



US 20060071057A1

(19) **United States**

(12) **Patent Application Publication**
Aschenbrenner et al.

(10) **Pub. No.: US 2006/0071057 A1**

(43) **Pub. Date: Apr. 6, 2006**

(54) **FRANGIBLE SEAL FOR PACKAGING**

(52) **U.S. Cl. 229/87.05; 383/207; 383/209**

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(57) **ABSTRACT**

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A product packaging comprising a non-rigid wrapper sheet with a top side and a bottom side and a thickness defined between the top side and the bottom side. The non-rigid wrapper sheet includes a frangible seal. The frangible seal includes a top recess located in the top side of the non-rigid wrapper sheet and a bottom recess located in the bottom side of the non-rigid wrapper sheet and being adjacent to the top recess. The top recess is at least partially offset from the bottom recess as defined by the non-intersection of two separate planes extending perpendicularly through the top side of the non-rigid wrapper sheet with one plane also passing through the lateral center of the top recess and the other plane also passing through the lateral center of the bottom recess.

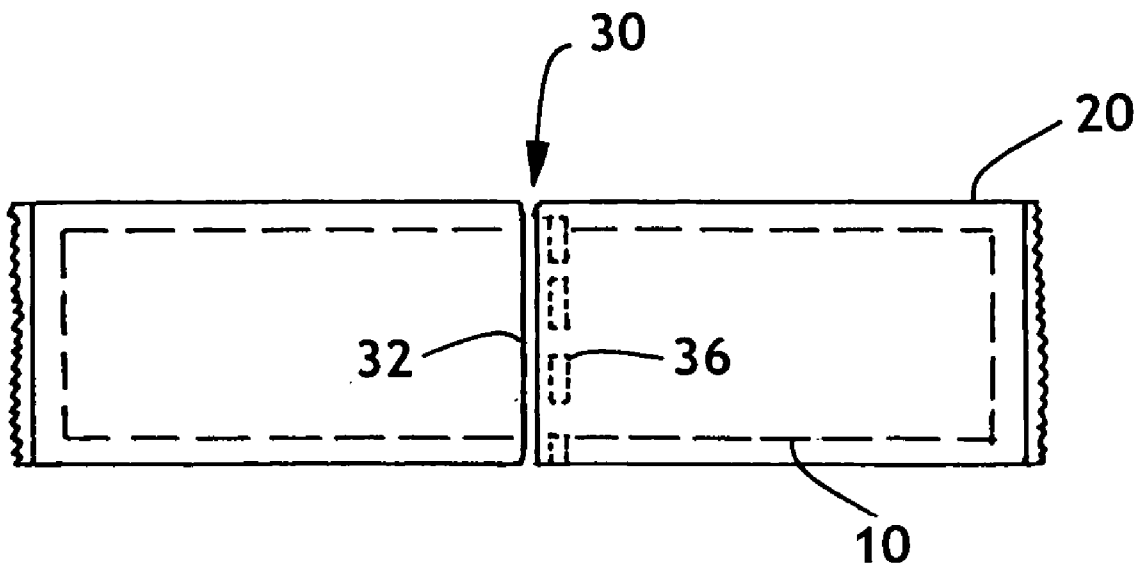
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(21) Appl. No.: **10/957,137**

(22) Filed: **Sep. 30, 2004**

Publication Classification

(51) **Int. Cl.**
B65D 65/26 (2006.01)
B65D 33/00 (2006.01)



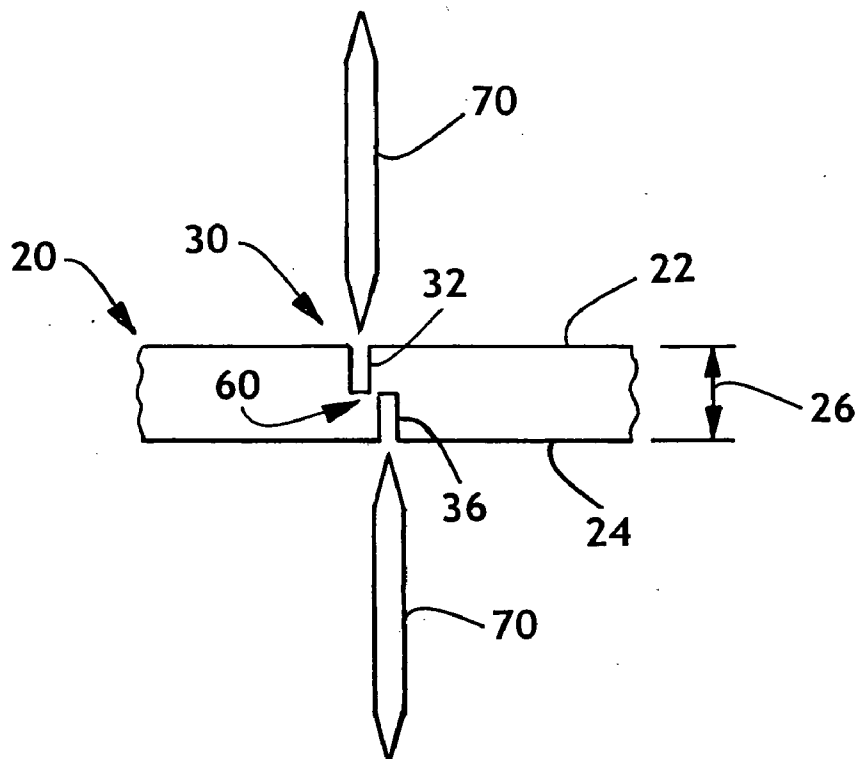


FIG. 1

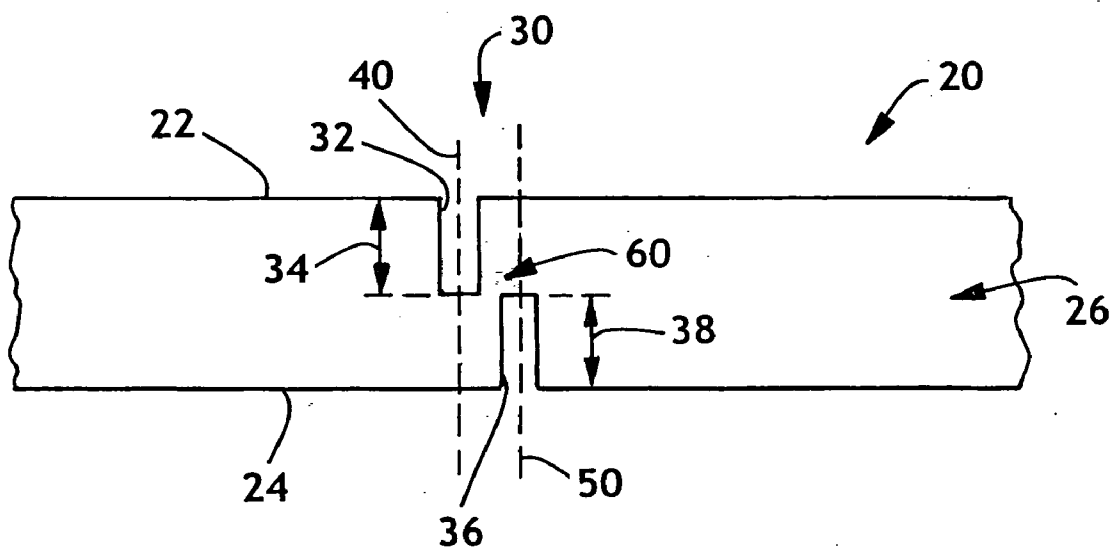


FIG. 2

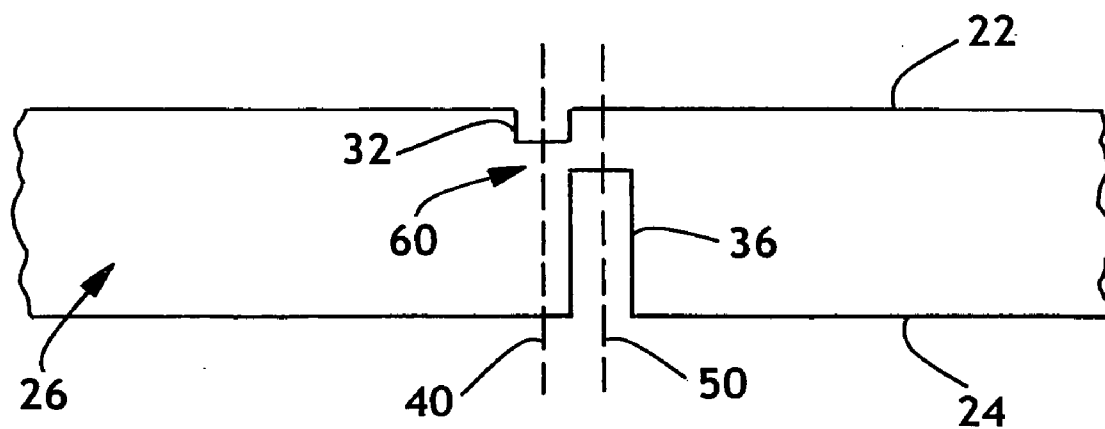


FIG. 3

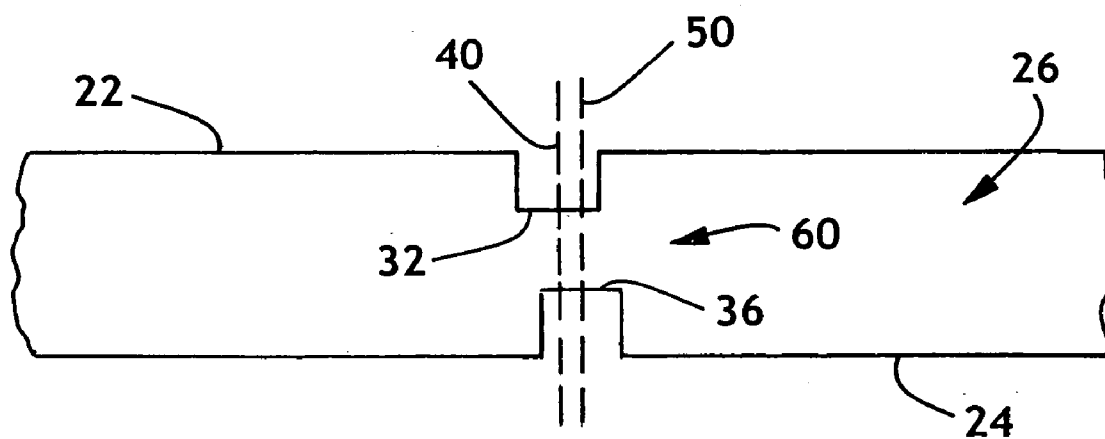


FIG. 4

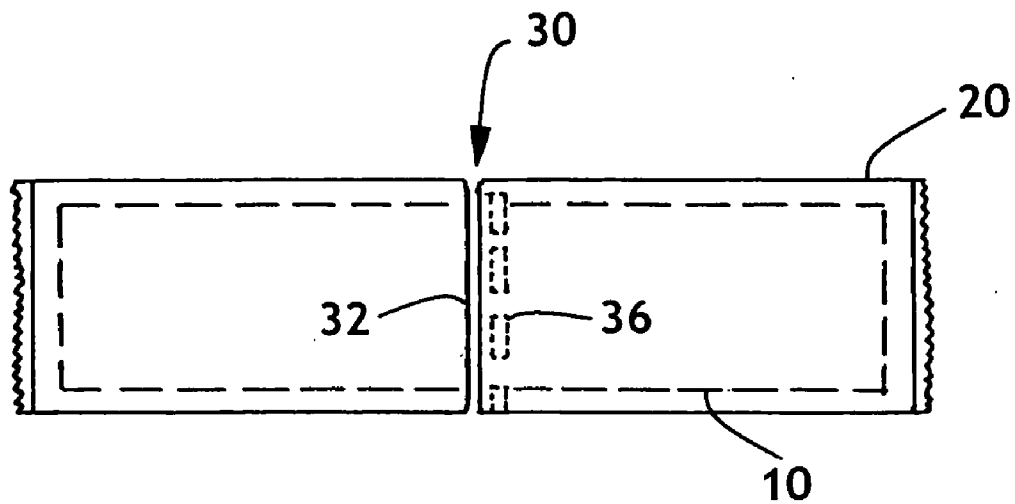


FIG. 5

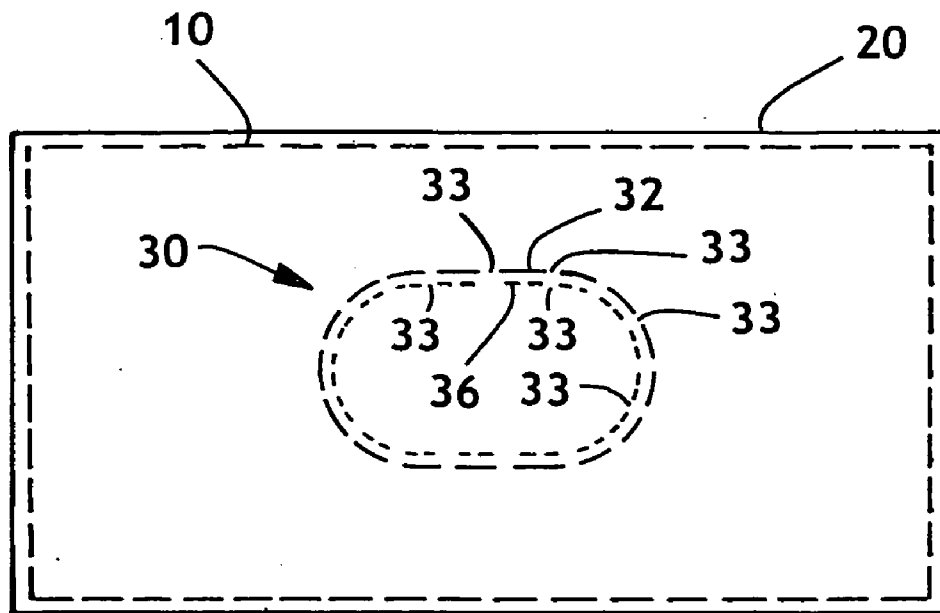


FIG. 6

FRANGIBLE SEAL FOR PACKAGING

BACKGROUND OF THE INVENTION

[0001] There are a variety of ways to frangibly seal packaging or a packaging wrapper, and thereby provide a defined opening in the package when the seal is broken. Some conventional ways include a simple single-sided perforation or a single-sided score in the package wrapper. Such conventional ways have generally provided a packaging that is sealed shut (completely air impermeable to some air permeability) before the seal is broken and then defines an opening in the package wrapper after the seal is broken, the seal being broken in a pattern which defines the opening and without readily tearing parts of the wrapper other than that which forms the opening itself. Such conventional seals have also been used to provide an easier opening package, due to the wrapper being weakened at the location defining the opening where the seal is broken.

[0002] However, the formation and/or use of conventional frangible seals has not been completely satisfactory. For example, the reliability and successful operation of conventional seals can be limited, and even negatively impacted, by manufacturing variability. Similarly, conventional seals have relatively narrow operating parameters and so manufacturing costs can be increased, and manufacturing options decreased, to insure an operable seal in final packaging. Thus, there is a need to overcome one or more of these, or possibly other, shortcomings of conventional frangible seals.

SUMMARY OF THE INVENTION

[0003] In response to one or more, or other, difficulties discussed above, for example, a new frangible seal for packaging has been invented. The purposes and features of the present invention will be set forth in and are apparent from the description that follows, as well as will be learned by practice of the invention. Additional features of the invention will be realized and attained by the aspects particularly pointed out in the written description and claims hereof, as well as from the appended drawings.

[0004] In one aspect, the invention provides a product packaging which includes a non-rigid wrapper sheet with a top side and a bottom side and a thickness defined between the top side and the bottom side. As used herein, "non-rigid" means a non-foamed polymeric containing film with a thickness of about 250 micrometers or less, advantageously about 200 micrometers or less, still more advantageously about 150 micrometers or less, yet still more advantageously about 100 micrometers or less, and yet still more advantageously about 50 micrometers or less, or alternatively, a foamed polymeric containing film with a thickness of about 2000 micrometers or less, advantageously about 1800 micrometers or less, still more advantageously about 1600 micrometers or less, yet still more advantageously about 1400 micrometers or less, and yet still more advantageously about 1200 micrometers or less. The non-rigid wrapper sheet includes a frangible seal. The frangible seal includes a top recess located in the top side of the non-rigid wrapper sheet and a bottom recess located in the bottom side of the non-rigid wrapper sheet and being adjacent to the top recess. The top recess is at least partially offset from the bottom recess as defined by the non-intersection of two separate planes extending perpendicularly through the top side of the

non-rigid wrapper sheet with one plane also passing through the lateral center of the top recess and the other plane also passing through the lateral center of the bottom recess.

[0005] In another aspect, the invention provides, optionally or additionally, a product packaging which includes a non-rigid wrapper sheet with a top side and a bottom side and a thickness defined between the top side and the bottom side. The non-rigid wrapper sheet includes a frangible seal. The frangible seal includes a top recess located in the top side of the non-rigid wrapper sheet and a bottom recess located in the bottom side of the non-rigid wrapper sheet and being adjacent to the top recess. A bond is located between the top recess and the bottom recess such that the non-rigid wrapper sheet forms an impermeable barrier to prevent liquid passing from at least one of the top side to the bottom side of the non-rigid wrapper sheet or the bottom side to the top side of the non-rigid wrapper sheet. The top recess extends a first distance into the thickness of the non-rigid wrapper sheet and the bottom recess extends a second distance into the thickness of the non-rigid wrapper sheet and the first distance is not equal to the second distance.

[0006] In still another aspect, the invention provides, optionally or additionally, a product packaging which includes a non-rigid wrapper sheet with a top side and a bottom side and a thickness defined between the top side and the bottom side. The non-rigid wrapper sheet includes a frangible seal. The frangible seal includes a top recess located in the top side of the non-rigid wrapper sheet and a bottom recess located in the bottom side of the non-rigid wrapper sheet and being adjacent to the top recess. A bond is located between the top recess and the bottom recess such that the non-rigid wrapper sheet forms an impermeable barrier to prevent liquid passing from at least one of the top side to the bottom side of the non-rigid wrapper sheet or the bottom side to the top side of the non-rigid wrapper sheet and the top recess does not superpose any part of the bottom recess.

[0007] In other aspects, the invention provides, optionally or additionally, various configurations for the top and bottom recesses, alternating recesses and non-recessed portions and continuous line recesses.

[0008] As with the other aspects of the invention, the wrapper can be transparent or translucent to provide an indication of the contents in the package. The wrapper can be made of various rigid to non rigid materials, including without limitation polymers, copolymers, and mixtures, including, e.g., polyethylene, polypropylene, polyester, polystyrene, and other polymers. The materials could be made into films or woven and non-woven sheets from which to construct the product packaging and non-rigid wrapper sheet.

[0009] It is to be understood that both the foregoing general description and the following detailed description are exemplary and are intended to provide further explanation of the invention claimed. The accompanying drawings, which are incorporated in and constitute part of this specification, are included to illustrate and provide a further understanding of the aspects of the invention. Together with the description, the drawings serve to explain the various aspects of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present invention will be more fully understood and further features will become apparent when reference is made to the following detailed description of the invention and the accompanying drawings. The drawings are merely representative and are not intended to limit the scope of the claims. Like parts of the packaging depicted in the drawings are referred to by the same reference numerals.

[0011] FIG. 1 diagrammatically shows a cross-sectional view of a portion of a non-rigid wrapper sheet in accordance with the invention and way of making same.

[0012] FIG. 2 shows an exploded view of the non-rigid wrapper sheet seen in FIG. 1.

[0013] FIG. 3 representatively shows an exploded view of a portion of another embodiment of a non-rigid wrapper sheet in accordance with the invention.

[0014] FIG. 4 representatively shows an exploded view of a portion of still another embodiment of a non-rigid wrapper sheet in accordance with the invention.

[0015] FIG. 5 representatively shows a product with packaging in accordance with the invention.

[0016] FIG. 6 representatively shows another product with packaging in accordance with the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0017] The present invention is directed at solving one or more problem related to frangible seals in packaging. As representatively illustrated throughout the figures, the present invention provides packaging for a product 10. The product could be a tampon (FIG. 5) or other cylindrical article, as well as flatter articles such as a stack of sanitary napkins, diapers, wipes, candy bar, soap, or most any consumer product (all as generally shown in FIG. 6). The product(s), e.g., tampon, sanitary pad, diaper, training pant, wipe, wet wipe, medical device, etc., can be arranged in the packaging in any manner which provides convenient storing and use thereof. The types and configurations for product(s), as well as others not specifically discussed herein, can be provided by means known to those skilled in the art.

[0018] The packaging includes a non-rigid wrapper sheet 20 with a top side 22 and a bottom side 24 and a thickness 26 defined between the top side and the bottom side. The non-rigid wrapper sheet includes a frangible seal 30. The frangible seal 30 includes a top recess 32 located in the top side 22 of the non-rigid wrapper sheet and a bottom recess 36 located in the bottom side 24 of the non-rigid wrapper sheet, with the recess 36 being adjacent to the top recess 32. The top recess 32 is at least partially offset from the bottom recess 36 as such is defined by the non-intersection of two separate planes 40 and 50 extending perpendicularly through the top side 22 of the non-rigid wrapper sheet 20 with plane 40 also passing through the lateral center of the top recess and the other plane 50 also passing through the lateral center of the bottom recess, all as representatively seen in FIGS. 2-4. Without being limited by a theory of understanding, such frangible seal features are believed to provide enhanced reliability and successful operation over conventional seals. For example, this can be advantageous to assist the wrapper sheet to seal the product inside and better disallowing entry of foreign particles (e.g., an impermeable seal), yet also enabling an easy and convenient/quick disruption/opening seal for consumers. Additionally, such can provide wider

operating parameters so manufacturing costs can be decreased, and manufacturing options increased, to better insure a consistently operable seal in final packaging. For example, this is particularly applicable when using films that due to their thinner profile, present unique manufacturing challenges during forming, filling and sealing shut of product inside the non-rigid wrapper sheets.

[0019] The recesses 32, 36 can be formed by various conventional means for forming a single sided recess, for example, forming perforations, zones of frangibility, score line(s) or crush cutting, where rotary blades 70 can be each a conventional type blade but then put into the inventive configuration first described and disclosed herein for forming a recess on each of the top side and bottom side of the non-rigid wrapper sheet. As used herein, "perforation" means the amount of linear cutting (as opposed to the depth of the cut into the thickness of the non-rigid wrapper sheet 20) and the distance between the cuts in the perforation that separates one part of the non-rigid wrapper sheet from the non-rigid wrapper sheet on the other side of the frangible seal 30. There are five parameters to the formation of the recesses 32, 36: cut length, cut width, bond length between linear sequential perforations, recess depth into the thickness of the sheet and distance of separation of a top recess from a bottom recess. By way of example only, exemplary recesses that are useful with non-rigid wrapper sheets of the invention, are ones that have: a cut length in the range of 0.1 mm to continuously and advantageously 0.1 mm to 5 mm and more advantageously 0.1 mm to 2 mm; a cut width in the range of 0.01 mm to 0.5 mm and advantageously 0.01 mm to 0.2 mm; a bond length in the range of 0 mm to 1 mm and advantageously 0 to 0.5 mm; a recess depth in the range of 0.002 mm to 0.1 mm and advantageously 0.002 mm to 0.05 mm; and, a distance of separation in the range of 0 mm to 0.1 mm and advantageously 0.01 mm to 0.05 mm. To the degree it is not self evident, when the cut length is continuous and the bond length zero, the recess is without perforations (see recess 32 in FIG. 5). The distance of separation between adjacent top and bottom recesses refers to the shortest distance between the most adjacent parts of each recess, and when the distance is zero the frangible seal is at least partially permeable because then there is no bond between at least a portion of each adjacent top and bottom recess.

[0020] The wrapper or packaging of the present invention can be made from various materials and in various configurations. By way of example without limitation, reference is made to the Figures for some of these. The wrapper or packaging pouch can be made of a variety of non-rigid materials, e.g., such non-rigid materials being polyester film laminated to polyethylene film. The polyester film can be reverse printed, so the printing is between the two film layers. Alternatively, a single-ply surface printed film can be used. A single-ply film can be composed of one or more layers of polyolefin, polypropylene, polyethylene, copolymers cellophane, and, e.g., formed in a coextrusion. The packaging with product therein can be formed by various form, fill and seal techniques known to those of skill in the art. Ultimately, desired recess measurements are dependent upon many factors including sheet characteristics (e.g., material composition, formation process, bulk, density, thickness, weight, CD tensile, MD tensile), desired packaging frangible sealing forces and seal opening forces (e.g., type of product within the packaging, type of dispensing, type of dispenser) and others that can affect how the sheet separates from itself along the frangible seal when opened for use of the product. Considering all of these variables, the

applicants have found it can be advantageous to configure recesses 32, 36 with measurements such that testing of the strength of the frangible seal in a conventional tensile tester makes the breaking strength (i.e., the force needed to break the frangible seal open) in the range of 15 to 70 Newtons and more advantageously 20 to 60 Newtons.

[0021] Various additional features of the invention will now be discussed. These features can be used individually or in combination with some or all of those discussed herein, as desired to take advantage of the invention in different ways. One of these features concerns where the top recess extends a first distance 34 into the thickness of the non-rigid wrapper sheet and the bottom recess extends a second distance 38 into the thickness 26 of the non-rigid wrapper sheet. In one aspect, and the first distance 34 is not equal to the second distance 38. In another aspect, the first distance 34 is equal to the second distance 38. In still another aspect, at least one of the first distance 34 and the second distance 38 is greater than one half the thickness of the non-rigid wrapper sheet.

[0022] Other features concern at least one of the top recess and the bottom recess being linearly adjacent at least one non-recessed portion, i.e., to form a perforation in that side of the sheet. There can be multiple top side perforations through a plurality of top recesses 32 and a plurality of top non-recessed portions 33, each top recess being adjacent a top non-recessed portion and each top recess and top non-recessed portion alternating in a line across the top side of the wrapper. Similarly, there can be multiple bottom side perforations through a plurality of bottom recesses 36 and a plurality of bottom non-recessed portions 33, each bottom recess being adjacent a bottom non-recessed portion and each bottom recess and bottom non-recessed portion alternating in a line across the bottom side of the wrapper.

[0023] Still other features concern a bond 60 located between the top recess 32 and the bottom recess 36 such that the non-rigid wrapper sheet forms an impermeable barrier to prevent liquid passing from at least one of the top side 22 to the bottom side 24 of the non-rigid wrapper sheet or the bottom side 24 to the top side 22 of the non-rigid wrapper sheet.

[0024] Yet another feature provides that the top recess 32 may (FIGS. 3 and 4) or may not (FIGS. 1, 2, 5 and 6) superpose any part of the bottom recess 36.

[0025] Still yet another feature provides at least one of the top recess 32 and the bottom recess 36 forms a continuous line (see recess 32 in FIG. 5) about the packaging.

[0026] While the invention has been described in detail with respect to the specific aspects thereof, it will be appreciated that those skilled in the art, upon attaining an understanding of the foregoing, may readily conceive of alterations to, variations of, and equivalents to these aspects. Accordingly, the scope of the present invention should be assessed as that of the appended claims.

What is claimed is:

1. A product packaging comprising:

a non-rigid wrapper sheet with a top side and a bottom side and a thickness defined between the top side and the bottom side;

the non-rigid wrapper sheet including a frangible seal; and,

the frangible seal including a top recess located in the top side of the non-rigid wrapper sheet and a bottom recess located in the bottom side of the non-rigid wrapper sheet and being adjacent to the top recess, wherein the top recess is at least partially offset from the bottom recess as defined by the non-intersection of two separate planes extending perpendicularly through the top side of the non-rigid wrapper sheet with one plane also passing through the lateral center of the top recess and the other plane also passing through the lateral center of the bottom recess.

2. The product packaging of claim 1 wherein the top recess extends a first distance into the thickness of the non-rigid wrapper sheet and the bottom recess extends a second distance into the thickness of the non-rigid wrapper sheet and the first distance is not equal to the second distance.

3. The product packaging of claim 1 wherein the top recess extends a first distance into the thickness of the non-rigid wrapper sheet and the bottom recess extends a second distance into the thickness of the non-rigid wrapper sheet and the first distance is equal to the second distance.

4. The product packaging of claim 1 wherein the top recess extends a first distance into the thickness of the non-rigid wrapper sheet and the bottom recess extends a second distance into the thickness of the non-rigid wrapper sheet and at least one of the first distance and the second distance is greater than one half the thickness of the non-rigid wrapper sheet.

5. The product packaging of claim 1 wherein at least one of the top recess and the bottom recess is linearly adjacent at least one non-recessed portion.

6. The product packaging of claim 5 comprising a plurality of top recesses and a plurality of top non-recessed portions, each top recess being adjacent a top non-recessed portion and each top recess and top non-recessed portion alternating in a line across the top side of the wrapper.

7. The product packaging of claim 5 comprising a plurality of bottom recesses and a plurality of bottom non-recessed portions, each bottom recess being adjacent a bottom non-recessed portion and each bottom recess and bottom non-recessed portion alternating in a line across the bottom side of the wrapper.

8. The product packaging of claim 1 comprising a bond located between the top recess and the bottom recess such that the non-rigid wrapper sheet forms an impermeable barrier to prevent liquid passing from at least one of the top side to the bottom side of the non-rigid wrapper sheet or the bottom side to the top side of the non-rigid wrapper sheet.

9. The product packaging of claim 1 wherein the top recess does not superpose any part of the bottom recess.

10. The product packaging of claim 1 wherein at least one of the top recess and the bottom recess forms a continuous line about the packaging.

11. A product packaging comprising:

a non-rigid wrapper sheet with a top side and a bottom side and a thickness defined between the top side and the bottom side;

the non-rigid wrapper sheet including a frangible seal;

the frangible seal including a top recess located in the top side of the non-rigid wrapper sheet and a bottom recess located in the bottom side of the non-rigid wrapper sheet and being adjacent to the top recess; and,

a bond located between the top recess and the bottom recess such that the non-rigid wrapper sheet forms an impermeable barrier to prevent liquid passing from at least one of the top side to the bottom side of the non-rigid wrapper sheet or the bottom side to the top side of the non-rigid wrapper sheet and wherein the top recess extends a first distance into the thickness of the non-rigid wrapper sheet and the bottom recess extends a second distance into the thickness of the non-rigid wrapper sheet and the first distance is not equal to the second distance.

12. The product packaging of claim 11 wherein the top recess extends a first distance into the thickness of the non-rigid wrapper sheet and the bottom recess extends a second distance into the thickness of the non-rigid wrapper sheet and at least one of the first distance and the second distance is greater than one half the thickness of the non-rigid wrapper sheet.

13. The product packaging of claim 11 wherein at least one of the top recess and the bottom recess is linearly adjacent at least one non-recessed portion.

14. The product packaging of claim 13 comprising a plurality of top recesses and a plurality of top non-recessed portions, each top recess being adjacent a top non-recessed portion and each top recess and top non-recessed portion alternating in a line across the top side of the wrapper.

15. The product packaging of claim 13 comprising a plurality of bottom recesses and a plurality of bottom non-recessed portions, each bottom recess being adjacent a bottom non-recessed portion and each bottom recess and bottom non-recessed portion alternating in a line across the bottom side of the wrapper.

16. The product packaging of claim 11 wherein at least one of the top recess and the bottom recess forms a continuous line about the packaging.

17. A product packaging comprising:

a non-rigid wrapper sheet with a top side and a bottom side and a thickness defined between the top side and the bottom side;

the non-rigid wrapper sheet including a frangible seal;

the frangible seal including a top recess located in the top side of the non-rigid wrapper sheet and a bottom recess located in the bottom side of the non-rigid wrapper sheet and being adjacent to the top recess; and,

a bond located between the top recess and the bottom recess such that the non-rigid wrapper sheet forms an impermeable barrier to prevent liquid passing from at least one of the top side to the bottom side of the non-rigid wrapper sheet or the bottom side to the top side of the non-rigid wrapper sheet and wherein the top recess does not superpose any part of the bottom recess.

18. The product packaging of claim 17 wherein at least one of the top recess and the bottom recess forms a continuous line about the packaging.

19. The product packaging of claim 18 wherein the top recess extends a first distance into the thickness of the non-rigid wrapper sheet and the bottom recess extends a second distance into the thickness of the non-rigid wrapper sheet and the first distance is not equal to the second distance.

20. The product packaging of claim 19 wherein the top recess extends a first distance into the thickness of the non-rigid wrapper sheet and the bottom recess extends a second distance into the thickness of the non-rigid wrapper sheet and at least one of the first distance and the second distance is greater than one half the thickness of the non-rigid wrapper sheet.

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