palpate the product and obtain tactile feedback as to, e.g., the hardness, softness or flexibility of the product. In some embodiments, the embodiment of Fig. 1, the package may have a total thickness "t" of about 0.1 in. to about 1 in., and preferably from about 0.3 in. to about 0.6 in, with the front wall 140 having a thickness of no more than about 12 mil, and the back wall 110 having a thickness of about 12 to 40 mil, preferably about 24-30 mil.

**[0055]** As shown in Figs. 10 and 11, in some embodiments two or more packaged food products similar to those described above may be joined together. In some embodiments, two products 180 and 182 are oriented such that the convex portion of a first package is located on the same side as the convex portion of the second package, as shown in Fig. 10. In other embodiments, an example of which is shown in Fig. 11, products 184 and 186 alternate such that every other package is reversed, front to back. In this arrangement, two joined

packages together have a generally S-shaped configuration as viewed in plan, which may contribute greater stability when the packages are standing on edge. Here, the convex portion of a first package is located on the opposite side of the convex portion of the connected package. In such a configuration, a shared connecting portion 188 may allow the packages to be separable from one another.

**[0056]** This arrangement also may provide an additional advantage relating to the consumer's visual perception of the product. The packages may have different graphics or information printed on their front and back surfaces respectively. Also, the front 190 and back 192 may offer somewhat different views of the food product within the packaging, due to opaque portions of the front and/or back wall partially obscuring the consumer's view. The embodiments wherein alternate packages are reversed provides the advantage of enabling consumers to view a back panel 192 and a front panel 190 simultaneously in a retail display setting. For example, the front panel may provide a consumer with the name and a direct view of the product, while the back panel may provide the consumer with nutritional or other types of information. Thus, in some embodiments, it would not be necessary for the consumer to physically move the package to obtain necessary information about the product, which may reduce the amount of handling a package incurs during display and reduce the need for retailers to reorganize their products.

**[0057]** In some embodiments, as shown in Figs. 13-16, the packaged food product 10 may comprise a plurality of rigid compartments 145 joined to a rigid back wall 110 that is generally similar to that described above with regard to the first embodiment. The rigid compartments may be thermoformed,

vacuum formed, injection molded, blow molded, or otherwise formed into configurations for holding food items. As shown in Figs. 13 and 14, the compartments may be arranged in multiple-compartment upper and lower arrays 194 and 196, with each array comprising a plurality of compartments 145 aligned in a horizontal row or arranged otherwise. As shown, each array may include a flange 198 that is joined to the rigid wall 110.

**[0058]** In some embodiments, the product 100 may also include bottom 127 and/or top 137 walls to facilitate stacking with other like packaged food products. Where both top and bottom walls 137, 127 are provided, as shown in Fig. 14, the bottom wall 127 of one food package 100 may be placed on the top wall 137 of another, allowing numerous packages to be displayed in a retail environment. Where the food package 100 includes only a top wall 137 or a bottom wall 127 but not both, a top or bottom edge 130, 120 of each package may engage a top or bottom wall 137, 127 of an adjacent package 100 above or below it.

**[0059]** In some embodiments, e.g., the embodiment of Fig. 15, the curved front wall 140 may be made of a thin, flexible material and the back wall 110 may be made of a rigid material, with the back wall having a peripheral flange 226 (Fig. 15), and one or more rigid cavities 145 formed therebetween. The product may be displayed with the curved front wall 140 and the flange 226 of the back wall oriented vertically, or alternatively may be displayed as shown in Fig. 15, with the one or more rigid cavities functioning both as one or more product-containing regions and as one or more alternative supports for the package. The one or more rigid cavities 145 include one or more surface 147 that individually or collectively can support the food package 100 in the

orientation shown in Fig. 15 on a horizontal surface 234. This orientation, rather than being supported for retail display on an edge of a front and/or back wall, the packaged food product may be placed on its front or back side and be supported by the front or back side of the rigid cavity or cavities. Where more than one cavity 145 is provided, the cavities may have generally coplanar back surfaces 147. In some embodiments, the end edges of the curved front and/or back wall may be coplanar with the back surfaces and thus may also provide additional support and stability to the package in this alternative orientation.

**[0060]** The front wall 140 and back wall 110 may be made of any suitable materials. For example, such materials may include various polymers and multilayer laminates or coextruded polyethylene based films and may include one or more moisture barrier layers, oxygen barrier layers, adhesive layers, anti-fogging layers, and/or other adhesive, ink, or easy peel layers. The back wall 110 may be a rigid, thermoformed structure, or may be formed by injection molding, blow molding, or other methods. The back wall 110 may be constructed from polyester (such as amorphous polyethylene terephthalate or APET), polypropylene (PP), polystyrene (such as HIPS), polyvinyl chloride (PVC), or styrene-butadiene-styrene copolymer (SBS copolymer) coextruded with barrier and sealant layers and/or other suitable materials. To open the package of Fig. 15, the thin flexible front wall 140 may be peeled away from the flange 226. The package may be resealable, with a resealable peelable adhesive employed to seal the front wall 140 to the back wall.

**[0061]** In other embodiments, as shown for purposes of example in Fig. 16, the food package 100 may have a back wall 110 that is made of a thin, flexible material and is

substantially vertical from top to bottom, and a front wall 140 made of a rigid material, with the front wall 140 having a peripheral flange 226 comprising substantially vertical top 228, bottom 230 and side 232 portions surrounding one or more cavities that provide product-containing regions 145. These product-containing regions may be identical in shape and size, or may vary. Any number of product-containing regions 145 may be utilized in the food package 100.

**[0062]** In some embodiments, the front 140 and back 110 walls of the food package 100 are affixed to each other by traditional hot melt or glue applications. The product containing region 145 may be gas flushed. The food product 150 may be hermetically vacuum sealed and subsequently placed within the product-containing region of food package 100, followed by the front and back walls being affixed to one another.

In some embodiments, the package may include colors, graphics, text, designs and/or other content over its entire surface, or over certain portions. For example, this content may include brand information, opening instructions, ingredients, nutritional information and other information. The content may be embossed and/or pre-printed onto the package or onto a label affixed to the package.

**[0063]** In some retail settings, horizontal shelf space may be limited, thus potentially reducing the number of food packages 100 that can be placed on their bottom edges for display. To provide an alternative way of supporting the packaged food product in a retail display, one or more holes 212 may be provided near one or more edges of the package to facilitate hanging on a peg, as shown in Figs. 3 and 13. The product may be nestable with other similar products on a peg

display, thus reducing the overall amount of space required for display at retail.

**[0064]** Fig. 19 illustrates a reclosable packaged food product comprising a rigid, curved wall 110 for supporting the packaged food product in an upright position, and at least one product-containing region or compartment 145. Each compartment 145 is defined by a plurality of rigid walls 200, each having a base at curved wall 110 and a flange 202 along its distal edge, and a lid 204 sealed to the flanges by a resealable peel seal, a snap fit, or other reclosable arrangement. In addition to being capable of display in an upright position with the curved wall 110 in a vertical orientation, the package may alternatively be displayed in stable configuration in which its lid 204 serves as a bottom wall, resting on a horizontal shelf. To this end, the lid may have a generally planar major surface 206, or at least may have a generally planar peripheral surface 208 for contacting a supporting shelf. The lid may have a flange 210 extending at an angle to its major surface 206, e.g., at an angle of about 90° thereto, extending toward the curved wall to help position and seal the lid on the walls 200.

**[0065]** Each compartment 145 may be generally rectangular, with the illustrated walls 200 being vertical when the packaged food product is standing upright as shown, and with horizontal top and bottom walls (not shown) each having a base at curved wall 110 and a flanged distal edge joining the lid. Each of the flanges on the walls may be L-shaped, with a first portion 216 extending outward and perpendicular to a major portion 214 of the wall, and a second, smaller portion 218 extending back toward the curved wall.

#### Methods

**[0066]** An example of a method of providing the above-described product 100 is shown in Fig. 17. First, at step 1710, the lightweight, rigid wall is formed. Food product is then placed 1720 on the rigid wall. A first flexible film is then placed 1730 over the food product and over the rigid wall, and the food product is then vacuum sealed 1740 between the rigid wall and the flexible film so that the flexible film conforms to the shape of the food product and rigid wall. A bow is formed 1750 in the food package so that when standing on edge, the package is bowed backwards between the end edges such that the bottom edge has a stabilizing point 125 generally between the end edges but forward or rearward thereof.

**[0067]** In another embodiment, the lightweight, rigid wall is provided with a bowed configuration prior to the step of placing the food product on the rigid wall 1720, and thus prior to the step of vacuum sealing 1730 the flexible film to the rigid wall. The food product may be placed on either the convex or concave surface of the rigid wall.

**[0068]** In some embodiments, the step of forming the lightweight, rigid wall 1710 may comprise thermoforming, mechanically forming, injection molding, or blow molding a rigid roll stock material into a generally planar configuration, then providing it with a bowed shape after vacuum sealing the food product between the rigid wall and the flexible film.

**[0069]** Vacuum sealing the food product 1740 may comprise sealing the flexible film to the rigid wall along two or more dimensions of the wall, then drawing a vacuum, then making a final seal between the flexible film and the wall. In some embodiments, the flexible film comprises a vacuum skin packaging (VSP) film.

**[0070]** In some embodiments and as previously described, the rigid wall may be curved or bowed early in the process of providing the food package 1700, and vacuum sealing the food product 1740 between the rigid wall and the flexible film may involve the use of sealing heads that are curved similarly to the rigid wall so that the rigid wall remains bowed during sealing. In other embodiments, vacuum sealing the food product 1740 between the rigid wall and the flexible film comprises temporarily straightening the food package to apply the vacuum seal. Upon completion of vacuum sealing the package 1740, the rigid wall may either be subjected to pressure and heat to return to a curved form, or alternatively, properties of the rigid wall such as elastic properties and/or memory properties may allow the package to return to a curved configuration.

**[0071]** The method 1700 may further comprise placing a second flexible film on the opposite surface of the rigid wall from the first flexible film. The step of vacuum sealing the food product 1740 between the rigid wall and the flexible film may comprise partially sealing the first flexible film to the second flexible film, then drawing a vacuum to remove air from around the food product, and subsequently completing the seal between the first flexible film and the second flexible film. The method 1700 may further comprise trimming the edges of the first and second flexible films so that the edges conform to the shape of the rigid wall after completing the seal, which may involve use of straight cutting edges and temporarily straightening the packaged food product, or may involve using curved cutting implements without straightening the packaged food product.

**[0072]** The method 1700 may further comprise providing means to facilitate initial opening of the package and/or reclosing

of the package, such as a peelable seal, a resealable peelable seal, a zipper, or other features.

**[0073]** In some embodiments, to facilitate display of brand information, product information, attractive graphics, or other content, pre-printed flexible film is provided on at least one side of the packaged food product, or pressure-sensitive labels may be applied on at least one side of the packaged food product.

**[0074]** The above-described method is preferably employed in a high-speed commercial packaging operation in a food plant, suitable for mass production of packaged food products in a refrigerated environment. As described in Fig. 18, the packaged food products may be nested together 1830 for transport to distribution locations and retail stores, where they may be de-nested and displayed 1840 standing upright on a bowed edge of the nonplanar lightweight, rigid wall on a horizontal surface in a retail display without external support.

What is claimed is:

1. An upstanding packaged food product comprising:
  - a lightweight, rigid first wall capable of being stably supported on edge on a horizontal surface, and having a pair of generally vertical end edges at opposite ends thereof, and curved top and bottom edges extending therebetween;
  - a second wall having a peripheral portion engaging the first wall, and at least one interior portion defining at least one product-containing region;
  - at least one quantity of food product disposed within the at least one product-containing region;
  - the packaged food product having a width defined by the distance between the end edges and a height defined by the lengths of the end edges;
  - the packaged food product having complementary front and back surfaces, one being concave and the other convex, configured so that the product is nestable with other like products;
  - the packaged food product having a bow formed therein so that it is bowed between the end edges so that the bottom edge is nonlinear;
  - said bottom edge having a stabilizing point between the end edges, and a depth defined by a distance between (1) a first line extending between the ends of the bottom edge, and (2) the stabilizing point;
  - the product further having a center of mass disposed between the first line and the stabilizing point of the bottom edge such that, when the product is standing on edge on a horizontal surface, a second line extending from the first line to the center of mass in a plane perpendicular to the first line forms an angle  $\alpha$  to the horizontal, and a third line extending from the stabilizing point to the center of

mass in a plane perpendicular to the first line forms an angle  $\beta$  with the horizontal,

wherein each of  $\alpha$  and  $\beta$  is less than  $90^\circ$ .

2. The packaged food product of claim 1 wherein the bottom edge extends through an arc such that a pair of lines tangent to the arc at its ends intersect at an angle  $\theta$  of about  $40^\circ$  to about  $100^\circ$ .

3. The packaged food product of claim 2 wherein the package has a height of about 4 in. to about 7 in., a depth of about 0.6 in. to about 2.3 in. and a width of about 6 in. to about 12 in.

4. The packaged food product of claim 3 wherein the width is greater than the height, and wherein the packaged food product has a width-to-depth ratio of between about 2:1 and about 20:1.

5. The packaged food product of claim 1 further comprising graphics on one or both of the first wall and the second wall suitable for presentation to the consumer in a retail display setting, such that the packaged food product may be displayed with its first wall facing the consumer.

6. The packaged food product of claim 1 further comprising graphics on one or both of the first wall and the second wall suitable for presentation to the consumer in a retail display setting, such that the packaged food product may be displayed with its second wall facing the consumer.

7. The packaged food product of claim 4 wherein the packaged food product has a height-to-depth ratio of between about 4:2.3 and about 7:0.6.

8. The packaged food product of claim 7 wherein the at least one interior region comprises two separate interior regions.

9. The packaged food product of claim 8 wherein the first wall and the second wall permit a substantially full

view of the food product therethrough, and wherein the packaged food product includes only two layers of packaging material, the second wall having a thickness no greater than about 12 mil, i.e., no greater than about .012 in., the first wall having a thickness no greater than about 40 mil, i.e., no greater than about .040 in.

10. The packaged food product of claim 9 wherein the food product comprises a shingled sliced deli meat product and the flexible film conforms to the shape of the food product; the food product being hermetically vacuum sealed in the package; the packaged food product having a thickness no greater than about one inch.

11. An upstanding packaged food product comprising:  
a lightweight, rigid wall capable of being stably supported on edge on a horizontal surface, and having a pair of end edges at opposite ends thereof, and top and bottom edges extending therebetween;

a quantity of food product disposed on and supported by the rigid wall;

a flexible film vacuum-sealed over the food product, cooperating with the rigid wall to form a hermetic seal around the food product;

the packaged food product having a concave first surface and a complementary convex second surface configured so that the product is nestable and stackable with other like products;

the packaged food product having a bow formed therein so that it is bowed between the end edges so that the bottom edge is nonlinear and has a stabilizing point between the end edges, and a depth defined by a distance between (1) a first line extending between the ends of the bottom edge, and (2) the stabilizing point;

the packaged food product further having a center of mass disposed between the first line and the stabilizing point such that, when the product is standing on edge on a horizontal surface, a second line extending from the first line to the center of mass in a plane perpendicular to the first line forms an angle  $\alpha$  to the horizontal, and a third line extending from the stabilizing point to the center of mass in a plane perpendicular to the first line forms an angle  $\beta$  with the horizontal,

wherein each of  $\alpha$  and  $\beta$  is less than 90°.

12. The packaged food product of claim 11 wherein the bottom edge comprises a series of connected line segments arranged in series.

13. The packaged food product of claim 11 wherein the packaged food product is continuously curved, and wherein the bottom edge extends through an arc such that a pair of lines tangent to the arc at its ends intersect at an angle  $\theta$  of about 40 to 100°, the rigid wall being shaped as a portion of a cylinder, the flexible film being contoured to conform to the shape of the food product.

14. The packaged food product of claim 11 wherein the packaged food product has a maximum thickness of no more than about one inch.

15. An upstanding packaged food product comprising:

a lightweight first wall having a pair of generally vertical end edges at opposite ends thereof, and top and bottom edges extending therebetween;

a second wall engaging the first wall so as to define at least one product-containing region between the second wall and the first wall;

at least one quantity of food product disposed within the at least one product-containing region;

the packaged food product having a width defined by the distance between the end edges and a height defined by the lengths of the end edges;

the packaged food product having a bow formed therein so that it is bowed between the end edges so that the bottom edge is nonlinear and has a stabilizing point between the end edges, and a depth defined by a distance between (1) a first line extending between the ends of the bottom edge, and (2) the stabilizing point;

the product further having a center of mass disposed between the first line and the stabilizing point of the bottom edge such that, when the product is standing on edge on a horizontal surface, a second line extending from the first line to the center of mass in a plane perpendicular to the first line forms an angle  $\alpha$  to the horizontal, and a third line extending from the stabilizing point to the center of mass in a plane perpendicular to the first line forms an angle  $\beta$  with the horizontal, each of  $\alpha$  and  $\beta$  being less than 90°.

16. The packaged food product of claim 15 further comprising generally horizontal top and bottom walls, the packaged food product being stackable with other like packaged food products by placing the bottom wall of one packaged food product on the top wall of another.

17. The packaged food product of claim 15 wherein the width is greater than the height.

18. The packaged food product of claim 15 wherein the bottom edge extends through an arc such that a pair of lines tangent to the arc at its ends intersect at an angle  $\theta$  of about 40° to about 100°.

19. The packaged food product of claim 15 wherein the bottom edge comprises a series of connected line segments arranged in series.

20. The packaged food product of claim 15 wherein the first wall has a generally concave front surface and a generally convex back surface.

21. The packaged food product of claim 15 wherein the first wall has a generally convex front surface and a generally concave back surface.

22. The packaged food product of claim 15 wherein the first wall is made of a thin, flexible material and is substantially vertical from top to bottom, and the second wall is made of a rigid material, the second wall having substantially vertical top and bottom portions, and one or more cavities formed therebetween to define the product-containing regions.

23. The packaged food product of claim 15 wherein the second wall is made of a thin, flexible material and is substantially vertical from top to bottom, and the first wall is made of a rigid material; the first wall having substantially vertical top and bottom portions, and one or more cavities formed therebetween; the one or more cavities defining the product-containing regions, and also defining a surface that is capable of supporting the packaged food product in an alternative orientation.

24. The packaged food product of claim 15 wherein the second wall and the first wall are joined to each other with hot melt or glue applications.

25. The packaged food product of claim 15 wherein the product-containing region between the second wall and the first wall is gas flushed.

26. The packaged food product of claim 15 wherein the at least one quantity of food product disposed within the at least one product-containing region comprises a vacuum-sealed food product in a separate pouch.

27. The packaged food product of claim 15 wherein the at least one product-containing region comprises a plurality of product-containing regions which are separable from one another.

28. The packaged food product of claim 27 wherein a perforation is provided between product-containing regions.

29. The packaged food product of claim 15 further comprising an engraved message along one or more perimeter edges.

30. The packaged food product of claim 15 further comprising means to facilitate hanging on a peg.

31. A method of packaging a food product to provide a packaged food product that is capable of standing upright on a nonlinear edge on a horizontal surface without external support comprising

forming a lightweight, rigid wall;

placing a food product on the rigid wall;

placing a flexible film over the food product and over the rigid wall; and

vacuum sealing the food product between the rigid wall and the flexible film so that the flexible film conforms to the shape of the food product and rigid;

the packaged food product being nestable and stackable with other like products;

forming a bow in the packaged food product so that when standing on edge it is bowed between the end edges so that the bottom edge is nonlinear and has a stabilizing point between the end edges, and a depth defined by a distance between (1) a first line extending between the ends of the bottom edge, and (2) the stabilizing point;

the product further having a center of mass disposed rearward of the first line and forward of the stabilizing point of the bottom edge such that, when the product is

standing on edge on a horizontal surface, a second line extending from the first line to the center of mass in a plane perpendicular to the first line forms an angle  $\alpha$  to the horizontal, and a third line extending from the stabilizing point to the center of mass in a plane perpendicular to the first line forms an angle  $\beta$  with the horizontal, wherein each of  $\alpha$  and  $\beta$  is less than 90°.

32. The method of claim 31 wherein forming the lightweight, rigid wall comprises providing the rigid wall with a bowed configuration, and wherein placing a food product on the rigid wall comprises placing the food product on a convex surface of the rigid wall such that the packaged food product has a bowed shape prior to vacuum sealing.

33. The method of claim 31 wherein forming the lightweight, rigid wall comprises providing the rigid wall with a bowed configuration, and wherein placing a food product on the rigid wall comprises placing the food product on a concave surface of the rigid wall.

34. The method of claim 31 wherein forming the lightweight, rigid wall comprises thermoforming or mechanically forming a rigid roll stock material into a generally planar configuration, and wherein the rigid wall and the packaged food product are provided with a bowed shape after vacuum sealing the food product between the rigid wall and the flexible film.

35. The method of claim 31 wherein the step of placing a flexible film over the food product and over the rigid wall comprises placing a vacuum skin packaging (VSP) film.

36. The method of claim 31 wherein vacuum sealing the food product comprises sealing the flexible film to the wall along two or more dimensions of the wall, then drawing a vacuum, then making a final seal between the flexible film and the wall.

37. The method of claim 31 wherein the rigid wall is curved, and vacuum sealing the food product between the rigid wall and the flexible film comprises use of sealing heads that are curved similarly to the rigid wall so that the rigid wall remains curved during sealing.

38. The method of claim 31 wherein vacuum sealing the food product between the rigid wall and the flexible film comprises temporarily straightening the packaged food product.

39. The method of claim 31 further comprising placing a second flexible film on the opposite surface of the rigid wall, and wherein vacuum sealing the food product between the rigid wall and the flexible film comprises partially sealing the first flexible film to the second flexible film, then drawing a vacuum to remove air from around the food product, then completing the seal between the first flexible film and the second flexible film.

40. The method of claim 39 further comprising trimming the edges of the first and second flexible films to conform to the periphery of the rigid wall after completing the seal.

41. The method of claim 40 wherein trimming the edges of the first and second flexible films after completing the seal comprises temporarily straightening the packaged food product.

42. The method of claim 40 wherein trimming the edges of the first and second flexible films after completing the seal comprises using curved cutting implements and does not require straightening the packaged food product.

43. The method of claim 31 further comprising providing means to facilitate opening of the package and reclosing of the package.

44. The method of claim 31 further comprising providing means to facilitate opening of the package and reclosing of the package, comprising a peelable seal.

45. The method of claim 31 further comprising providing means to facilitate opening of the package and reclosing of the package, comprising a resealable peelable seal.

46. The method of claim 31 further comprising providing means to facilitate opening of the package and reclosing of the package, comprising a zipper.

47. The method of claim 31 wherein pre-printed flexible film is provided on at least one side of the packaged food product.

48. The method of claim 31 further comprising applying pressure-sensitive labels on at least one side of the packaged food product.

49. A method of packaging a food product in a high-speed commercial packaging operation and thereafter displaying the food product in a retail setting, comprising:

(a) forming a nonplanar lightweight, rigid wall which has a bowed configuration;

(b) placing a food product on the rigid wall;

(c) placing a first flexible film over the food product and over the rigid wall; and

(d) vacuum sealing the food product between the rigid wall and the flexible film so that the flexible film conforms to the shape of the food product and rigid wall;

(e) providing the packaged food product with a bowed configuration so that the rigid wall will be capable of independently supporting the packaged food product in a stable position on a horizontal surface while standing on edge;

(f) repeating steps (a) through (e) multiple times to form a plurality of additional packaged food products which have a bowed configuration and which are nestable and stackable with like products;

(g) nesting a plurality of the packaged food products together and shipping them to a retailer; and

(h) standing a plurality of the packaged food products upright on a bowed edge of the nonplanar lightweight, rigid wall on a horizontal surface in a retail display without external support;

the packaged food product having a bow formed therein so that when standing on edge it is bowed between the end edges so that the bottom edge has a stabilizing point between the end edges, and a depth defined by a distance between (1) a first line extending between the ends of the bottom edge, and (2) the stabilizing point;

the packaged food product having a center of mass disposed rearward of the first line and forward of the stabilizing point of the bottom edge such that, when the product is standing on edge on a horizontal surface, a second line extending from the first line to the center of mass in a plane perpendicular to the first line forms an angle  $\alpha$  to the horizontal, and a third line extending from the stabilizing point to the center of mass in a plane perpendicular to the first line forms an angle  $\beta$  with the horizontal, wherein each of  $\alpha$  and  $\beta$  is less than 90°.

50. The method of claim 49 wherein providing the packaged food product with a bowed configuration comprises providing the rigid wall with a convex surface prior to step (a).

51. The method of claim 49 wherein providing the packaged food product with a bowed configuration comprises providing the rigid wall with a concave surface prior to step (a).

52. The method of claim 49 wherein forming a nonplanar lightweight, rigid wall comprises thermoforming or mechanically forming a roll stock rigid film or board into a concave or convex shape.

53. The method of claim 49 wherein vacuum sealing the food product comprises sealing the flexible film to the wall along two or more dimensions of the wall, then drawing a

vacuum, then making a final seal between the flexible film and the wall.

54. The method of claim 49 wherein the rigid wall is curved, and vacuum sealing the food product between the rigid wall and the flexible film comprises use of sealing heads that are curved similarly to the rigid wall so that the rigid wall remains curved during sealing.

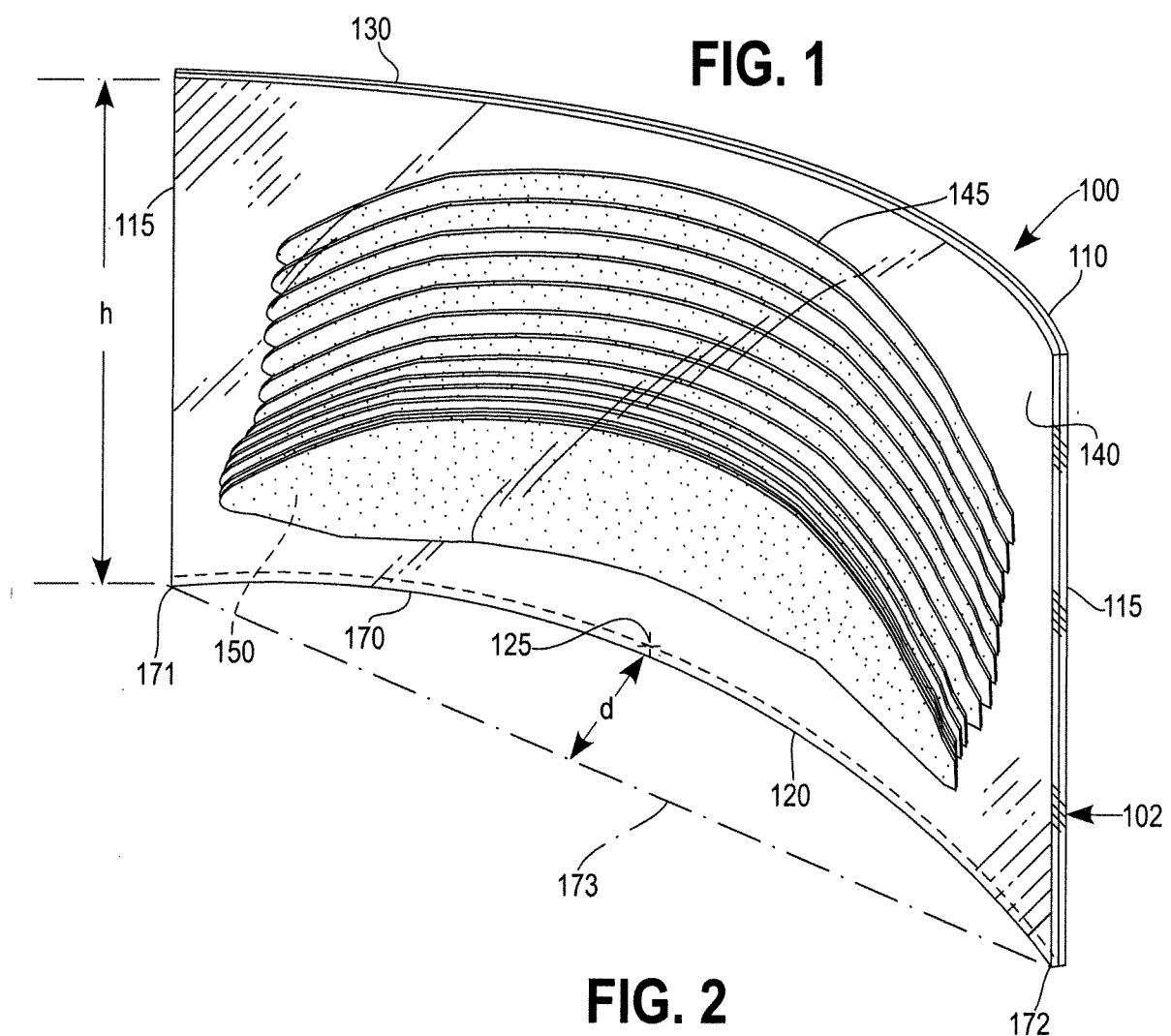
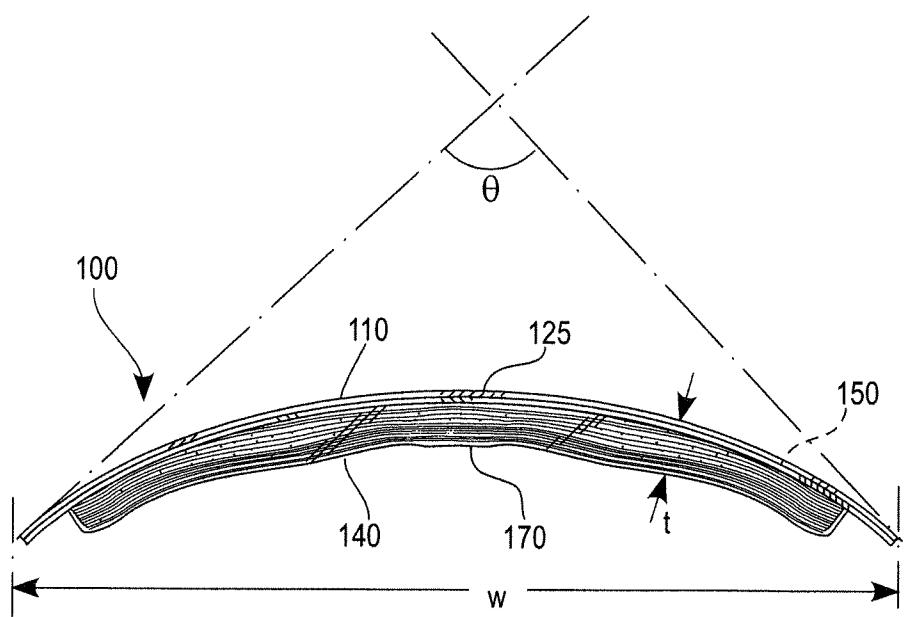
55. The method of claim 49 wherein vacuum sealing the food product between the rigid wall and the flexible film comprises temporarily straightening the rigid wall.

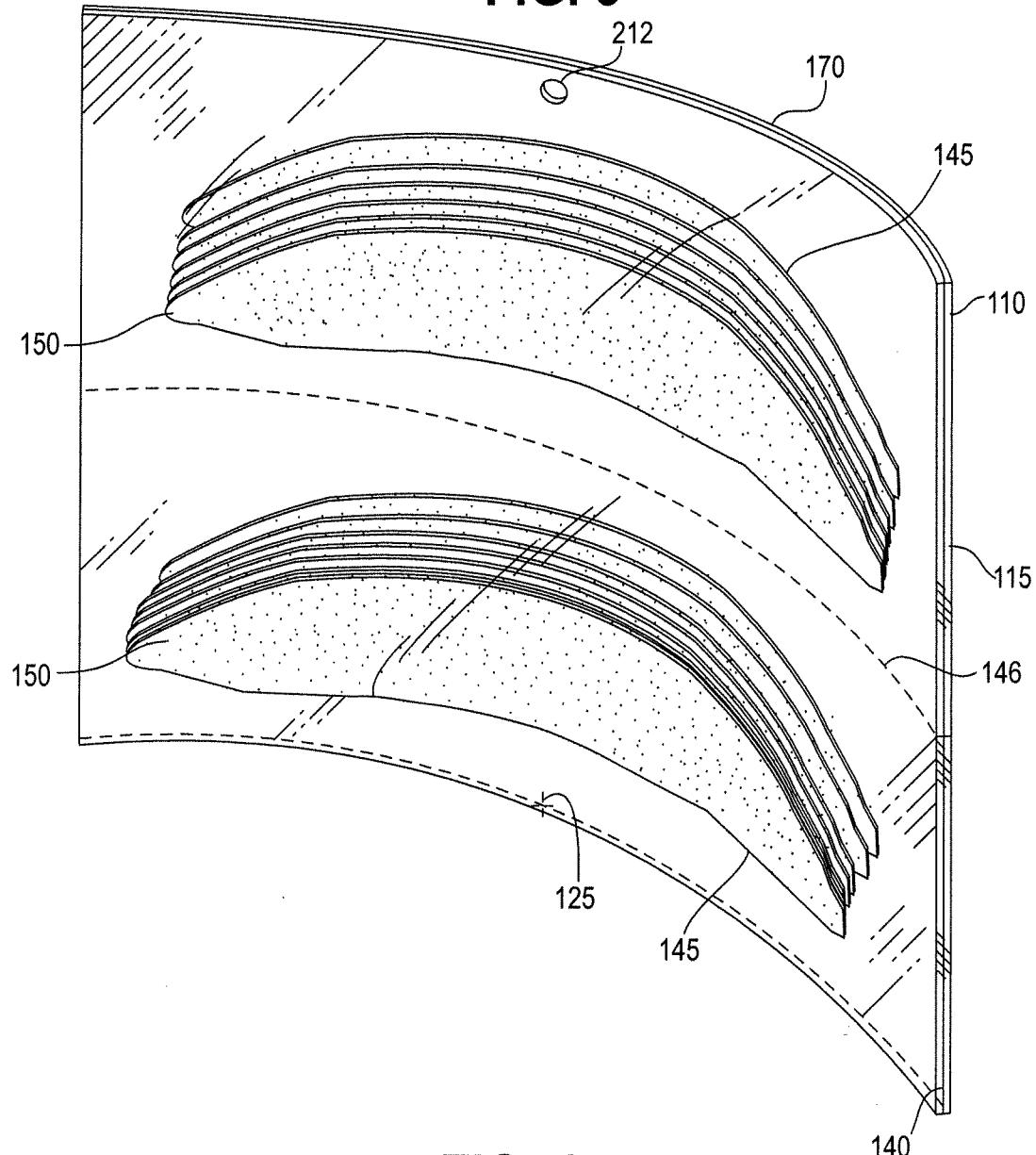
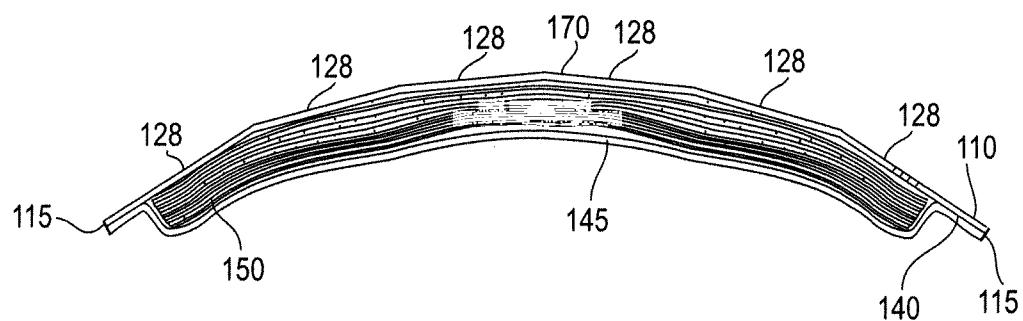
56. The method of claim 49 further comprising placing a second flexible film on the bottom of the rigid wall, and wherein vacuum sealing the food product between the rigid wall and the flexible film comprises partially sealing the first flexible film to the second flexible film, then drawing a vacuum to remove air from around the food product, then finishing the seal between the first flexible film and the second flexible film.

57. The method of claim 49 further comprising trimming the edges of the first and second flexible films after finishing the seal, wherein trimming the edges of the first and second flexible films after finishing the seal comprises straightening the packaged food product temporarily.

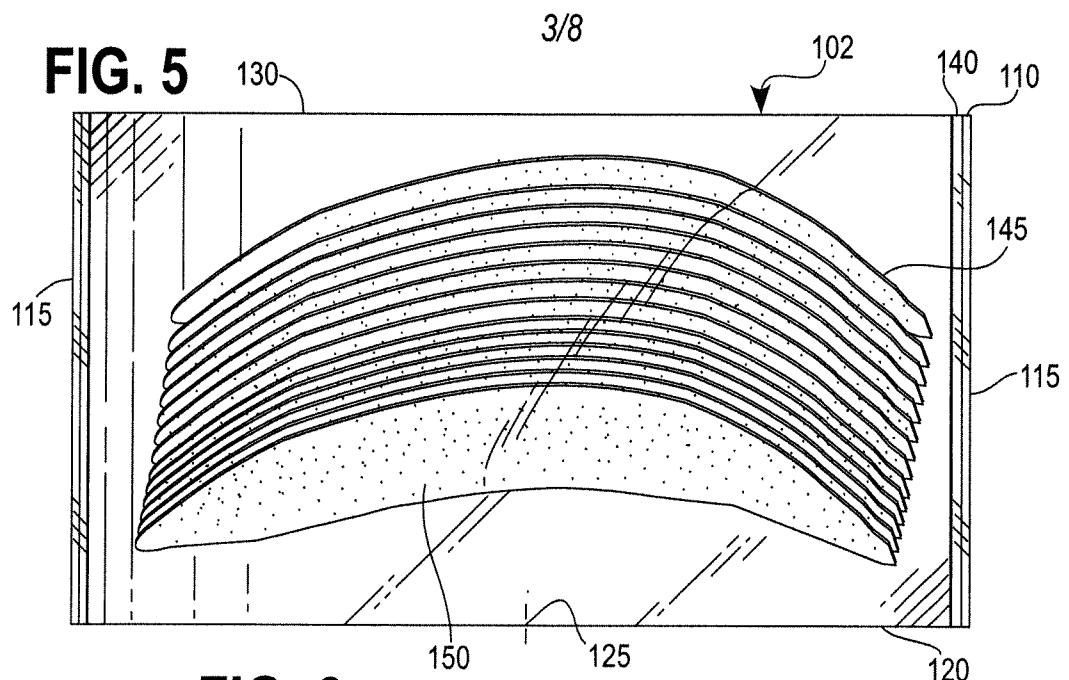
58. The method of claim 40 wherein trimming the edges of the first and second flexible films after finishing the seal comprises using curved cutting implements and does not require straightening the packaged food product.

1/8

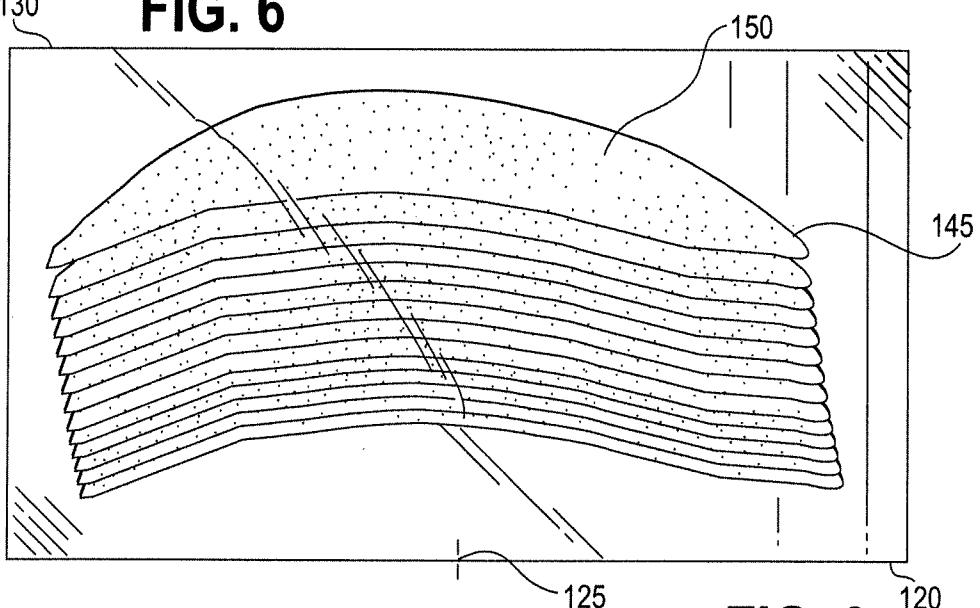
**FIG. 1****FIG. 2**

**FIG. 3****FIG. 4**

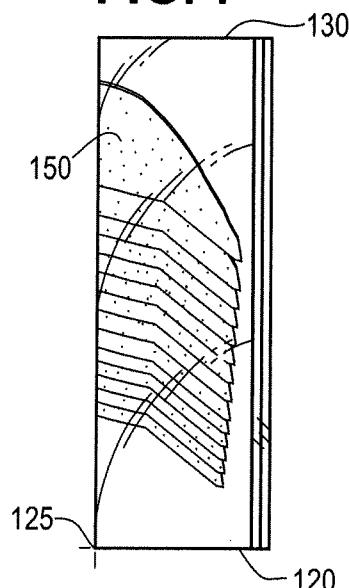
**FIG. 5**



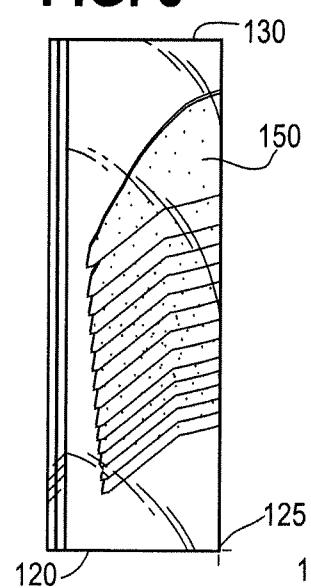
130 FIG. 6



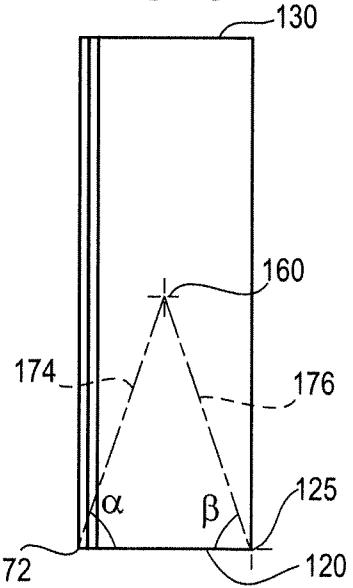
**FIG. 7**

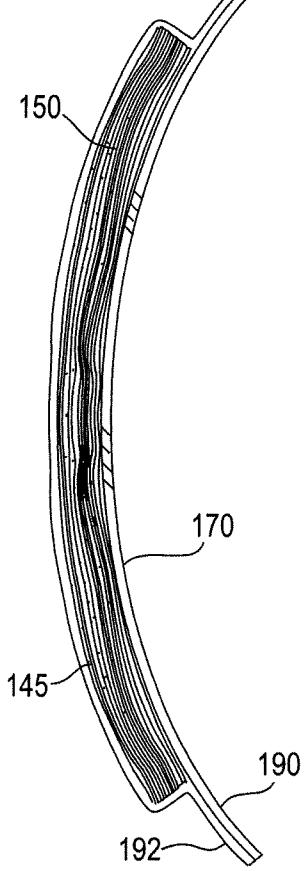
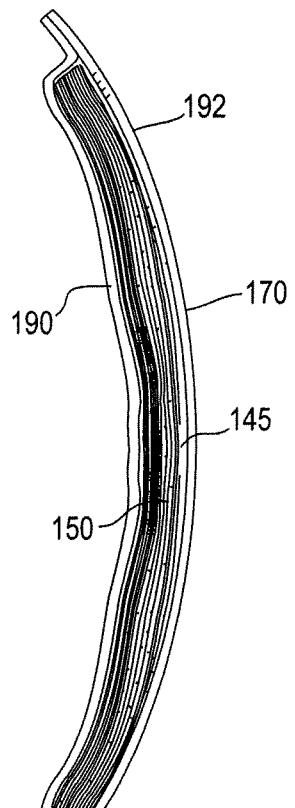
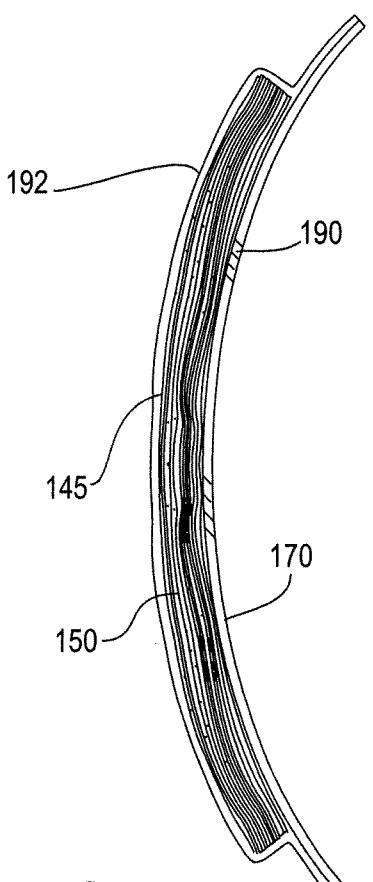


**FIG. 8**

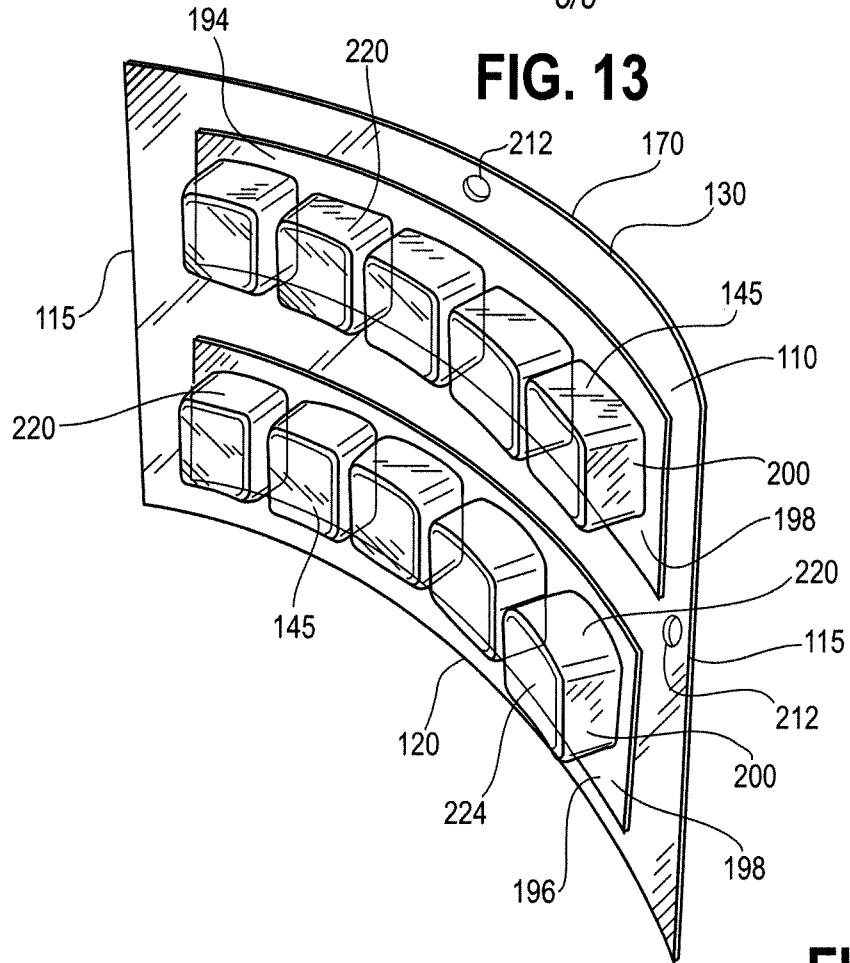
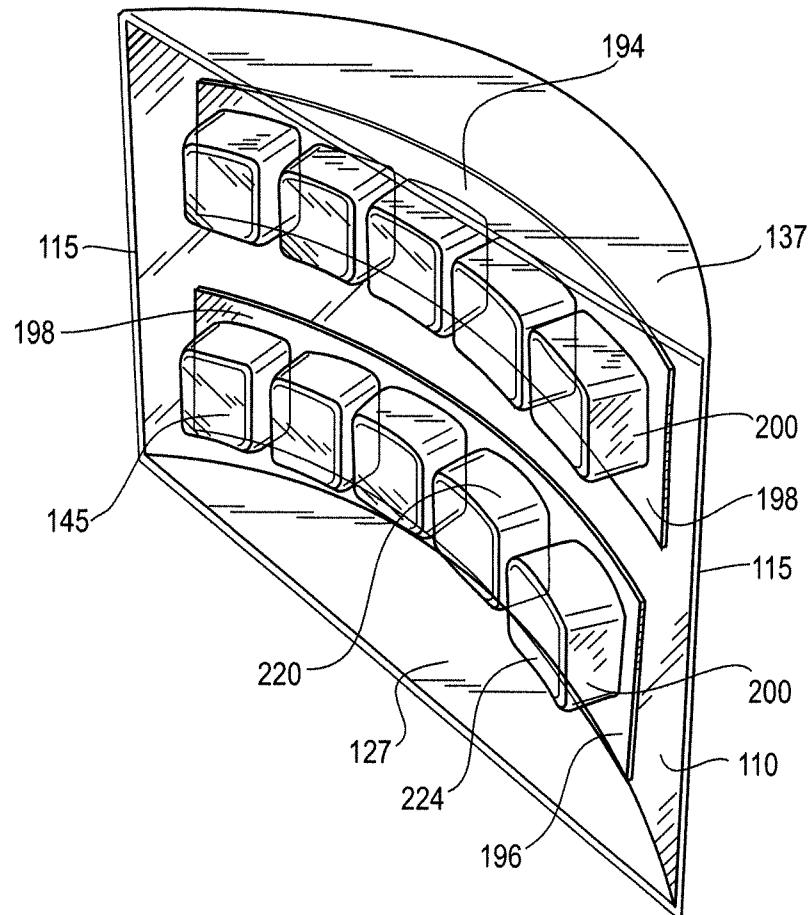


**FIG. 9**



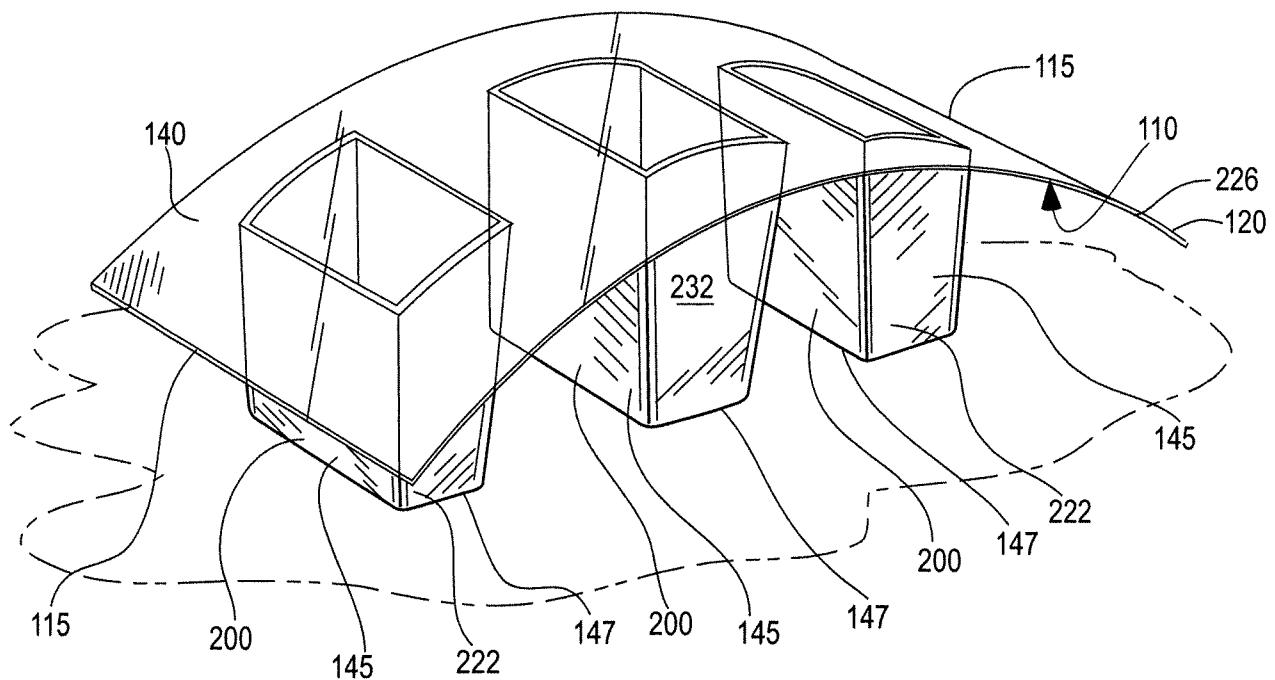


5/8

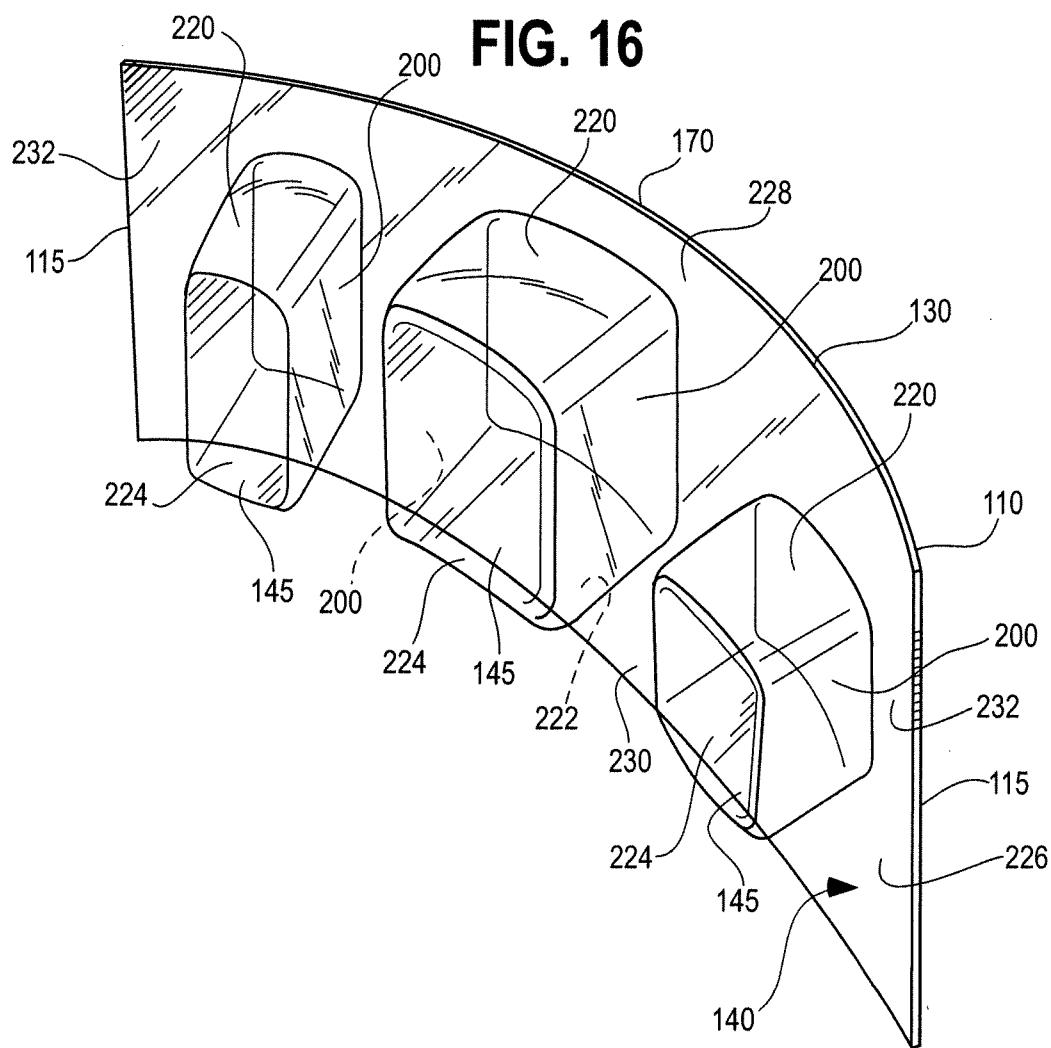
**FIG. 13****FIG. 14**

6/8

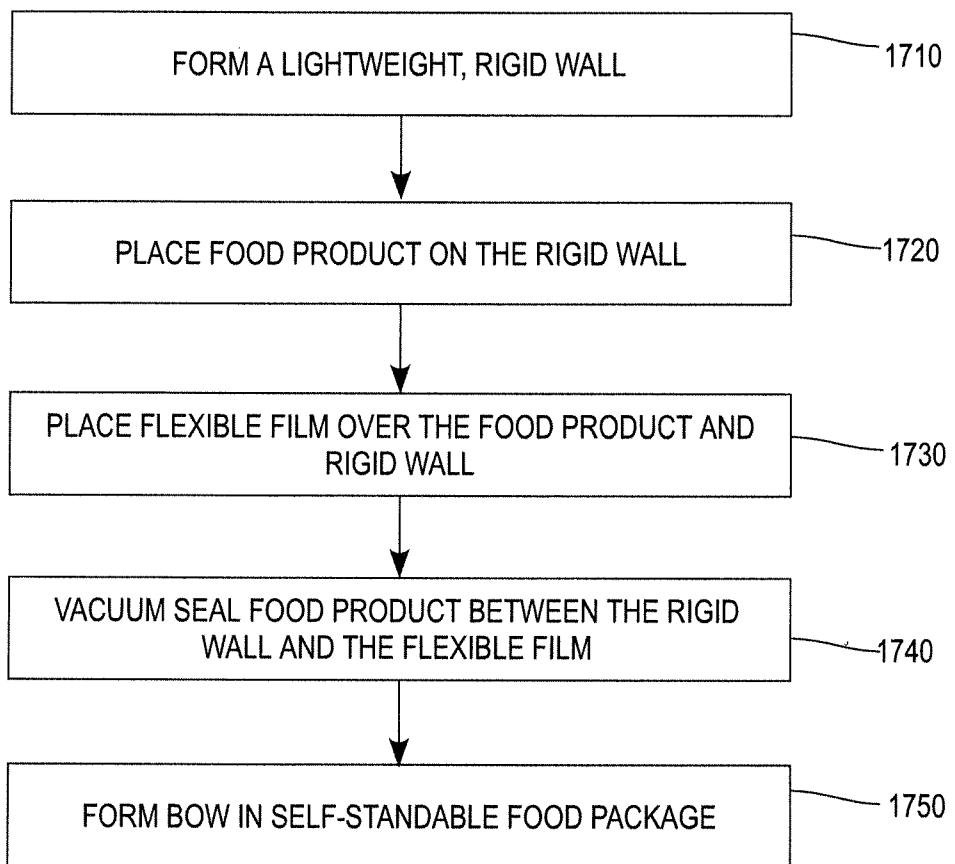
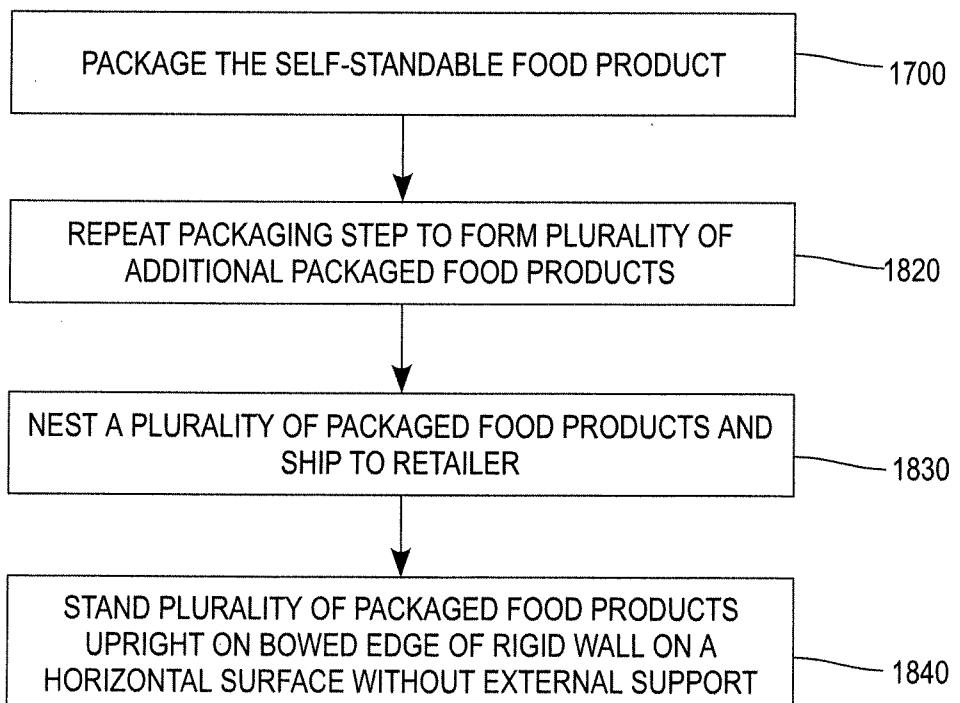
**FIG. 15**



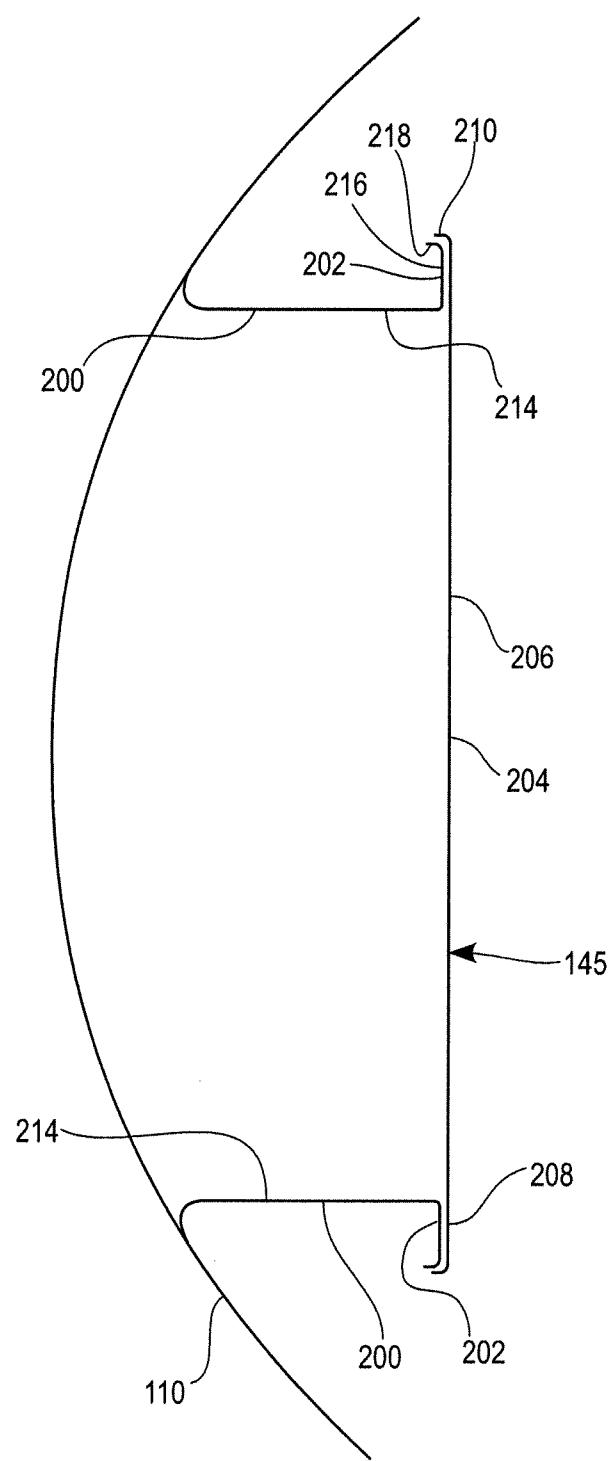
**FIG. 16**



7/8

**FIG. 17****FIG. 18**

**FIG. 19**



## INTERNATIONAL SEARCH REPORT

## International application N

PCT/US2014/013826

#### A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D75/28 B65D75/30

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	WO 2012/012015 A1 (MEADWESTVACO CORP [US]; WADE MICHAEL P [US])	1-7, 15-26,
Y	26 January 2012 (2012-01-26) paragraph [0028]; figures 3,4	29,30 8-14,27, 28,31-58
Y	-----	
Y	US 5 846 582 A (MAYFIELD WILLIAM D [US] ET AL) 8 December 1998 (1998-12-08)	10-14, 31-58
Y	figures 1-5 -----	
Y	US 5 904 263 A (ST PIERRE DANE T [CA] ET AL) 18 May 1999 (1999-05-18)	8-10,27, 28
Y	figures 1-4 -----	
A	US 1 929 217 A (SHY ROSEN) 3 October 1933 (1933-10-03)	1-58
A	figures 1-4 -----	
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		
A		

Further documents are listed in the continuation of Box C.

See patent family annex.

#### \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than

"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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 April 2014	19/05/2014
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Jervelund, Niels

**INTERNATIONAL SEARCH REPORT**

International application No
PCT/US2014/013826

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009/188833 A1 (KLOS KIMBERLY T [US]) 30 July 2009 (2009-07-30) figures 4,5,10 -----	1-58
1		

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No

PCT/US2014/013826

Patent document cited in search report	Publication date	Patent family member(s)			Publication date
WO 2012012015	A1	26-01-2012	CN	102985045 A	20-03-2013
			EP	2595595 A1	29-05-2013
			US	2012012491 A1	19-01-2012
			WO	2012012015 A1	26-01-2012
US 5846582	A	08-12-1998	NONE		
US 5904263	A	18-05-1999	CA	2222264 A1	06-03-1998
			US	5904263 A	18-05-1999
US 1929217	A	03-10-1933	NONE		
US 2009188833	A1	30-07-2009	US	2009188833 A1	30-07-2009
			US	2011139673 A1	16-06-2011
			US	2012181213 A1	19-07-2012
			US	2012234723 A1	20-09-2012