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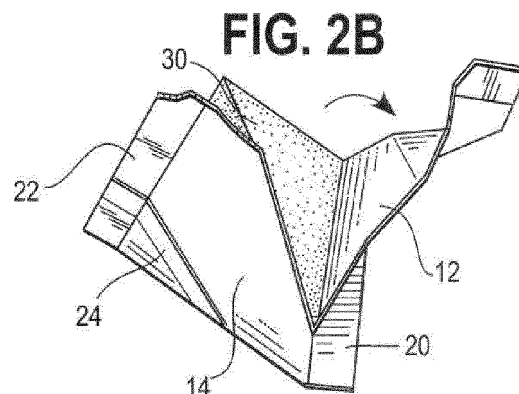
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(54) **A package for a liquid filled, solidified food stuff, method of forming and method of opening**

(57) A wrapper is provided that has a plurality of crease lines (28a, 28b, 28c, 28d) arranged such that the wrapper can be shaped into a package (10) by folding about the crease lines (28a, 28b, 28c, 28d). The package

(10) can be filled with a liquid food stuff that solidifies in the package (10) such that the solidified food stuff has defined edges imparted by the crease lines (28a, 28b, 28c, 28d). The package (10) can be opened along the crease lines (28a, 28b, 28c, 28d) to access the food stuff.



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Description

Field

[0001] A package formed from a wrapper having crease lines for use in folding the wrapper and, in particular, a package for a food stuff.

Background

[0002] Packages for food stuffs are available in a wide variety of shapes and sizes, including tetrahedral-shaped packages. Tetrahedral-shaped packages generally have the advantages of utilizing a minimum amount of packaging material in relation to the quantity of the contents contained thereby, being readily adapted to mechanized manufacturing and filling techniques, having a shape that differentiates the package from other packages, and being generally economical to manufacture.

[0003] When made of flexible film and other similar materials, tetrahedral-shaped packages can result from the angled orientation of a pair of cross seals, which orientation causes the material to loosely fold into the tetrahedral shape. It is known to fill such tetrahedral packages with a liquid food stuff, such as ice cream, and then allow the liquid food stuff to solidify.

[0004] One problem with the foregoing type of package is that the resultant solidified food stuff can undesirably have soft, rounded edges shaped by the loose folds. Another problem with the foregoing type of package is that it can be difficult to open. When efforts are made to provide opening features, such opening features can undesirably weaken the film material or reduce the ability of the film to provide certain barrier properties with respect to the enclosed food stuff.

Summary

[0005] A flexible film wrapper is provided that is configured to be sealed to form a package enclosing a liquid-filled, solidified food stuff. The wrapper is characterized by a plurality of crease lines, which may be laser-formed or otherwise formed in the wrapper prior to folding, in the flexible wrapper about which the wrapper is folded when the package is formed and filled such that the wrapper will impart sharp or defined edges shaped by the folded crease lines to the solidified food stuff. The package can have a tetrahedral shape, or other shapes such as cube, cuboid, triangular prism, or the like.

[0006] The wrapper can be separable along the crease lines to provide access to the food stuff when the wrapper is formed and filled into the food package. The wrapper can include sealing margins configured to form seals with adjacent sealing margins during formation of the wrapper into the package. Pairs of adjacent crease lines can have arcuate intersections spaced from the sealing margins, and the arcuate intersection of two pairs of adjacent crease lines can have larger radii than that of another

pair of adjacent crease lines such that there is a greater propensity for continuous tearing along intersecting crease lines having the larger radii as compared to along the another pair of adjacent crease lines after formation of the wrapper into the food package. The wrapper can also include at least one pair of tear initiation lines, which may be laser-formed, each of the tear initiation lines extending from different crease lines and into one of the sealing margins.

[0007] A package, such as a tetrahedral-shaped package, containing a liquid-filled, solidified food stuff can be formed from the wrapper. The package has a plurality of panels defined in part between pairs of adjacent crease lines and seals and wherein the solidified food stuff has sharp or defined edges imparted by the folded crease lines.

[0008] A notch positioned in one of the seals for initiating tearing along the tear initiation lines for facilitating separation of one of the panels along adjacent crease lines to provide access to the food stuff. The wrapper can optionally include a second pair of tear initiation lines and a second notch positioned in the one of the seals for initiating tearing along the second pair of tear initiation lines for facilitating separation of another of the panels along adjacent crease lines to provide access to the food stuff.

[0009] A method is provided for opening the package comprising separating one of the panels along adjacent crease lines to provide access to the food stuff. The method can further comprise separating another of the panels along adjacent crease lines to provide further access to the food stuff, the another of the panels being connected to the one of the panels about a crease line that is not separated such that after separation the one and the another of the panels remain connected. The method can include initiating separation of the one of the panels using the notch and optionally further comprising initiating separation of the another of the panels using the second notch.

[0010] A method of making a food package, such as a tetrahedral-shaped food package, using the wrapper is also provided, including the steps of forming the wrapper into a tube; forming a bottom seal of the tube to form an open receptacle; filling the open receptacle with a liquid food stuff; forming a top seal of the open receptacle to enclose the liquid food stuff in the food package, whereby some or all of the forming steps result in folding of the wrapper about the crease lines to form edges of the package. The method can further comprise solidifying the liquid food stuff inside of the package to form a food stuff having sharp or defined edges formed by the folded crease lines, such that the liquid food stuff takes the shape of adjacent portions of the interior of the package.

[0011] The package can be unwrapped so that a user gets full access to the packaged food stuff while the food stuff maintains its packaged shape during the unwrapping. In addition, the package can permit the user to unwrap the package and remove the food stuff from the

package without directly contacting the food stuff. This can advantageously prevent transfer between the user's hands and the food stuff as well as damage or alteration of the intended shape of the food stuff.

Brief Description of the Drawings

[0012] FIG. 1A is a side perspective view of an exemplary embodiment of a tetrahedral-shaped package having a notch for opening the package;

[0013] FIG. 1B is a rear perspective view of the package of FIG. 1A;

[0014] FIG. 1C is a side elevational view of the package of FIG. 1A;

[0015] FIGS. 2A-2D illustrate sequential steps of for opening the package of FIG. 1A to expose a food stuff therein;

[0016] FIG. 2E is a side elevational view of the package of FIGS. 2A-2D shown with two panels detached.

[0017] FIG. 2F is a side elevational view of an exemplary package shown with one panel fully detached and another panel partially detached.

[0018] FIG. 3 illustrates an exemplary method of manufacturing a tetrahedral-shaped package;

[0019] FIG. 4 is a top plan view of a wrapper shown with laser-formed crease lines configured to form edges of the tetrahedral-shaped package of FIG. 1A when the wrapping material is folded about the crease lines;

[0020] FIG. 5A is a side elevational view of another exemplary embodiment of a tetrahedral-shaped package having a pair of notches for opening the package; and

[0021] FIG. 5B is a side elevational view of the package of FIG. 5A shown with two panels detached.

Detailed Description

[0022] A flexible wrapping material having one or more crease lines is provided. The flexible wrapping material can be folded about the one or more crease lines when forming and filling the package with a liquid food stuff to form a package which, in the illustrated example, is a tetrahedral-shaped package. The tetrahedral package, despite being made from a flexible wrapping material, yields well-defined contours and crisp edges defined by the crease lines about which the wrapping material is folded during the formation of the tetrahedral package. As described in more detail below, the liquid food stuff solidifies in the package and the package imparts a corresponding tetrahedral shape on the solidified food stuff. This advantageously can result in a solidified food stuff that has well-defined contours and crisp edges. A further advantage of the use of crease lines is that the tetrahedral-shaped food package can readily be opened along such crease lines to provide access to the food stuff.

[0023] With reference to the exemplary embodiment of FIGS. 1A-2D, a tetrahedral-shaped food package 10 is provided. The package 10 includes a first panel 12, a second panel 14, a third panel 16 opposite the second

panel 14, and a fourth panel 18. The first, second, and third panels 12, 14, and 16 meet at one of the corners 29. Each of the four panels 12, 14, 16, and 18 is generally triangular, and in the illustrated embodiment, is in the form of an isosceles triangle. The first and fourth panels 12 and 18 are hinged to one another at a hinge line 27, as shown in FIG. 2D, for purposes that will be described herein.

[0024] The package 10 includes a first seal 20, a second seal 22, and a fin seal 24. The first and second seals 20 and 22 are hermetic end seals (also known as cross seals) extending across opposite ends of the package 10. A plurality of crease lines 28a, 28b, 28c, and 28d are formed in the package 10, as shown in FIG. 1A. The crease lines 28a, 28b, 28c, and 28d are preferably formed at junctions of panels 12 and 14, 12 and 16, 14 and 18, and 16 and 18, respectively. The panels 12, 14, 16 and 18 are each defined between a pair of the crease lines 28a, 28b, 28c and 28d and one of the first and second seals 20 and 22. More specifically, the first panel 12 is defined on its three sides by an adjacent pair of the crease lines 28a and 28b and the first seal 20; the second panel 14 is defined on its three sides by another adjacent pair of the crease lines 28a and 28c and the second seal 22; the third panel 16 is defined on its three sides by yet another adjacent pair of the crease lines 28b and 28d and the second seal 22; and the fourth panel 18 is defined on its three sides by another adjacent pair of the crease lines 28c and 28d and the first seal 20.

[0025] The crease lines 28a, 28b, 28c, and 28d are preferably formed by one or more laser beams and provide the package 10 with sharp, crisp or otherwise defined edges, which in turn impart corresponding sharp, crisp or otherwise defined edges to a food stuff 30 (also referred to herein as food stuff) stored within the package 10. While lasers can be used to form the crease lines, they can be formed in other manners, such as using mechanical dies. The crease lines can be formed in the film prior to folding about the crease lines to guide the folding in a predetermined manner. The food stuff 30 may be any edible item having a liquid form that solidifies. The use of the term "liquid" means that the food stuff 30 can be molded by the wrapping of the package 10. For example only, the food stuff 30 may be a chocolate, cheese, pudding, fruit gel, cream pie, candy, jelly, and the like, and can include food stuffs that are frozen in order to solidify or food stuffs that do not require being frozen in order to solidify.

[0026] The second seal 22 optionally includes a notch 26. The notch 26 may be formed by a laser cutting through a portion of the second cross seal 22, or may be formed using other cutting methods, for example a die cut. The notch 26 provides a tear initiation site that facilitates unwrapping the package 10 along an adjacent pair of crease lines, as shown in FIGS. 2A-2D and described in more detail below. It will be appreciated that the packages 10 may include only one notch 26, as shown in FIG. 1A, or two or more notches, as shown in FIG. 5A, for purposes

which will be described further. The notch 26 can optionally be aligned with a pair of tear initiation lines 25, which may be laser, mechanically or otherwise formed, each extending from within the second seal 22 to an associated one of the pair of crease lines 28a and 28b that define in part the first panel 12, as shown in FIGS. 1A-1C. Instead of or in addition to the tear initiation lines 25, an orientated film such as orientated polypropylene can be used to facilitate opening.

[0027] In order to open the package 10, a user can grasp the second seal 22 and the second and third panels 14 and 16 below the notch 28 with one hand and above the notch 26 with the other hand and tear the seal 22 along the notch 26 in the direction shown in FIG. 2A. The tear leads through the seal 22, about an adjacent corner 29 of the package 10, and follows an adjacent pair of the crease lines 28a and 28b toward the first seal 20, separating two sides of the panel 12 from the rest of the package 10, as shown in FIGS. 2B and 2C, to provide access to the food stuff 30. When the tear or separation reaches near the first seal 20, at least one side of the food stuff 30 is exposed to the user, as shown in FIG. 2C.

[0028] However, it can be advantageous to further expose the food stuff. Optional further downward movement of the panel 12 in the direction shown in FIG. 2D results in the food stuff 30 being even more exposed and permits the user to remove the food stuff 30 from the package 10. This is accomplished by also separating the fourth panel 18 along its associated pair of crease lines 28c and 28d, with the initiation of the separation of the fourth panel 18 being by pulling the first panel 12 which is connected to the fourth panel 18 about the hinge line 27 and the first seal 20. It is to be appreciated that package 10 can be unwrapped, and food stuff 30 may advantageously be removed from the package 10 without the user's fingers directly coming into contact with the food stuff 30. This can be accomplished by holding the second and third panels 14 and 16 with the food stuff 30 therebetween while partially or completely detaching the first and fourth panels 12 and 18 as shown in FIG. 2E. Alternatively, the first panel 12 may be completely detached, while the fourth panel 18 may be detached only along one of the crease lines 28c, remaining hinged to the third panel 16 along another of the crease lines 28d, as shown in FIG. 2F. This can be accomplished, for example, by having the crease line 28d between the third panel 16 and the fourth panel 18 being of lesser depth.

[0029] With reference to FIGS. 2A-2E, in order to facilitate using the first panel 12 to initiate separation of the fourth panel 18, the respective pairs of crease lines are preferably continuous. That is, one of the pair of crease lines 28a of the first panel 12 is continuous with one of the pair of crease lines 28c of the fourth panel 18, and the other of the pair of crease lines 28b of the first panel 12 is continuous with the other of the pair of crease lines 28d of the fourth panel 18. However, if the first seal 20 is inadvertently formed at the intersections of the continuous crease lines 28a/28c or 28b/28d, then the propa-

gation of the tear could be hindered. To avoid the first seal 20, the intersections of the continuous crease lines 28a/28c or 28b/28d are preferably spaced from the margin where the first seal 20 will be formed. Moreover, a bypass segment of the crease lines can be formed at the intersections in order to bypass the first seal 20. The bypass segment can be arcuate to enable ready redirection of the separation forces for propagating the tearing and separation.

[0030] The package 10 may be made from a polymeric, flexible film on vertical form/fill/seal (VFFS) machinery. The flexible film may be made from various materials, including, but not limited to, polypropylene and polypropylene laminates, which can optionally include a metalized layer. It is to be appreciated that materials suitable for making the film include both single-ply materials as well as multi-ply materials (such as various laminates).

[0031] The film of any of the packages described herein - prior to creasing - can optionally exhibit poor dead fold characteristics, i.e., the amount of acceptable spring-back to an original orientation. The crease lines described herein can allow the use of such films to form packages that retain their folded shapes more readily than if there were no crease lines. A description of dead-fold characteristics, including a test for a material considered to exhibit poor dead fold characteristics, is set forth in U.S. Patent Publ. 2011/0203229, published August 25, 2011, which is hereby incorporated by reference in its entirety. A material exhibiting poor dead-fold characteristics can exhibit a percentage spring-back of greater than 50%, more preferably 75% and most preferably 90%. The percentage of spring back of a material, and thus its dead-fold characteristics, may be measured, for instance, by performing the following test upon a particular material. A given sheet of material is laid in a resting position (at 0 degrees). The material has one end that may be bent from its resting position towards its opposite end (a total of 180 degrees). Pressure may be applied at the point of the fold. If the material has good dead-fold characteristics, the one end remains in its new orientation, or within about 90 degrees of its new orientation, upon removing the external force that bent this end. If this material has poor dead-fold characteristics, however, the one end tend to move back through an angle of return towards its original orientation by greater than 90 degrees within 60 seconds of removing the external force. A material with no dead-fold characteristics whatsoever will return completely to its original orientation. A material with poor dead-fold characteristics may not return to the exact original orientation but will move at least halfway to that original orientation in the absence of that external bending force.

[0032] In one example, the film wrapper can be a laminate with an inner layer of about 30 microns of polypropylene film and an outer layer of about 30 microns of polypropylene film having an outer metalized layer. The laser application is preferably on the inner layer, extending completely through the inner layer and just partially,

e.g., 2-5 microns, into the inner side of the outer layer. This can advantageously permit the crease lines to be made deep without decreasing the integrity of the film to an undesirable degree. An advantage of laser treatment to form the crease lines is that the laser can both vaporize some of the film and cause adjacent portions of the film to increase in thickness. This can lead to the crease lines having increased strength and foldability, which in turn can allow for the use of thinner film materials.

[0033] VFFS machinery is generally well known. An exemplary VFFS machine 40 used to manufacture various embodiments of the tetrahedral-shaped packages 10 is shown in FIG. 3. The VFFS machine 40 includes rollers 42 and 44, a filling tube 46, an accumulating station 48, and a laser applicator 50. The VFFS machine 40 further includes a plurality of sealing bars (also known as sealing jaws) and, in particular, longitudinal sealing bars 52, upper transverse/cross sealing bars 54, and lower transverse/cross sealing bars 56. While the sealing bars 52 are positioned vertically, the upper and lower sealing bars 54 and 56 are positioned horizontally and are oriented at 90° with respect to each other, as shown in FIG. 3.

[0034] During the operation of the VFFS machine 40 in accordance with an exemplary method of the present invention, a web of flexible film is passed under the laser applicator 50. The laser applicator 50 emits one or more laser beams onto the film 60. The beam or beams emitted by the laser applicator 50 can form a plurality of crease lines in the film 60. In the example shown in FIG. 3, the laser applicator 50 emits one or more laser beams to only one surface of the film 60. It will be appreciated that one or more of the crease lines may be formed on the opposing side of the film 60 by one laser applicator 50, using, for example, mirrors, or by two or more laser applicators.

[0035] After being exposed to the laser applicator 50, the film 60 proceeds about tensioning rollers 42 and 44 toward the filling tube 46. As the film 60 moves in a generally downward direction around the filling tube 46 and toward an accumulating station 48, the longitudinal sealing bars 52 form a fin seal 24 (shown in FIG. 1A) to form the web into a tube, a lower sealing bar 56 forms one of the seals 20 or 22 to form an open-ended receptacle, the open-ended receptacle is filled using the filling tube 46, and an upper sealing bar 54 forms the other of the seals 20 or 22 to close the package. The package can then be singulated from the remainder of the web 60. The sealing bars 54 and 56 can optionally be ultrasonic so that resulting vibrations can be used to move food material away from the sealing area.

[0036] The orientation of the upper and lower sealing bars 54 and 56 of the VFFS machine 50 results in the tetrahedral shape of the package 10 and folding about the crease lines. The package 10 has a tetrahedral-shaped interior that is filled with the food stuff 30. When the liquid-filled food stuff 30 solidifies within the package 10, the food stuff 30 assumes the tetrahedral shape of the package 10, including sharp edges due to the folded

crease lines. The VFFS can be adapted for forming different-shaped food packages, such as by altering the shape and/or location of the sealing bar(s).

[0037] With reference to FIG. 4, a portion of the film 60 is shown with a crease line pattern 90 formed by one or more laser beams of the laser applicator 50. Folding the film 60 about the crease line pattern 90 during formation of the package 10 results in the finished tetrahedral-shaped package 10. The crease line pattern 90 includes a plurality of linear portions 91 having a plurality of angles therebetween. With reference to the exemplary crease line pattern 90 shown in FIG. 4, each of angles α_1 - α_4 is 60°. It will be appreciated that angles α_1 - α_4 do not have to be identical or be exactly 60°. The crease line pattern 90 also includes a plurality of bypass segments in the form of arcuate portions 93, 95, and 97 that connect adjacent linear portions 91. The arcuate portions 93, 95, and 97 are spaced apart from a sealing margin 92 of the film 60. It is to be noted that portions of the sealing margins 92 of film 60 form the seals 20 and 22 in the tetrahedral package 10. In the illustrated form, the radii R1 and R2 of the arcuate portions 93 and 95, respectively, are larger than the radius R3 of the arcuate portion 97. The larger radii R1 and R2 can make the redirection of separation forces more amenable than the smaller radii, which can be useful, in facilitating separation of the fourth panel 18 using the first panel 14. It will be understood that FIG. 4 could represent a discrete portion of a larger web of film, such as a larger web of film having the score pattern repeating.

[0038] With reference to FIGS. 5A and 5B, a tetrahedral-shaped package 100 is provided according to another embodiment of the present invention. The tetrahedral package 100 is similar to the package 10 of FIGS. 1A-1C in that it includes a first panel 112, a second panel 114, a third panel (not shown) opposite the second panel 114, a fourth panel 118, a corner 129, a first seal 120, a second seal 122, and laser-formed crease lines 128a, 128b, 128c, and 128d. Each of the panels 112, 114, 116, and 118 is generally triangular, and may be in the form of an isosceles triangle or a non-isosceles triangle.

[0039] In contrast to the package 10, the second seal 122 of the exemplary package 100 includes not one, but two notches 126a and 126b. The notches 126a and 126b provide two tear initiation sites that can be used in unwrapping the package 100. For example, the user may grasp the seal 122 above the notch 126a and below the notch 126b, tearing the seal 122 along the notches 126a and 126b in the direction toward the panels 112 and 118, respectively. The tear initiated at the notch 126a extends through the seal 122 and follows the crease lines 128a and 128b, and the tear initiated at the notch 126b extends through the seal 122 and follows the crease lines 128a and 128b, thereby detaching the panels 112 and 118 from the rest of the package 100, as shown in Fig. 5B.

[0040] Once one or both of panels 112 and 118 are detached, one or more sides of the food stuff 30 are exposed to the user, as shown in FIG. 5B. It will be appre-

ciated that during then unwrapping of the package 100, the user typically holds the packages by grasping the seal 122 and the second and third panels 112 and 114. This allows the user to unwrap the food stuff 30 without directly contacting the food stuff 30 with the user's fingers. These teachings describe cost-effective and easy to manufacture wrapping packages having well-defined contours and sharp edges, and using those contours and sharp edges to form like contours and sharp edges in a liquid-filled, solidified food stuff. The tetrahedral-shaped packages also provide an advantage of allowing the user to unwrap the food stuff stored within the packages along the crease lines. Further one or more panels can be separated from the remainder of the package to expose the food stuff, while optionally permitting direct contact with the food stuff to be avoided.

[0041] While a tetrahedral-shaped package is described herein by way of example, other packages shapes can also be formed having the laser-formed crease lines and opening features described herein. For example, packages shapes can include cube, cuboid, triangular prism, or the like.

[0042] Those skilled in the art will recognize that a wide variety of modifications, alterations, and combinations can be made with respect to the above described embodiments without departing from the spirit and scope of the invention, and that such modifications, alterations, and combinations are to be viewed as being within the ambit of the inventive concept.

Claims

1. A package containing a liquid-filled, solidified food stuff and formed from a flexible film wrapper, wherein the package is **characterized by** a plurality of crease lines in the flexible wrapper about which the wrapper is folded such that the wrapper imparts defined edges shaped by the folded crease lines to the solidified food stuff.
2. The package of claim 1, wherein the wrapper is separable along the crease lines to provide access to the solidified food stuff.
3. The package of any of claims 1 or 2, wherein the wrapper includes sealing margins forming seals with adjacent sealing margins.
4. The package of claim 3, wherein pairs of adjacent crease lines have arcuate intersections spaced from the sealing margins.
5. The package of claim 4, wherein the arcuate intersection of two pairs of adjacent crease lines have larger radii than that of another pair of adjacent crease lines such that there is a greater propensity for continuous tearing along intersecting crease lines

having the larger radii as compared to along the another pair of adjacent crease lines.

6. The package of any of claims 4 or 5, wherein the wrapper includes at least one pair of tear initiation lines, each of the tear initiation lines extending from a middle of one of the sealing margins to different crease lines.
7. The package of any of claims 1-6, wherein the package comprises a plurality of panels defined in part between pairs of adjacent crease lines and seals.
8. The package of claim 6, wherein the package comprises a plurality of panels defined in part between pairs of adjacent crease lines and seals and a notch positioned in one of the seals for initiating tearing along the tear initiation lines for facilitating separation of one of the panels along adjacent crease lines to provide access to the food stuff.
9. The package of claim 8, wherein the wrapper includes a second pair of tear initiation lines, and wherein a second notch is positioned in the one of the seals for initiating tearing along the second pair of tear initiation lines for facilitating separation of another of the panels along adjacent crease lines to provide access to the food stuff.
10. A method of opening the package of any of claims 1-9, the method comprising separating one of the panels along adjacent crease lines to provide access to the food stuff.
11. The method of claim 10, further comprising separating another of the panels along adjacent crease lines to provide further access to the food stuff, the another of the panels being connected to the one of the panels about a crease line that is not separated such that after separation the one and the another of the panels remain connected.
12. The method of claim 11, further comprising initiating separation of the one of the panels using the notch and, more preferably, additionally initiating separation of the another of the panels using the second notch.
13. A method of making the food package of any of claims 1-9, the method comprising:
 - forming the wrapper into a tube;
 - forming a bottom seal of the tube to form an open receptacle;
 - filling the open receptacle with a liquid food stuff;
 - forming a top seal of the open receptacle to enclose the liquid food stuff in the food package;
 - solidifying the liquid food stuff after enclosing

the liquid food stuff in the food package to form a food stuff having defined edges formed by the folded crease lines,

whereby some or all of the forming steps result in folding of the wrapper about the crease lines to form the package. 5

14. The package or method of any of the foregoing claims, wherein the package is tetrahedral-shaped. 10

15. The package or method of any of the foregoing claims, wherein the crease lines are formed by laser scoring. 15

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FIG. 1A

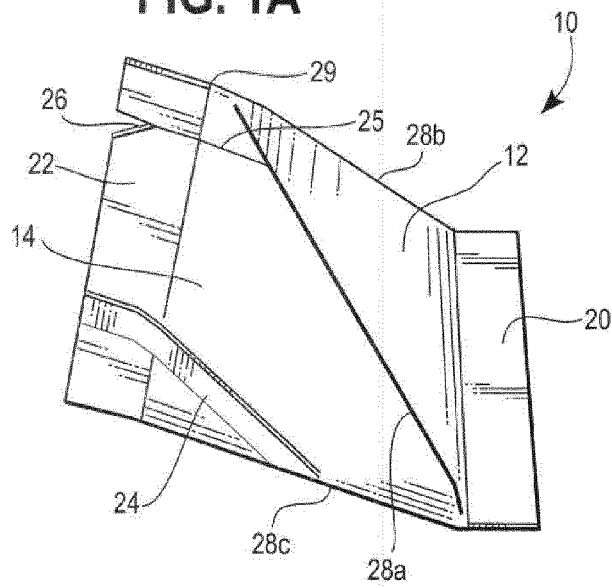


FIG. 1B

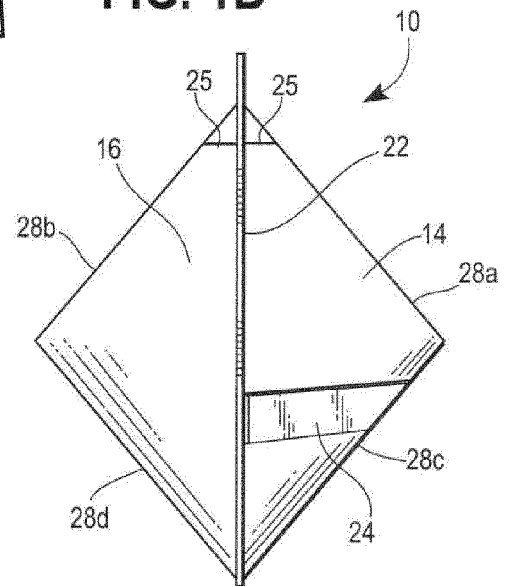


FIG. 1C

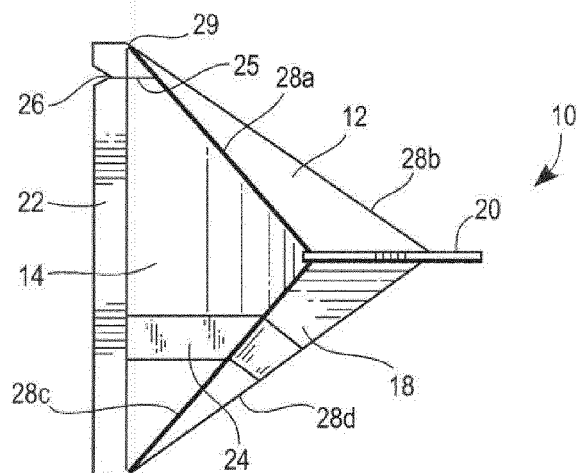


FIG. 2A

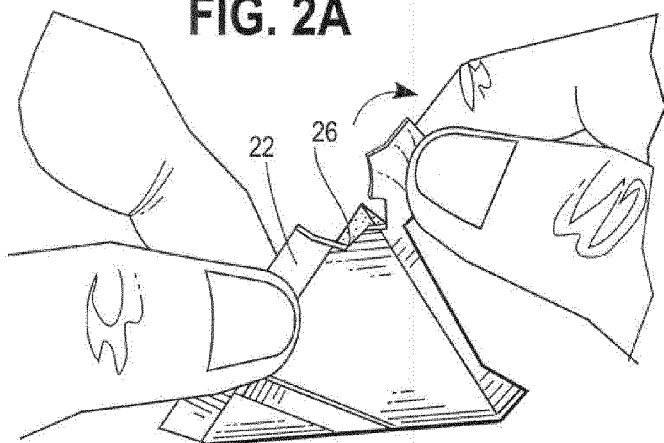


FIG. 2B

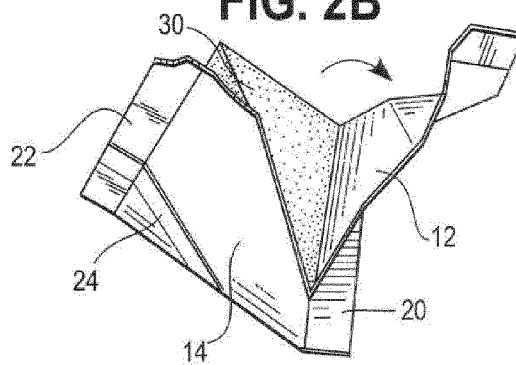


FIG. 2C

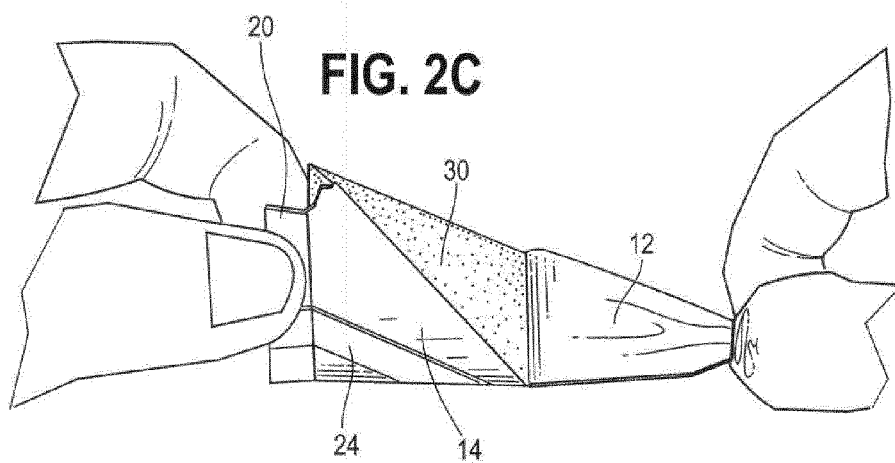


FIG. 2D

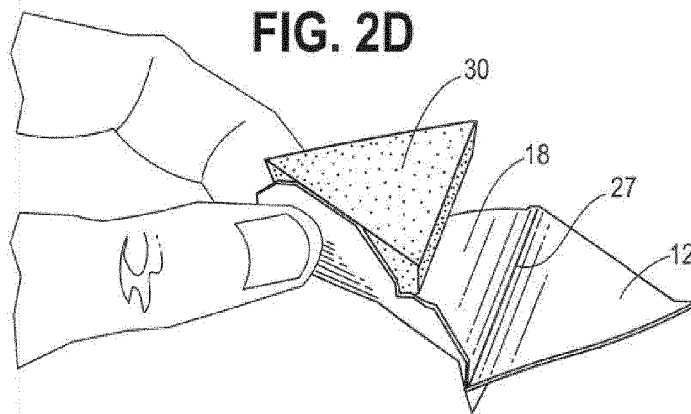


FIG. 2E

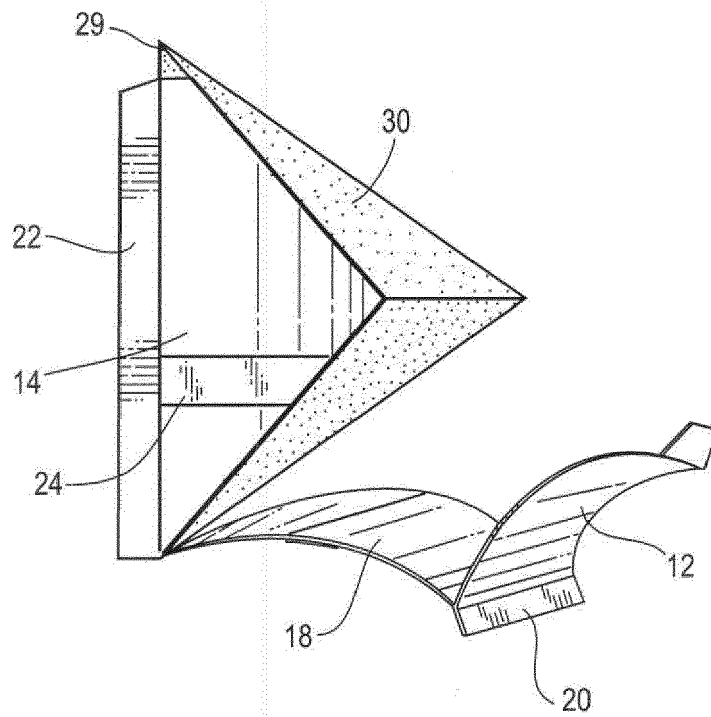


FIG. 2F

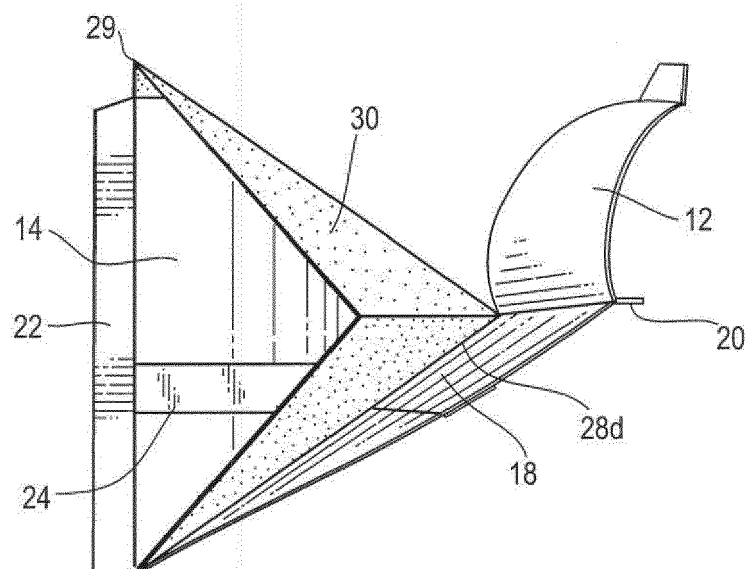


FIG. 3

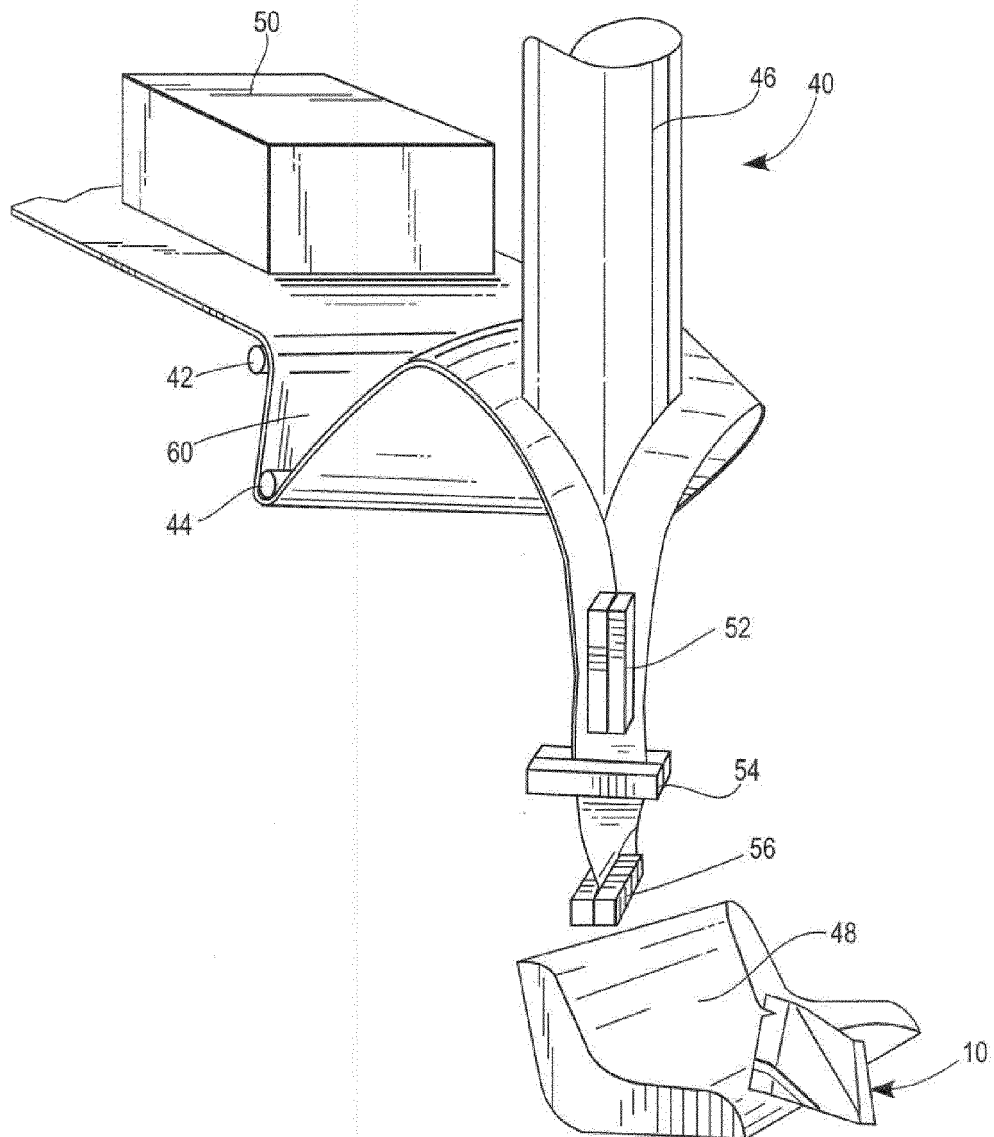


FIG. 4

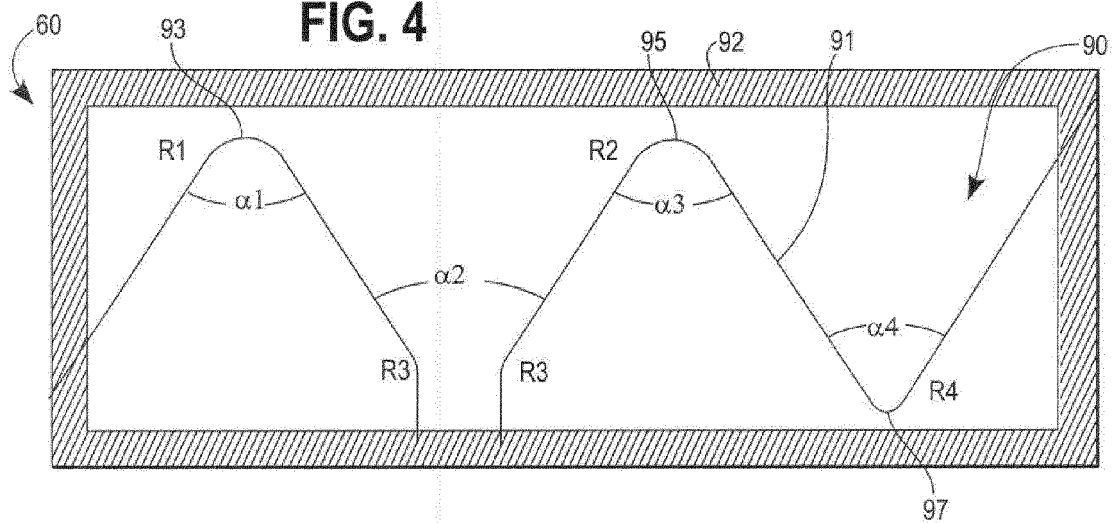


FIG. 5A

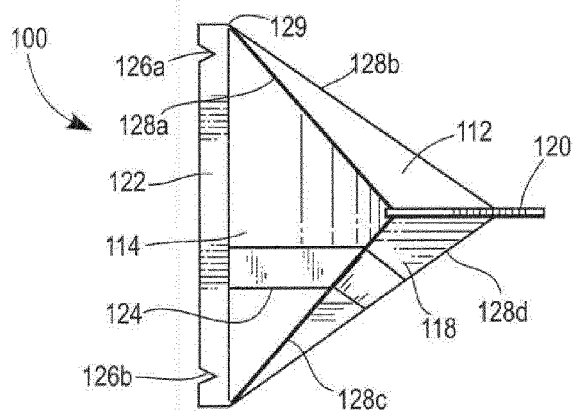
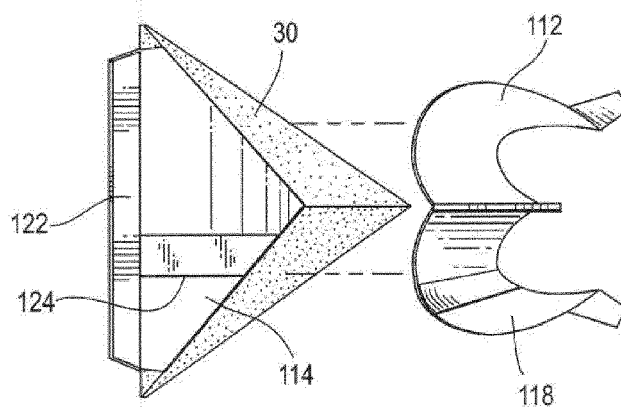


FIG. 5B





EUROPEAN SEARCH REPORT

Application Number
EP 12 27 5033

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Place of search Munich		Date of completion of the search 22 August 2012	Examiner Lämmel, Gunnar
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