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(54) **DOUBLE-BOTTOM SIDE-WELDED BAG**

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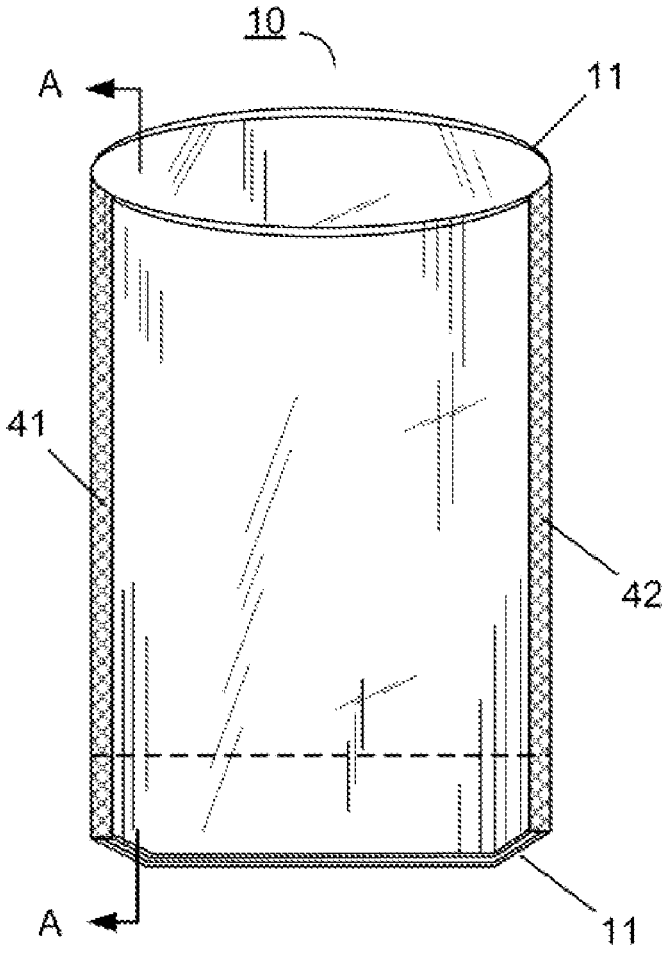
(57) **ABSTRACT**

The present invention relates to flexible double-bottom bags having an outer web which is folded upon itself to form a front panel and a back panel The outer web includes an inward-facing cross-sectional gusset opposite the open mouth of the bag and centered along the width of the bag joining the front panel to the back panel and creating an outer bottom portion of the bag. The bags also have an inner web which is folded upon itself to form a front panel and a back panel.



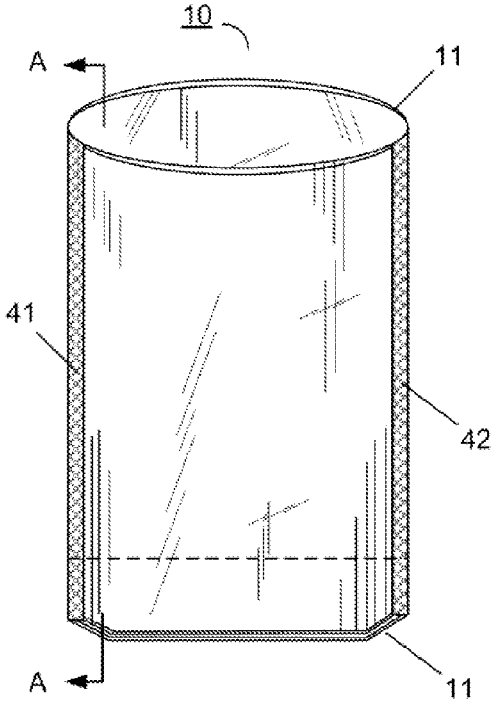


FIG. 1

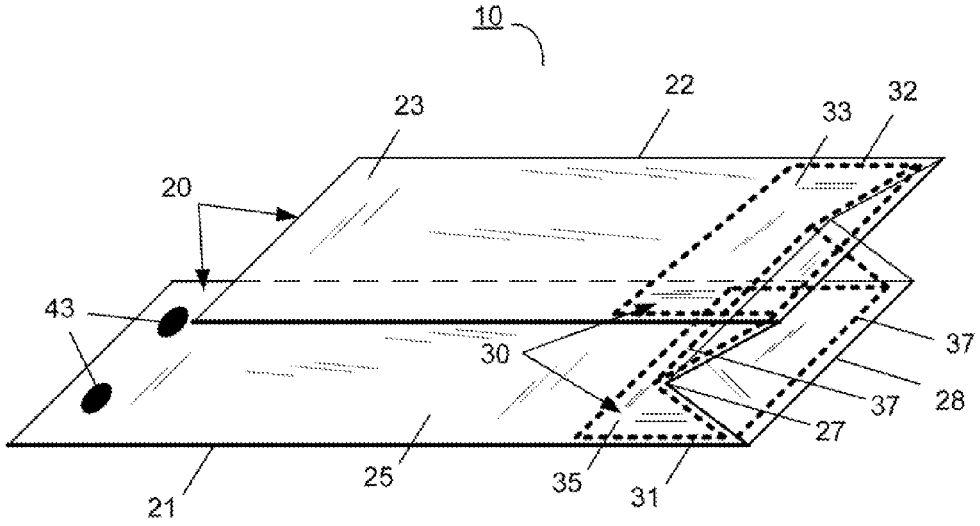


FIG. 2

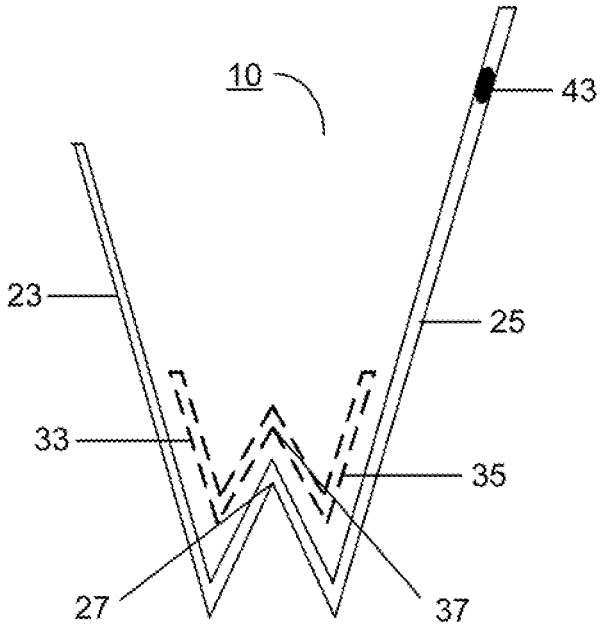


FIG. 3

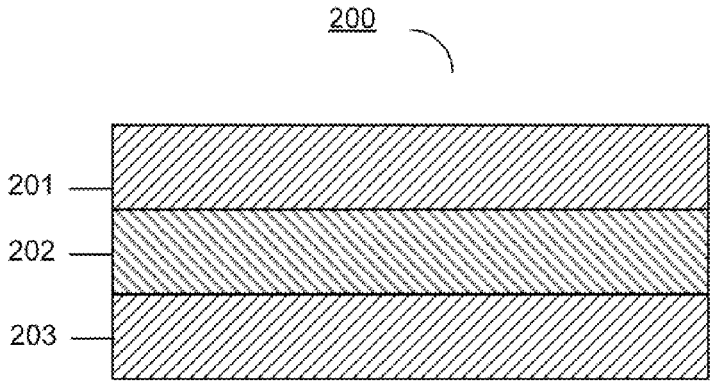


FIG. 4

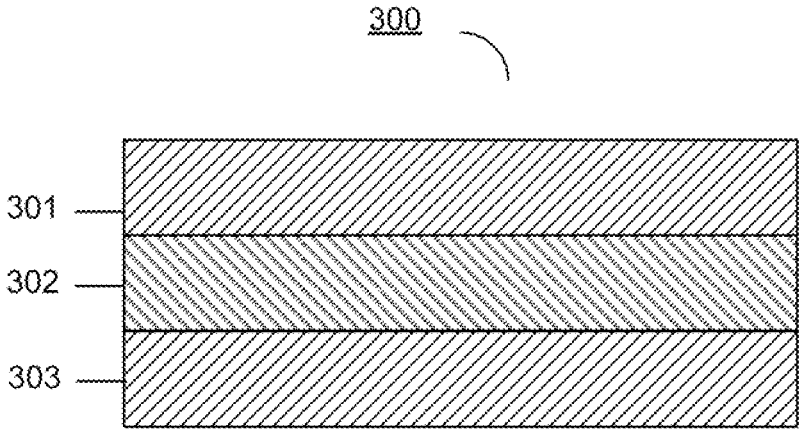


FIG. 5

DOUBLE-BOTTOM SIDE-WELDED BAG

BACKGROUND OF THE INVENTION

[0001] The present invention relates generally to flexible bags designed to hold food products such as bread.

[0002] It is known to construct a plastic bag by folding a continuous sheet of a flexible material, such as thermoplastic, over on itself, then making an in-fold at the folded edge, to form a gusset, and then simultaneously cutting and heat sealing the folded sheet along spaced apart transverse lines that are perpendicular to the fold. Each individual bag formed in this manner has an "W" shaped cross section at the gusset. This type of bag is commonly referred to as a "bread bag" and is often used for packaging loaves of bread. The bread loaf is inserted into the bag through an open end that is opposite the gusset. The open end is then tied shut in an appropriate manner to often present what is called the "pony-tail" end of the bag.

[0003] When fresh warm bread and similar bakery products are packaged in plastic bags, the moisture from the bread is retained and often condenses on the inside of the package. This is a particular problem when bread is stored in bags formed from polyethylene where the bread contacts the bottom gusset of the bag. Typically, the bottom gusset faces the consumer and contains the product identifying information and the supplier's trade-marks and logos. Product information and logos are often printed directly on the bag or affixed using a label at this location. Because bread bags are usually transparent or translucent, any moisture that condenses on the inside of the polyethylene bottom gusset causes the package to have an unsightly appearance and decreases the visual quality of the food.

[0004] There is therefore a need for improved flexible bags which solves the above problems and can be efficiently manufactured.

SUMMARY OF THE INVENTION

[0005] The present invention is directed to a double-bottom bag comprising an outer web and an inner web having an open mouth and an opposing bottom, where the outer web has a first side edge, an opposing second side and is folded upon itself thereby defining a front panel having a length and a back panel having a length. The outer web further includes an inward-facing cross-sectional gusset opposite the open mouth of the bag and centered along the width of the bag which joins the front panel to the back panel and forms an outer bottom portion of the bag. The inner web has a first side edge, an opposing second side and is folded upon itself thereby defining a front panel having a length which is less than the length of the front panel of the outer web and a back panel having length which is less than the length of the back panel of the outer web. The inner web further includes an inward-facing cross-sectional gusset opposite the open mouth of the bag and centered along the width of the bag which joins the front panel to the back panel and forms an inner bottom portion of the bag. The bag further comprises a first side-seam affixing the first side edge of both the inner and outer webs together and affixing the front and back panels of the outer web together along the first side edge. The bag still further includes an opposing second side-seam affixing the opposing second side edge of both the inner and outer webs together and affixing the front and back panels of the outer web together along the second side edge. The bag of the present invention is designed such that the inward-facing cross-sectional gussets of both the inner and outer webs expand to form a square cross-sectional portion upon receiving a material to be packaged. One advantage of the present invention provides is a separate surface of an inner web where moisture from the bread or other bakery products may condense without affecting the appearance of product identifying information printed on an outer web of the bag. The present invention also provides the convenience of a square or rectangular bottom gusset cross sectional area where product information can be printed and viewed by the consumer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Further features and advantages of the present invention will become apparent from the following detailed description, taken in combination with the appended drawings, in which:

[0007] FIG. **1** illustrates a schematic view of one embodiment of a double-bottom bag according to the present invention.

[0008] FIG. **2** illustrates an exploded view taken along line A-A of FIG. **1** depicting a double-bottom bag in a horizontal position.

[0009] FIG. **3** illustrates an exploded view taken along line A-A of FIG. **1** depicting a double-bottom bag in a vertical position.

[0010] FIG. **4** illustrates a transverse cross-sectional view of one embodiment of an outer web.

[0011] FIG. **5** illustrates a transverse cross-sectional view of one embodiment of an inner web.

DETAILED DESCRIPTION OF THE INVENTION

[0012] In accordance with the practice of the present invention, a representative double-bottom bag as described herein is shown in FIGS. **1-3**. Bag **10** of the present invention comprises an open mouth **11** and an opposing bottom **12**. As shown in the exploded view of bag **10** of FIGS. **2** and **3**, bag **10** further includes an outer web **20** (represented as a solid line) having a first side edge **21** and an opposing second side edge, **22**, a front panel **23** and a back panel **25**. Bag **10** also includes an inner web **30** (represented as a dotted line) having a first side edge **31** and an opposing second side edge, **32**, a front panel **33** and a back panel **35**. Outer and inner webs each include an inward-facing cross-sectional gusset, **27** and **37**, respectively, opposite the open mouth **11** and centered along the width of the bag. As depicted in FIGS. **2** and **3**, gussets **27** and **27** join the front panels, **23** and **33** to the back panels, **25** and **35**, respectively. Inward-facing cross-sectional gusset **27** of outer web **20** forms an outer bottom portion **28** of bag **10** while inward-facing cross-sectional gusset **37** of inner web **30** forms an inner bottom portion **38** of bag **10**. Referring back to FIG. **1**, bag **10** further comprises a first side-seam **41** affixing first side edges **21** and **31** together, and affixing the front and back panels, **23** and **25** of the outer web **20** together along the first side edge **31**. Bag **10** also includes opposing second side-seam **42** affixing second side edges **22** and **32** together, and affixing the front and back panels, **23** and **25** of the outer web **20** together along the opposing second side edge **32**. First and second side-seams, **41** and **42**, will generally extend the entire length of front and back

panels **23** and **25** of the outer web **20**. Side-seams **41** and **42** may be formed by application of an adhesive which may include, but not limited to cold-seal adhesives, pressure sensitive adhesive and the like, or by heat sealing. Preferably, side seams **41** and **42** are each heat seals formed by application of heat and pressure to outer and inner webs **20** and **30**. The inward facing cross-sectional gussets **27** and **37** are each adapted to expand to form a square or rectangular cross-sectional bag bottom upon receiving a material to be packaged. Such a material may include, but is not limited to bakery products, such as bread loaves, hot dog and hamburger buns and the like. Non-food products may also be packed in the bags of the present invention.

[0013] In accordance with the present invention, the front panel **33** of inner web **30** has a length which is less than the length of the front panel **23** of outer web **20**. Front panel **33** may have a length which is about 75%, 70%, 65%, 60%, 55%, 50%, 45%, 40%, 35%, 30%, 25%, 20%, 15%, 10% or 5% of the length of front panel **23** of outer web **20**. Preferably, as illustrated in FIGS. **2** and **3**, front panel **33** of inner web **30** has a length which is less than 50%, more preferably, less than 25% and most preferably, about 15%, 10% or 5% of the length of front panel **23** of outer web **20**. Similarly, the back panel **35** of inner web **30** has a length which is less than the length of the back panel **25** of outer web **20**. Back panel **35** may have a length which is about 75%, 70%, 65%, 60%, 55%, 50%, 45%, 40%, 35%, 30%, 25%, 20%, 15%, 10% or 5% of the length of front panel **25** of outer web **20**. Preferably, as illustrated in FIGS. **2** and **3**, back panel **35** of inner web **30** has a length which is less than 50%, more preferably, less than 25% and most preferably, about 15%, 10% or 5% of the length of back panel **25** of outer web **20**. It is also contemplated that a substantial portion of each front panels **23** and **33** face each other and are unlaminated together, and a substantial portion of each back panels **25** and **35** face each other and are unlaminated together.

[0014] Optionally, the back panel **25** of outer web **20** may have a length which is greater than the length of the front panel **23** of outer web **20**. Back panel **25** may have a length which is 5%, 10%, 15%, 20% greater than the length of front panel **23** of outer web **20**. As illustrated in FIGS. **2** and **3**, by extending the length of the back panel **25** of outer web **20** a lip is formed which provides an area for one or more apertures, perforations or holes, **43** located near the open mouth **11**. Bags constructed with one or more apertures aids in handling and packaging of products in such a way that multiple bags can be placed on a wire "wicket" for ease of dispensing. Typically, there may be up to 250 bags mounted on a wicket pack. With this construction style, the bags can be mounted on a blower that will blow each individual bag open to allow products to be slid in easily. The bag can then be torn from the wicket and the next bag will blow open, ready for another packaging operation.

[0015] Any suitable packaging material may be used to formed outer and inner webs **20** and **30**. Preferably, outer web **20** is formed from a heat-fusible material. In one embodiment, it is desirable to form outer web **20** from a flexible thermoplastic film which is heat-fusible. In another embodiment, it is desirable to from outer **20** from a flexible thermoplastic film which is heat-fusible and substantially transparent. Preferably, outer web **20** is fabricated from a polyolefin thermoplastic material, which may include, but not limited to polyethylene homopolymer and copolymers, polyethylene blends, polypropylene homopolymer and copolymers, and blends of polyethylene and other thermoplastic materials.

[0016] Preferably, outer web **20** comprises a blend of low density polyethylene (LDPE) and linear low density polyethylene (LLDPE), a blend of 10% by weight of low density polyethylene (LDPE) and 90% by weight of linear low density polyethylene (LLDPE), a blend of 40% by weight of low density polyethylene (LDPE) and 60% by weight of linear low density polyethylene (LLDPE), or a blend of 60% by weight of low density polyethylene (LDPE) and 40% by weight of linear low density polyethylene (LLDPE). Outer web **20** may comprise a monolayer or multilayer structure. Referring now the FIG. **5**, outer web **20** may comprise a three ply structure **200** having an interior layer **202** sandwiched between two exterior layers **201** and **203**. In a preferred embodiment, layers **201**, **202** and **203** each comprise polyethylene. In another preferred embodiment, interior layer **202** comprises a blend of about 50% by weight polyethylene and about 50% by weight polypropylene copolymer, and exterior layers **201** and **203** each comprise polyethylene. It is also desirable that outer web **20** has a thickness of between 18 and 50 microns (0.71-2.0 mil).

[0017] Inner web **30** may be formed from the same material as outer web **20** or a different material. Preferably, inner web **30** is formed from a heat-fusible material. In one embodiment, it is desirable to from inner web **30** from a flexible thermoplastic film which is heat-fusible. In another embodiment, it is desirable to form inner **30** from a flexible thermoplastic film which is heat-fusible and substantially transparent. It may also be desirable to emboss at least one surface of inner web **30**. Embossing reduces the total surface area of inner web **30** that comes into contact with the moistened surface of a bread product. In another embodiment, inner web **30** is embossed and formed from a flexible thermoplastic film which is substantially opaque. Preferably, inner web **30** is fabricated from a polyolefin thermoplastic material, which may include, but not limited to polyethylene homopolymer and copolymers, polyethylene blends, polypropylene homopolymer and copolymers, and blends of polyethylene and other thermoplastic materials. Inner web **30** may comprise a monolayer or multilayer structure. Referring now the FIG. **6**, outer web **20** may comprise a three ply structure **300** having an interior layer **302** sandwiched between two exterior layers **301** and **303**. In a preferred embodiment, layers **301**, **302** and **303** each comprise polyethylene. It is also desirable that inner web **30** has a thickness of between 9 and 50 microns (0.35 and 2.0 mil), preferably, between 20 and 30 microns (0.8-1.2 mil).

[0018] The above description and the following examples illustrate certain embodiments of the present invention and are not to be interpreted as limiting. Selection of particular embodiments, combinations thereof, modifications, and adaptations of the various embodiments, conditions and parameters normally encountered in the art will be apparent to those skilled in the art and are deemed to be within the spirit and scope of the present invention.

WORKING EXAMPLES

[0019] In all the following examples, the outer web **20** structures were produced using a blown film coextrusion apparatus and methods which are well known to those skilled in the art. The inner web **30** structures were produced using cast coextrusion film apparatus and methods which are

well known to those skilled in the art. Inner web **30** was embossed by pressing and simultaneously cooling a melt-plastified film against an engraving cylinder.

Example 1

[0020] Example 1 is one embodiment of an outer web **20** as illustrated in FIG. **3**, and one embodiment of an inner web **30** as illustrated in FIG. **4** each having a structure and layer compositions as described below:

[0021] Layer **201** is a blend of 43% by weight of low density polyethylene (LDPE) having density of 0.922 g/cm^3, 54% by weight of linear low density polyethylene (LLDPE) having density of 0.918 g/cm^3, and about 3% by weight of processing additives. Exemplary of a commercially available LDPE is ExxonMobil™ LDPE LD 123.LN supplied by Exxon Mobil Chemical Company (Houston, Tex., USA). Exemplary of a commercially available LLDPE is ExxonMobil™ LLDPE LL 1002YB supplied by Exxon Mobil Chemical Company (Houston, Tex., USA).

[0022] Layer **202** is a blend of 60% by weight of linear low density polyethylene (LLDPE) having density of 0.919 g/cm^3, 10% by weight of polyethylene regrind, 27.5% by weight of low density polyethylene (LDPE) having density of 0.922 g/cm^3, and about 2.5% by weight processing additives. Exemplary of a commercially available LLDPE is DOWLEX™ TG 2085B supplied by Dow Chemical Company (Midland, Mich., USA).

[0023] Layer **203** has the same composition as Layer **201**.

[0024] Layer **301** is a blend of 29.5% by weight of linear low density polyethylene (LLDPE) having a density of 0.941 g/cm^3, 25% by weight of high density polyethylene (HDPE) having a density of 0.96 g/cm^3, 23% by weight of low density polyethylene (LDPE) having density of 0.918 g/cm^3. 21% by weight of linear low density polyethylene (LLDPE) having a density of 0.918 g/cm^3, and about 1.5% by weight processing additives. Exemplary of a commercially available LLDPE having a density of 0.941 g/cm^3 is ExxonMobil™ LLDPE LL 3404.48 supplied by Exxon Mobil Chemical Company (Houston, Tex., USA).

[0025] Layer **302** is a blend of 25% by weight of high density polyethylene (HDPE) having a density of 0.96 g/cm^3, 22% by weight of linear low density polyethylene (LLDPE) having a density of 0.918 g/cm^3, 18% by weight of linear low density polyethylene (LLDPE) having a density of 0.941 g/cm^3, 18% by weight of low density polyethylene (LDPE) having density of 0.918 g/cm^3, 12% by weight of a white pigmented low density polyethylene masterbatch, 2% by weight of polyethylene regrind, and about 2% by weight processing additives. Exemplary of a commercially available white pigment masterbatch is POLYBATCH® 8000 AP supplied by A. Schulman, Inc. (Akron, Ohio, USA).

[0026] Layer **303** has the same composition as Layer **301**.

[0027] Webs **20** and **30** of Example 1 were then evaluated for their physical and optical properties. The results are shown in TABLES 1 and 2 as follows:

TABLE 1

Outer Web 20	
Thickness (microns)	31
Elmendorf Tear Strength MD/TD (gram-force)	114/763
Secant Modulus MD/TD (Psi)	22000/27000
Elongation to Break (%)	400/550
Peak Stress MD/TD (Psi)	3300/2200
Haze	7.5
Gloss at 60°	100
Puncture to Break (Pound-force)	4.9
Seal Strength @ 140° C., 60 psi (grams/inch)	1600
Coefficient of Friction Kinetic/Static	0.16/0.14

TABLE 2

Inner Web 30	
Thickness (microns)	20-30
Elmendorf Tear Strength MD/TD (gram-force)	10/140
Elongation to Break (%) MD	160-600
Elongation to Break (%) MD	300-800
Opacity	50

[0028] To produce a bag as illustrated in FIGS. **1-3**, an outer web is unwound from a feed roll and then passed through a high speed in-register printing press to produce a printed outer web. An inner web that has been embossed and slit into narrow strips is unwound from a feed roll and is overlaid and centered onto the printed outer web. The two webs are folded upon themselves using a triangular fold initiator so as to create a front and back panel in each web. The outer web is folded in a manner so that the one panel is longer than the opposing other panel. The longer panel serves as a lip of the bag. Upon leaving the folding means, the folded edge of each web are engaged with a tucking element composed of three shaping disks, two disks which contact the inside surface of the inner web and one disk which contacts the outside surface of the outer web, which forms a longitudinally extending inward-facing tuck or a "W" shaped gusset in the folded edge of each web. The folded and gusseted webs are then drawn between a pair of opposed draw rolls and at least one hole is punched into the lip of the bag along with a corresponding tear notch, located near the open mouth of the bag. The lateral edges of the outer and inner webs are then sealed together by application of heat and pressure to form the side-seams. Each bag is then individualized by cutting along the length of the side-seam between the bag and the leading edge of the succeeding bag. Completed bags are collected in piles or placed on wickets for filling.

What is claimed:

1. A double-bottom bag having an open mouth, an opposing bottom and a width, comprising:

a. an outer web having a first side edge, an opposing second side edge and folded upon itself thereby defining:

i. a front panel having a length;

ii. a back panel having a length;

iii. an inward-facing cross-sectional gusset opposite the open mouth and centered along the width of the bag which joins the front panel to the back panel and forms an outer bottom portion of the bag;

b. an inner web having a first side edge, an opposing second side and folded upon itself thereby defining:
   i. a front panel having a length which is less than the length of the front panel of the outer web;
   ii. a back panel having length which is less than the length of the back panel of the outer web;
   iii. an inward-facing cross-sectional gusset opposite the open mouth and centered along the width of the bag which joins the front panel to the back panel and forms an inner bottom portion of the bag;

c. a first side-seam affixing the first side edge of both the inner and outer webs together, and affixing the front and back panels of the outer web together along the first side edge;

d. an opposing second side-seam affixing the opposing second side edge of both the inner and outer webs together, and affixing the front and back panels of the outer web together along the opposing second side edge; and

e. wherein the inward-facing cross-sectional gussets of both the inner and outer webs expand to form a square or rectangular cross-sectional bag bottom upon receiving a material to be packaged.

2. A bag according to claim **1**, wherein a substantial portion of the front panel of the outer web and a substantial portion of the front panel of the inner web face each other and are unlaminated.

3. A bag according to claim **1**, wherein a substantial portion of the back panel of the outer web and a substantial portion of the back panel of the inner web face each other and are unlaminated.

4. A bag according to claim **1**, wherein the length of the back panel of the outer web is greater than the length of the front panel of the outer web.

5. A bag according to claim **4**, wherein the back panel of the outer web comprises at least one aperture proximal to the open mouth of the bag.

6. A bag according to claim **4**, wherein the back panel of the outer web comprises a pair of apertures proximal to the open mouth of the bag.

7. A bag according to claim **1**, wherein the outer web comprises a heat-fusible material.

8. A bag according to claim **1**, wherein the outer web is a flexible thermoplastic film.

9. A bag according to claim **8**, wherein the flexible thermoplastic film is substantially transparent.

10. A bag according to claim **8**, wherein the flexible thermoplastic film is a three ply film.

11. A bag according to claim **8**, wherein the flexible thermoplastic film comprises polyethylene.

12. A bag according to claim **1**, wherein the inner web comprises a heat-fusible material.

13. A bag according to claim **1**, wherein the inner web is a flexible thermoplastic film.

14. A bag according to claim **13**, wherein the flexible thermoplastic film is substantially opaque.

15. A bag according to claim **13**, wherein the flexible thermoplastic film is a three ply film.

16. A bag according to claim **13**, wherein the flexible thermoplastic film comprises polyethylene.

17. A bag according to claim **1**, wherein the first side-seam is a heat seal.

18. A bag according to claim **1**, wherein the second side-seam is a heat seal.

19. A bag according to claim **1**, wherein the inner web is embossed.

20. A bag according to claim **1**, wherein the bag is a bread bag.

* * * * *