Nov. 9, 1971 T. E. PIAZZE 3,618,478

THREE DIMENSIONAL BAG WITH REINFORCED BOTTOM AND METHOD OF FORMING SAME

Filed July 31, 1969

FIG. 1

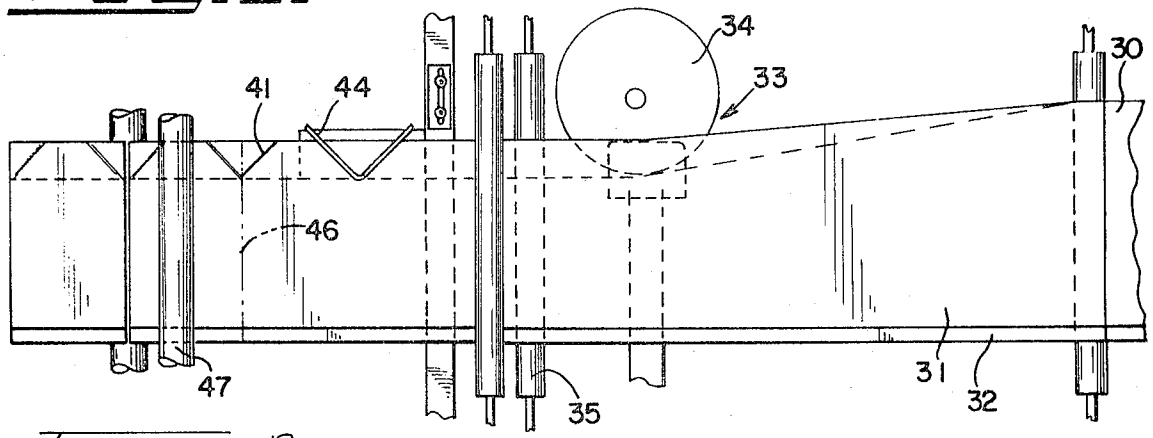


FIG. 2

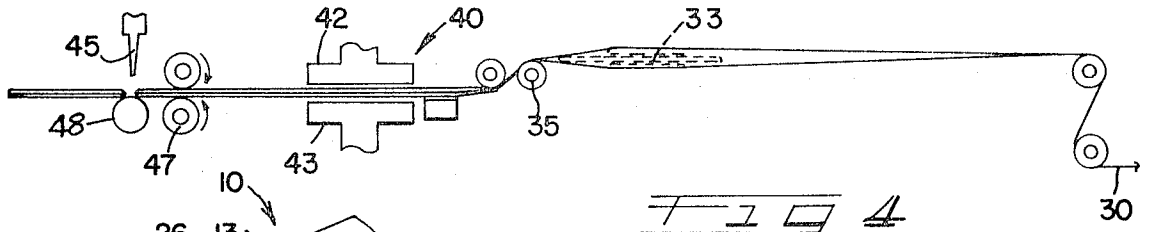


FIG. 3

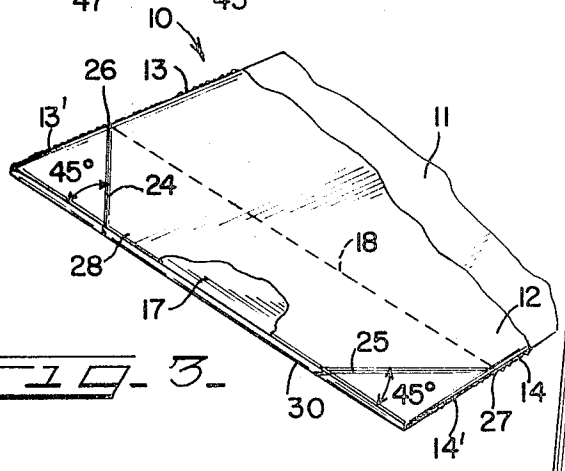


FIG. 4

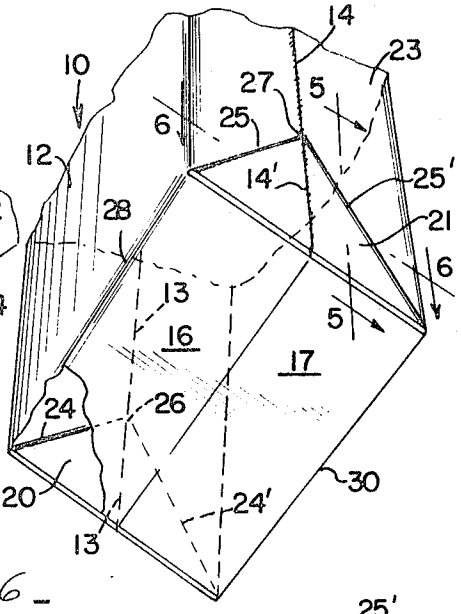


FIG. 5

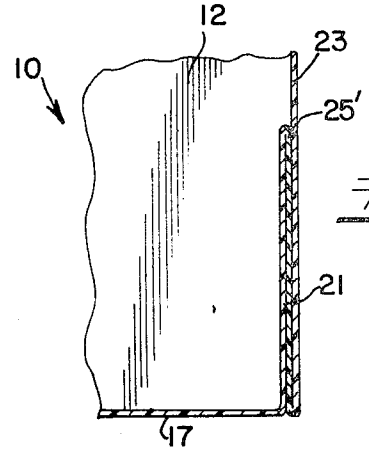
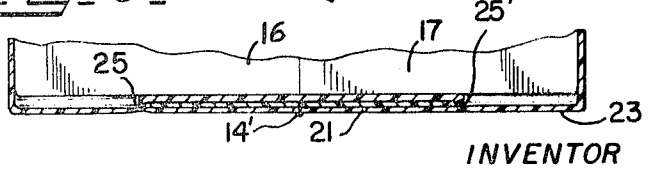


FIG. 6



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THREE DIMENSIONAL BAG WITH REINFORCED BOTTOM AND METHOD OF FORMING SAME

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U.S. Cl. 93—35 SB 7 Claims

ABSTRACT OF THE DISCLOSURE

A side sealed, gusseted bottom plastic bag and the method of forming the same wherein the bottom forming seams are reinforced by providing diagonal flat seals inwardly from the junction area of the gusset inner fold line and the side seal lines, to the gusset outer fold lines with the side seals connecting the ends of the gusset walls to the side walls being continued to the outer gusset folds, so as to relieve the stress at the junction point when the bag is filled and the bottom opened out into square or rectangular form.

The present invention relates to flexible bags and methods of fabricating the same from heat sealable plastic film so as to provide, when opened up, a square or rectangular bottom structure.

Bags for packaging various products have been provided heretofore which are fabricated from a web of relatively flexible plastic sheet material which is initially folded with a gusset at the fold line and transversely severed and sealed at intervals so as to provide a side seal tubular bag structure with a square or rectangular bottom when opened up which is capable of assuming an upright position when filled with a product. One such bag structure which has been found satisfactory for packaging numerous products is described in my Pat. No. 3,023,679, dated Mar. 6, 1962. Experience with this bag, when fabricated from thermoplastic films of various types and gauge, has indicated the desirability of providing some reinforcement in the bottom seam areas, particularly, when the bag is designed to be used in the packaging of flowable materials having substantial weight such as, for example, sugar and like granular materials. It is a general object, therefore, of this invention to provide a side sealed bag of this type in which the bottom is reinforced so as to relieve the stress in the bottom seam areas.

A more specific object of the invention is to provide a side sealed bag and a method of fabricating the same from heat sealable plastic film material wherein special supplementary seals are provided in the gusseted bottom structure which strengthen the bottom end areas and reduce the likelihood of the seals rupturing when the bag is filled with a flowable product of substantial weight.

A further object of the invention is to provide a side sealed gusseted bottom plastic bag structure wherein the ends of the gusset bottom folds are sealed to the side walls by extensions of the side seals and also by supplemental flat seals extending inwardly from the junction of the gusset inner fold line and the side seal lines to the outer gusset folds.

A still further object of the invention is to provide a side sealed, gusseted bottom, plastic bag structure in which the side seals are extended to the outer gusset folds and supplemental reinforcing bottom seals are provided which extend from the intersecting points of the inner gusset fold and the side seal lines diagonally inwardly to the outer gusset folds at a 45° angle so that the resulting triangular webs lie flat against the bottom portions of the side wall when the bag is set up and filled so as to reinforce the same.

These and other objects and advantages of the invention will be apparent from a consideration of the bag structure and the method of fabricating the same which are illustrated in the accompanying drawings wherein:

FIG. 1 is a diagrammatic top plan view, partly broken away, illustrating a method and apparatus employed in fabricating a bag structure which embodies the invention;

FIG. 2 is a diagrammatic side elevation, partly in section, illustrating the method and apparatus shown in FIG. 1;

FIG. 3 is a perspective view, with portions broken away, of the bottom portion of one of the flattened bag forming units;

FIG. 4 is a perspective view of the bottom portion of one of the bag units in fully opened condition;

FIG. 5 is a fragmentary cross section taken on the line **5—5** of FIG. 4, to an enlarged scale; and

FIG. 6 is a cross section, taken on the line **6—6** of FIG. 4, to an enlarged scale.

The bag and the method of fabricating the same will be best understood by reference first to the details of the bag structure which it is desired to fabricate. Referring then to FIGS. 3 to 6, the bag **10**, which is illustrated, comprises two generally rectangular wall forming panels **11** and **12** which, in collapsed condition, as shown in FIG. 3, are flattened upon each other and connected along the side edges by bead-like seals or welds **13** and **14**. Generally, the panels **11** and **12** are made of different lengths so as to provide a lip (not shown) at the filling end of the bag. The bag bottom is formed, when the bag is fabricated, in a folded edge connecting the two wall panels **11** and **12**, the fold being a bellows-type or being an infolded gusset so as to provide a bottom structure consisting of panels **16** and **17** on opposite sides of a center fold line **18**, which panels **16** and **17** are adapted, when the bag is set up, to open into coplanar, bottom forming relation with triangular sections or extensions **20** and **21** at opposite ends. The triangular sections **20** and **21**, which unfold into the plane of the vertical end or side walls **22** and **23**, terminate at converging flat heat seals **24**, **24'** and **25**, **25'**. The flat heat seals extend at each end from the corners of the bottom wall formed by the panels **16** and **17** inwardly at a 45° angle to a meeting point with the side seals **13** and **14**, indicated at **26** and **27**. The meeting points **26** and **27** are at the juncture of the gusset inner fold **18** and the side seals **13** and **14** and are spaced from the bottom ends of the side seals **13** and **14**, the latter being extended in the flattened condition of the bag to the bottom fold lines **28** and **30** of the infolded gusset and connecting the ends of the gusset folds to the adjacent side wall portions, the bottom extensions thereof being indicated at **13'** and **14'**. This results in triangular areas at the base of the vertical side or end walls **22** and **23**, in the set up condition of the bag, in which there is a multiple thickness of material, these areas being defined by the flat seal lines **24**, **24'** and **25**, **25'** and the respective bottom edges of the bag. The innermost wall sections are the triangular sections **20** and **21** formed in the gusset material over which lie outer webs of triangular shape and substantially the same dimensions but having two thicknesses of film material which are joined along the edge seal extensions **13'** and **14'** and which extend to the flat seals **24**, **24'** and **25**, **25'** with the material being derived from the end portions of the infolded gusset. While this triangular double ply section is not sealed on its face to the associated confronting inner wall section **20**, **21**, it overlies the same when the bag is opened up and filled and hugs the surface thereof so as to reinforce the seal areas by relieving stress therein. It further serves to

square up the bottom since the lowermost edge has a width corresponding to the combined width of the bottom forming panels **16, 17** and defines the bottom edge of the side walls **22** or **23** so that a more nearly square or rectangular shape is imparted to the bag bottom and the product is restrained against distorting the same.

Referring to FIGS. 1 and 2, there is illustrated a method of fabricating the bag in which a web **30** of stock material is employed which is selected according to the requirements of the material to be packaged. For example, a polyethylene film having good heat sealing characteristics and of a suitable weight or gauge depending upon the use to which the bag is to be put. The stock material **30** is fed from a supply roll (not shown) and folded on a longitudinal fold line into overlapping relation with top and bottom folds **31** and **32** being offset at the free edge to form a lip on the bag sections, the latter being subsequently determined by dividing and sealing or welding the plies of the folded material on transverse lines spaced at intervals along the length thereof. The folded web is advanced to a gusseting station **33** where a conventional gusseting wheel **34** and associated mechanism infolds the material at the folded edge so as to form a gusset therein of a width which corresponds to twice the width of the bottom panel of the bags which are subsequently formed from the material. Prior to the folding and gusseting operations, a means for preventing heat sealing is applied to the pleat outer surfaces which are not to be joined by the sealing bars. Preferably, the web is printed with a pattern of the seal preventing material as disclosed in my Pat. No. 3,023,679. The folded and gusseted web advances through a pair of gusset back rollers **35** to a seal forming apparatus indicated at **40** which applies flat heat seals, indicated at **41**, top and bottom of the gusseted area. The heat sealing apparatus **40** comprises a top sealer **42** and a bottom sealer **43** which are reciprocably mounted so as to engage on the top and bottom faces of the gusset fold portion of the web as it is advanced. The top and bottom sealers **42** and **43** each have a triangular-shaped flat seal forming heated bar as indicated at **44** in FIG. 1. The two legs of each of the sealing bars **44** are at right angles and the sealing devices **42** and **43** are operated to form the seals, indicated at **41** in FIG. 1, in the gusset plies and the adjoining side wall portions, with the innermost plies of the gusset material remaining unsealed. The flat seals **41** are applied at intervals spaced longitudinally of the film so that separation of the web by a hot knife **45** on a transverse line, indicated at **46**, in FIG. 1 which extends through the apex of the triangle results in side seals **13** and **14** on the trailing edge of the leading bag forming section and on the leading edge of the next adjacent bag forming section with the seals **41** being divided and forming the seals **24, 24'** and **25, 25'** in adjoining bag sections and with each of the latter being at 45° relative to the transverse sealing lines **46** and the outer gusset folds. The web is advanced through a pair of draw rollers **47** to the hot knife **45** which has a cooperating anvil roller **48** and which simultaneously severs and seals the material on a transverse line in which the apex of the triangular seal **41** lies. Suitable controls (not shown) for advancing the web are provided to insure proper registration of the severing and sealing knife **45** and the triangular seals **41**. The knife **45** extends the full width of the web material and upon operation the leading end portion of the web becomes a completed bag which is advanced between a pair of discharge conveyor belts or the like (not shown) to a stack or other accumulating area. The apparatus is designed for continuous operation in high volume production. The speed with which the bags can be produced depends upon the speed and efficiency of the bottom seal forming mechanism **40** and this can be designed to achieve relatively fast and efficient operation.

I claim:

1. A bag formed from a sheet of heat sealable plastic film material which is folded upon itself in making the bag with a bottom wall forming gusset at the fold line and having side wall forming panels connected by side edge seals, said side edge seals extending from the outer gusset folds to the opposite edge of the folded sheet, and bottom reinforcing seals extending diagonally inward from the points where the gusset inner fold line intersects the side edge seals to the gusset outer fold lines and joining the ends of the panels formed by the gusset folds to the portions of the side walls which extend beyond the intersection of said gusset inner fold line and said side edge seals, whereby, when the bag bottom is opened up, a rectangular bottom is formed and triangular portions at the bottom of oppositely disposed side wall panel sections overlie triangular portions at the ends of the bottom wall which latter triangular portions open up into the plane of said side wall sections and co-operate therewith in forming a reinforced triangular area at the bottom of said oppositely disposed side wall panel sections.

2. A bag as set forth in claim **1**, and said bottom reinforcing seals extending inwardly at a 45° angle relative to the side edge seal and defining triangular areas at the ends of said bottom wall which are disposed in snug engagement with the overlying triangular wall portions at the bottom of said side edge seals when the bottom portion of the bag is filled with a flowable product.

3. A bag as set forth in claim **1** and said bottom reinforcing seals extending at an angle of 45° relative to the gusset outer fold line and defining triangular wall sections at opposite ends of the bottom wall which unfold into the plane of the side wall panel sections at the bottom of said side edge seals so as to be in substantial engagement within the corresponding triangular side wall sections when the bottom portion of the bag is filled with a flowable product.

4. A bag formed of a sheet of heat sealable plastic film material which sheet is folded upon itself with a bottom wall panel forming gusset at the fold line and having side wall forming panels connected by side edge seals in the form of hot knife welds, said side edge seals extending from the outer gusset folds substantially the full dimension of the folded sheet, and bottom reinforcing flat seals extending diagonally inward from the junction of the gusset inner fold and the side edge seals to the gusset outer folds, and joining the ends of the gusset folds to the portions of the side walls which extend beyond said junction, with the confronting gusset fold portions free of each other, so that, when the bag bottom is opened up, triangular panel portions extending on opposite sides of the edge seals at the bottom of oppositely disposed side wall sections overlie triangular panel portions at the opposite ends of the bottom wall panel, which triangular portions open into the plane of said oppositely disposed side wall panel sections and form therewith multi-ply reinforced triangular areas at the bottom of said side wall panel sections.

5. A bag as set forth in claim **4**, and said bottom reinforcing seals extending at a 45° angle to the gusset outer fold line and to the side edge seals and defining triangular panel portions at opposite ends of the bottom wall panel which unfold into the plane of the oppositely disposed side wall panel sections and lie in engagement with the corresponding side wall panel sections when the bottom of the bag is opened up and filled with a flowable product.

6. A method of fabricating bags from a web of heat sealable plastic film material which comprises folding the web upon itself about a longitudinal line with a gusset formed at the fold line and treating the seal forming areas of the innermost confronting faces of said gusset folds to inhibit heat sealing between said innermost faces of said folds, applying flat heat seals at intervals along the gusset folded margin to form reinforcing seals in the confronting faces of the folds and the adjoining side wall

panels with the heat seals beibng V-shaped and opening outwardly of the folded web and spaced a distance corresponding to the width of collapsed bag desired, the apex of each V-shaped seal being in a web severing and sealing line which extends transversely of the path of advance of the web from the gusset outer fold lines substantially the full dimension of the folded sheet and each V-shaped seal subtending an angle of 90° which is bisected by said transversely extending severing and sealing line, and severing and sealing said web on said transversely extending lines so as to form successive side sealed bags with a rectangular bottom and with triangular portions at the bottom of oppositely disposed side wall panel portions which triangular portions open up into the plane of the adjoining side wall sections and co-operate therewith in forming a multi-wall reinforced triangular area at the bottom of said side wall sections when the bottom is opened up.

7. A method of fabricating bags as set forth in claim 6, wherein said web is severed and sealed on said transversely extending lines by a hot knife forming element which severs the material and simultaneously seals the severed edges of the web.

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U.S. Cl. X.R.

93—33 H; 229—57