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(54) **BAG WITH SUPPORT BRACE**

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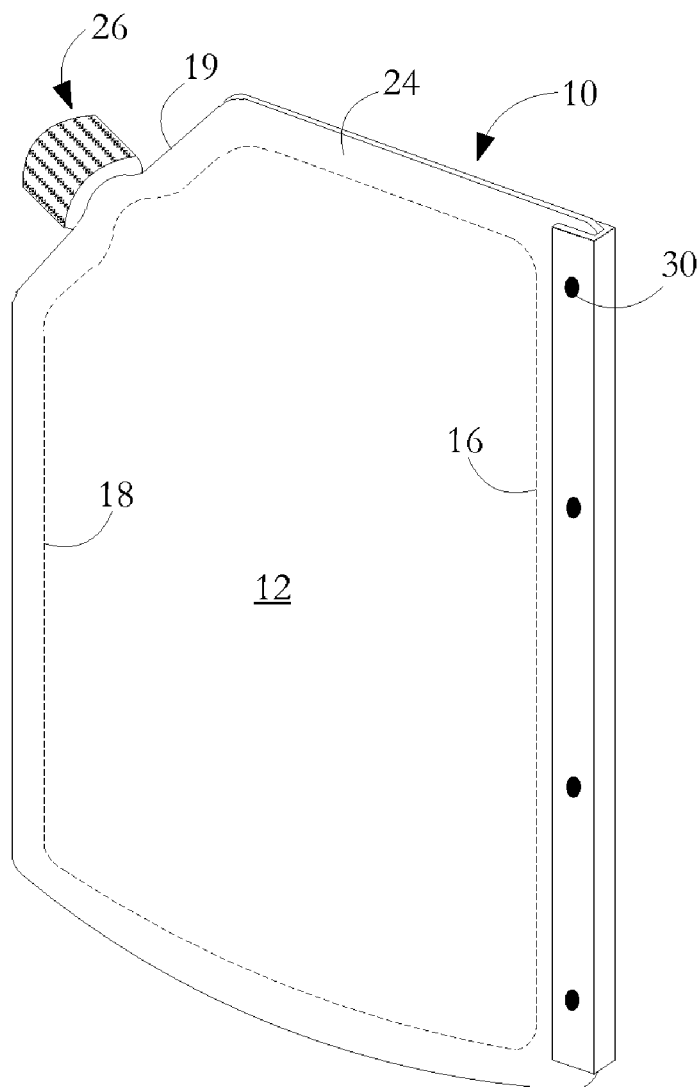
(57) **ABSTRACT**

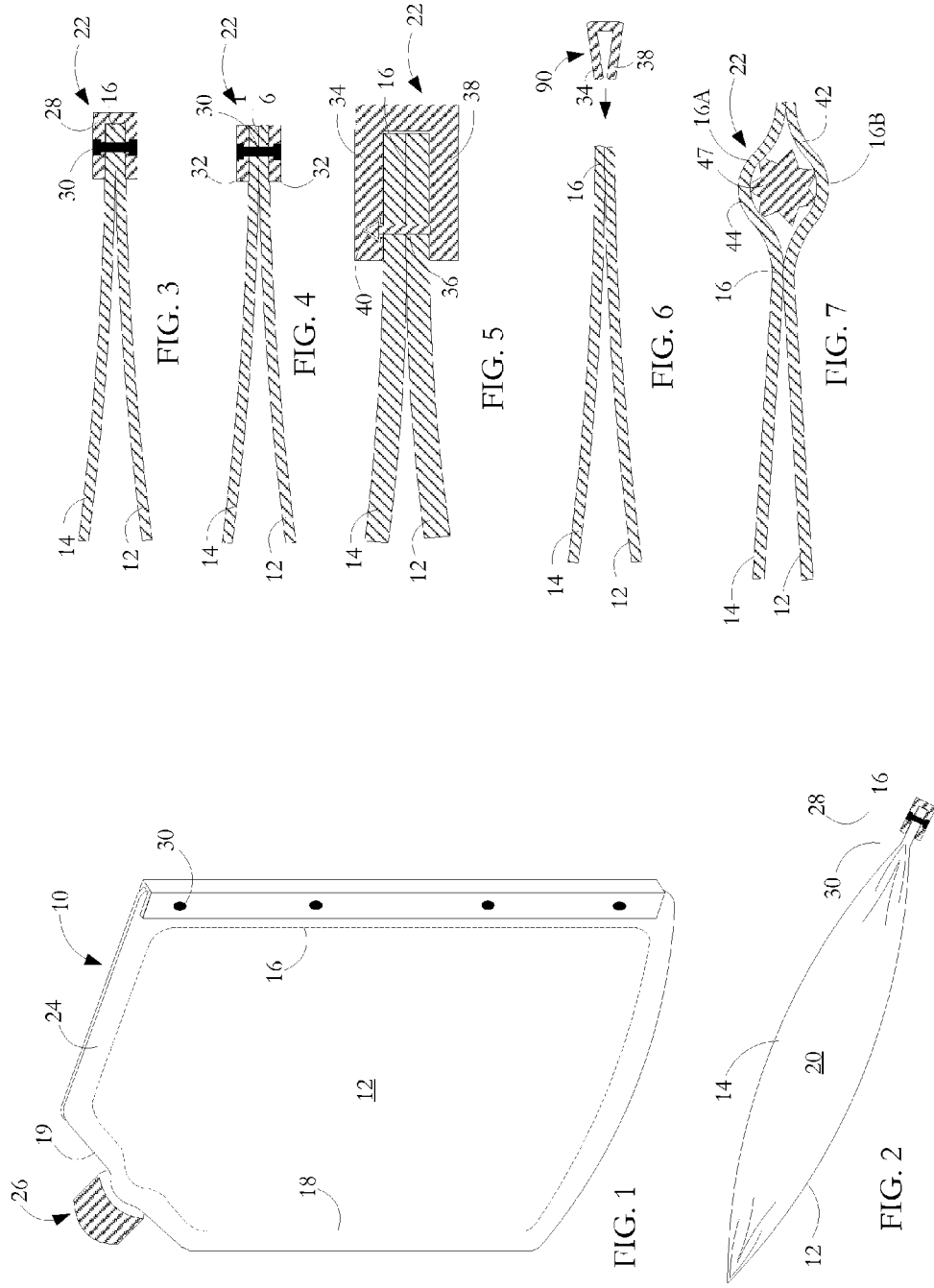
(22) Filed: **Oct. 29, 2013**

A bag formed of plastic film material has first and second side panels with a margin portion at a rear edge of the first side panel joining a margin portion at a rear edge of the second side panel at a rear seam. The rear seam along at least a part of its length is braced by a solid elongate brace of plastic material which is either fixed mechanically to the panels or is thermally welded to them.

Related U.S. Application Data

(60) Provisional application No. 61/719,831, filed on Oct. 29, 2012.





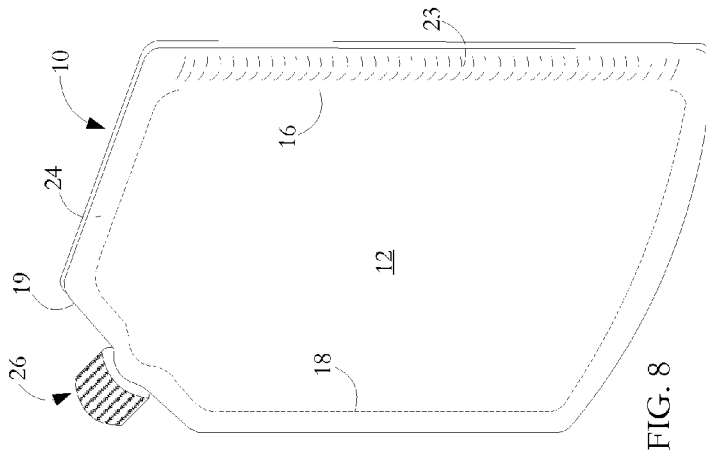


FIG. 8

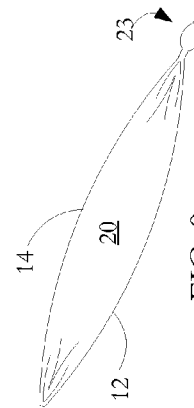


FIG. 9

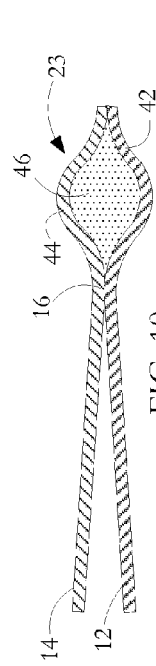


FIG. 10

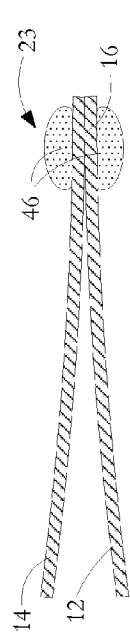


FIG. 11

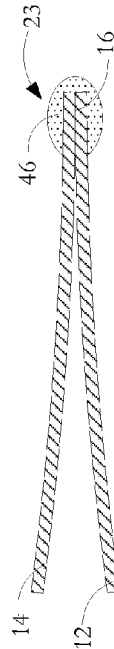


FIG. 12

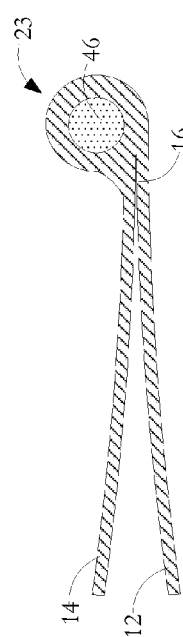


FIG. 13

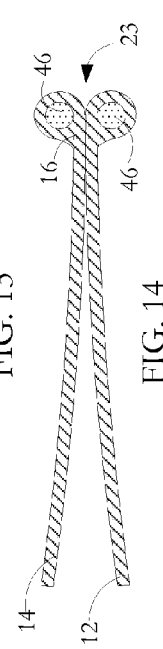
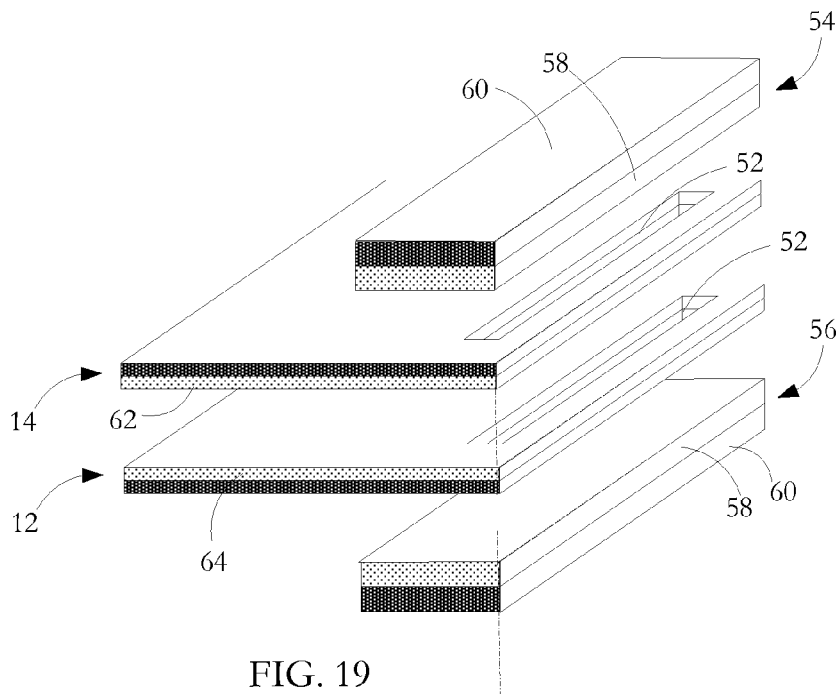
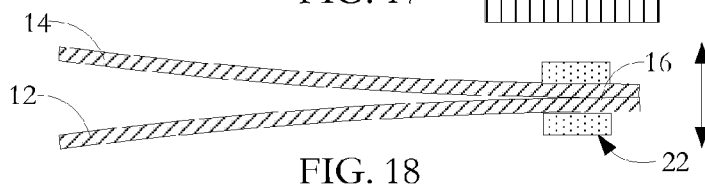
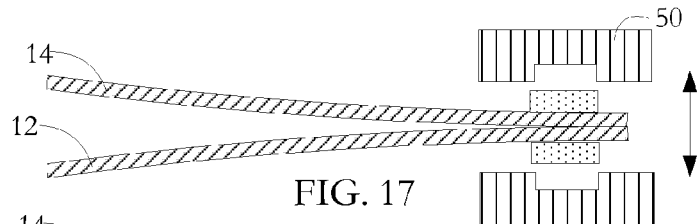
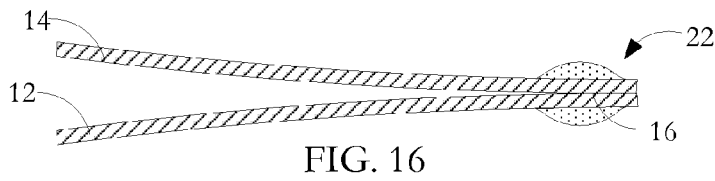
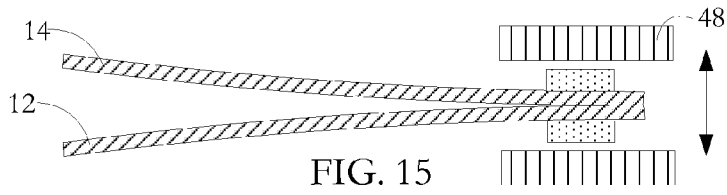


FIG. 14



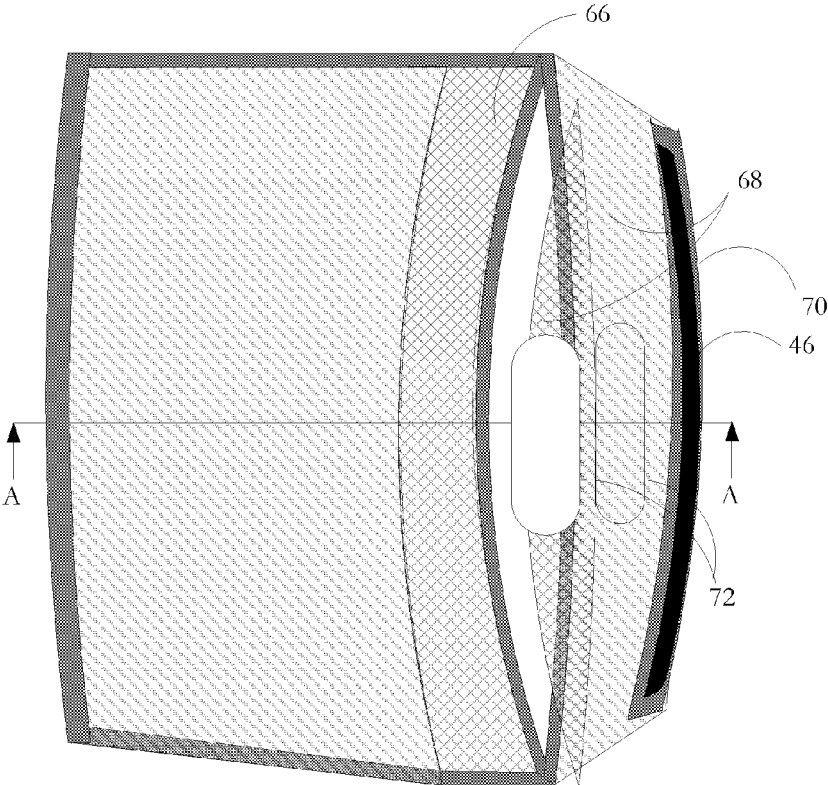


FIG. 20

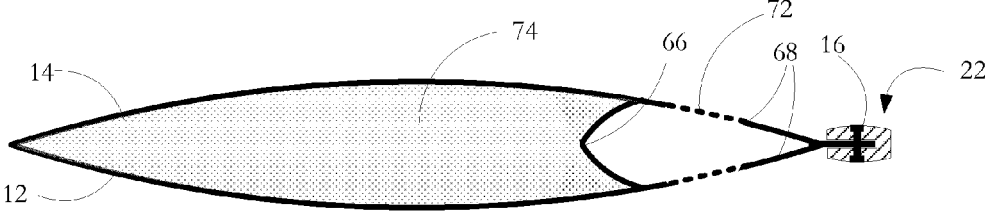


FIG. 21

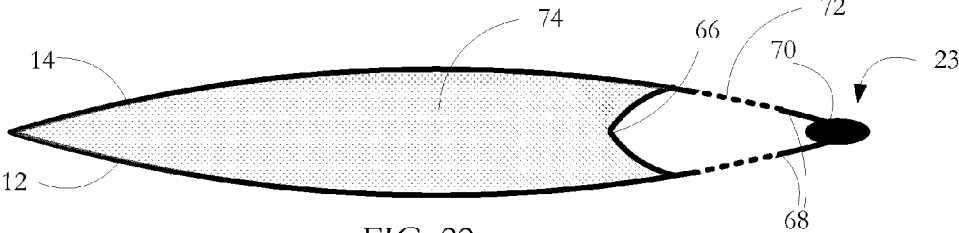


FIG. 22

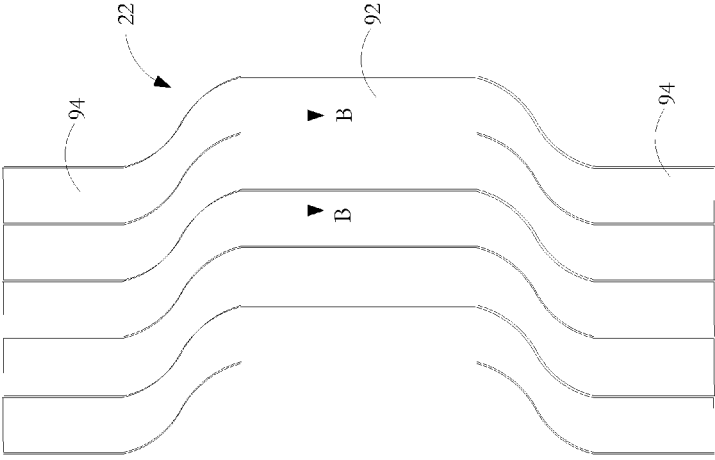


FIG. 25

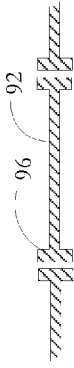


FIG. 26

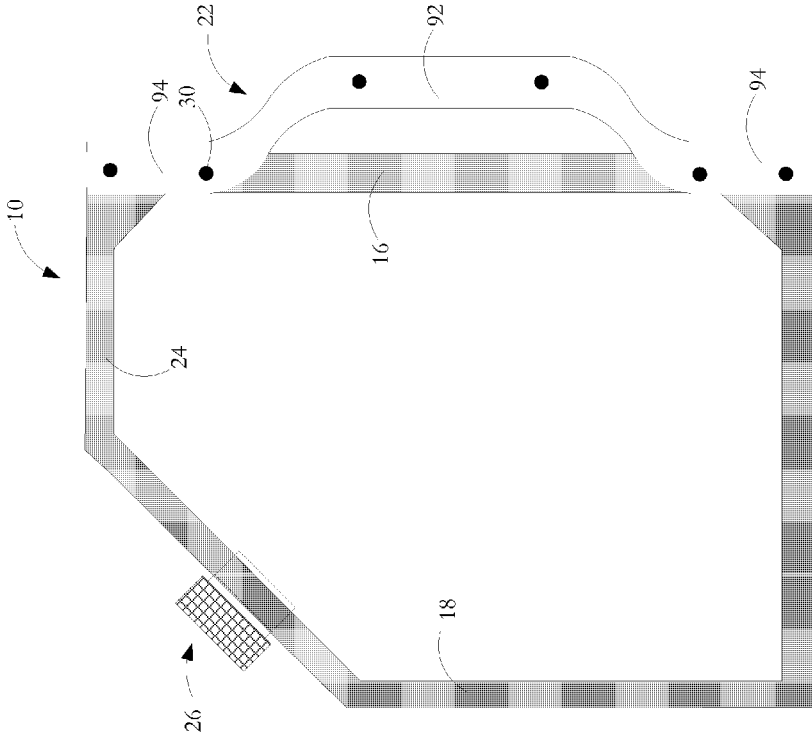


FIG. 23

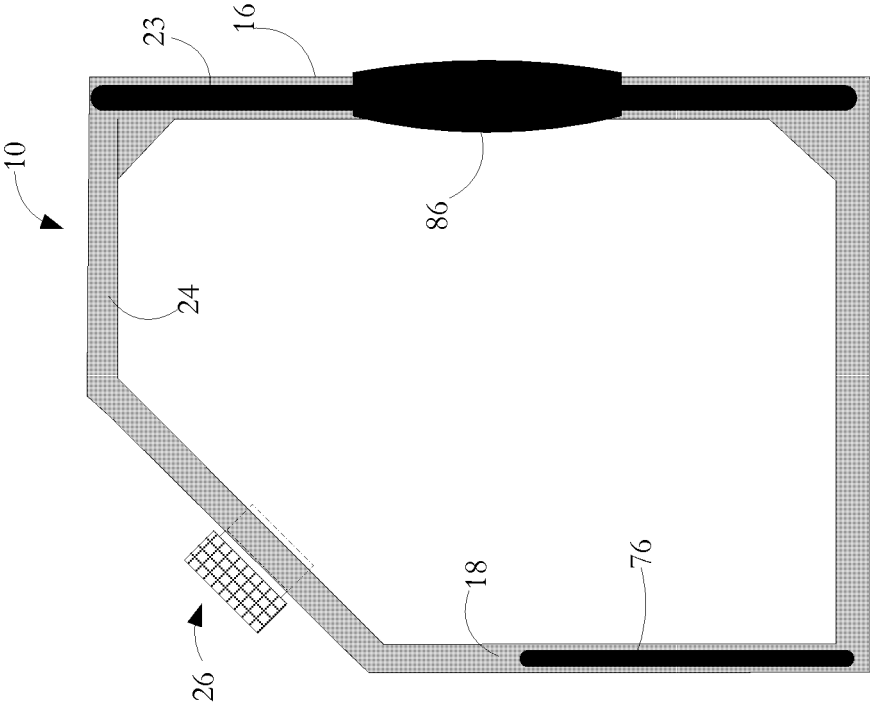


FIG. 24

BAG WITH SUPPORT BRACE

FIELD OF THE INVENTION

[0001] This invention relates to a bag having a support brace.

DESCRIPTION OF RELATED ART

[0002] Plastic bags are a ubiquitous and highly practical mode of carrying things and there is a whole panoply of shapes and structures of such bags depending on the particular function of the bag. Many bags have handles of some kind or other. These may be merely formations in the material of the bag itself or may include additional elements which are attached to the main carcass of the bag and which provide added strength and convenience.

[0003] Of particular interest from the viewpoint of reducing packaging materials are plastic bags that might replace in the marketplace freestanding, relatively thick-walled plastic jugs. Such a replacement is desirable for many reasons. Firstly, the volume of plastic material required in thick-walled plastic jugs is generally much higher in comparison with plastic bags configured to function as jugs. Secondly, placing of graphic materials is much easier on plastic bags where simple printing directly onto a paper-like plastic sheet can be implemented. Conventionally, printing is done on to a ply of the plastic sheet material, a typical ply material being polyester which readily accepts industry standard printing inks. This is in comparison with stiff-walled jugs which generally have some contour in the walls making it difficult for a print head to seat against anything but a very small wall area. This may mandate a relatively expensive process step of attaching labels to the jugs. Finally, prior to filling, thick-walled jugs being stored or shipped take considerable space in comparison with a compact stack of flat plastic bags.

[0004] The structure of a handled bag that is to function as a jug should have the strength to hold granular or fluid contents. It should also have a form enabling it to be gripped in one hand, moved from a standing into a pouring position and back again, and, ideally, for the pouring position to be retained as substantially all the contents of the bag are poured from a spout or functionally similar devices. Throughout the use cycle, the bag should substantially retain a jug form and function until the contents have been emptied. Finally, such a structure must be easy to manufacture.

[0005] While bags with handles are known that can provide a substitute for jugs made of more rigid materials, further improvements are possible to improve the performance and manufacturability of such bags. Limitations and disadvantages of conventional and traditional approaches to bag-as-jug designs and manufacture thereof will become apparent to one of ordinary skill in the art through comparison of such bags with the present invention.

SUMMARY OF THE INVENTION

[0006] According to one aspect of the invention, there is provided a bag formed of plastic film material, the bag having a first side panel, a second side panel, a margin portion at a rear edge of the first side panel joining a margin portion at a rear edge of the second side panel at a rear seam, and a brace fixed to the rear seam along at least a part of its length, the brace being a solid plastic member. The plastic member can

have a cross-sectional shape which is any of regular polygonal, circular, square, rectangular, elliptic, lamellar, star-shaped or irregular.

[0007] The rear seam can be part of a complex of seams and panels defining an interior storage space of the bag. Alternatively, the rear seam can be part of a handle, the bag further comprising a rear gusset extending between respective side seams, the respective side seams formed between the rear gusset and the first and second side panels, the first and second side seams being part of a complex of seams and panels defining an interior storage space of the bag, the handle being on the distal side of the rear gusset from the interior storage space.

[0008] The plastic member can be positioned in an elongate pocket formed between the first and second panels at the rear seam. Alternatively, the plastic member can be fixed between the first and second side panels at the rear seam. Alternatively, the plastic member can be fixed against one side of the rear seam. The rear seam can be sandwiched between the plastic member fixed to the rear seam on one side of the bag and a second plastic member fixed to the rear seam on the other side of the bag. The rear seam can include a first plastic member fixed between the side panels at the rear seam, a second plastic member fixed to the rear seam on one side of the bag, and a third plastic member fixed to the rear seam on the other side of the bag. In the two-plastic member and three-plastic member structures, the plastic members can be lamellar and can be joined by a spine portion to form a channel structure embracing a rear part of the rear seam.

[0009] The or each plastic member can be attached to the rear seam by rivets or other mechanical fixture device. Alternatively, the plastic member or members can be fixed to the rear seam by adhesive. In a further alternative, the plastic member or members can be fixed to the rear seam by being pinched between elements of a channel section plastic member.

[0010] The cross-sectional shape of the plastic member can vary along its length to present a thickened area ergonomically suited to gripping or to provide enhanced support at selected locations. The brace can have a first plastic member part fixed to part of the rear seam, a second plastic member part fixed to another part of the rear seam and an intermediate plastic member part spaced from and not fixed to the rear seam whereby to provide a handle part at the intermediate plastic member part. Such intermediate plastic member part can be bowed or angled outwardly to present a space between the handle part and the contents storage part of the bag.

[0011] The bag can further comprise an openable and closeable pouring fixture at the front of the bag.

[0012] According to another aspect of the invention, there is provided a bag formed of plastic film material, the bag having a first side panel, a second side panel, a margin portion at a rear edge of the first side panel joining a margin portion at a rear edge of the second side panel at a rear seam, the rear seam along a first part of its length braced by a solid elongate thickened region derived from a starter rod of thermoplastic material welded to the rear seam.

[0013] The rear seam can be part of a complex of seams and panels defining an interior storage space of the bag. Alternatively, the rear seam can be part of a handle, the bag further comprising a rear gusset extending between respective side seams between the rear gusset and the first and second side panels, the first and second side seams being part of a complex

of seams and panels defining an interior storage space of the bag, the handle being on the distal side of the rear gusset from the interior storage space.

[0014] The thickened region can be derived from first and second starter rods thermally welded to opposite sides of the rear seam. The thickened region can alternatively be derived from a trio of starter rods, one welded between the side panels at the rear seam and the other two welded to opposite sides of the rear seam. The or each starter rod can have an initial cross-sectional shape which is any of round, square, rectangular, elliptic, star-shaped, regular polygonal, lamellar and irregular, whereby to obtain a desired cross-sectional profile of the thickened region following thermal welding. The starter rod can have varying cross-sectional shape and size along its length whereby to result in a thickened region at the rear seam which varies along its length.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] For simplicity and clarity of illustration, elements illustrated in the following figures are not drawn to a common scale. For example, the dimensions of some of the elements are exaggerated relative to other elements for clarity. Advantages, features and characteristics of the present invention, as well as methods, operation and functions of related elements of structure, and the combinations of parts and economies of manufacture, will become apparent upon consideration of the following description and claims with reference to the accompanying drawings, all of which form a part of the specification, wherein like reference numerals designate corresponding parts in the various figures, and wherein:

[0016] FIG. 1 is an isometric view of a pouch bag including a bracing arrangement according to an embodiment of the invention.

[0017] FIG. 2 is a view from below of the bag of FIG. 1.

[0018] FIG. 3 is a scrap cross-sectional view of a bag with braced seam according to one embodiment of the invention.

[0019] FIG. 4 is a scrap cross-sectional view of a bag with braced seam according to another embodiment of the invention.

[0020] FIG. 5 is a scrap cross-sectional view to a larger scale of a bag with braced seam according to a further embodiment of the invention.

[0021] FIG. 6 is a scrap cross-sectional view of a bag with braced seam according to a further embodiment of the invention.

[0022] FIG. 7 is a scrap cross-sectional view of a bag with braced seam according to a further embodiment of the invention.

[0023] FIG. 8 is an isometric view of a pouch bag including a bracing arrangement according to another embodiment of the invention.

[0024] FIG. 9 is a view from below of the bag of FIG. 8.

[0025] FIG. 10 is a scrap cross-sectional view of a bag with braced seam according to a further embodiment of the invention.

[0026] FIG. 11 is a scrap cross-sectional view of a bag with braced seam according to a further embodiment of the invention.

[0027] FIG. 12 is a scrap cross-sectional view of a bag with braced seam according to a further embodiment of the invention.

[0028] FIG. 13 is a scrap cross-sectional view of a bag with braced seam according to a further embodiment of the invention.

[0029] FIG. 14 is a scrap cross-sectional view of a bag with braced seam according to a further embodiment of the invention.

[0030] FIG. 15 is a scrap cross-sectional view showing a stage in the manufacture of a bag with braced seam according to an embodiment of the invention.

[0031] FIG. 16 is a scrap cross-sectional view showing a braced bag seam produced by the manufacturing stage illustrated with reference to FIG. 15.

[0032] FIG. 17 is a scrap cross-sectional view showing a stage in the manufacture of a bag with braced seam according to another embodiment of the invention.

[0033] FIG. 18 is a scrap cross-sectional view showing a bag with braced seam produced by the manufacturing stage illustrated with reference to FIG. 17.

[0034] FIG. 19 is a scrap cross-sectional view partly in perspective showing a stage in the manufacture of a bag with braced seam according to another embodiment of the invention.

[0035] FIG. 20 is a side front view partly in perspective showing a gusseted bag-with-handle strengthened by a bracing arrangement according to an embodiment of the invention.

[0036] FIG. 21 is a sectional view on the lines A-A of FIG. 20 when the bag contains granular or fluid material.

[0037] FIG. 22 is a side view similar to FIG. 21, but showing a bag with braced seam according to another embodiment of the invention.

[0038] FIG. 23 is a side view of a bag according to an embodiment of the invention.

[0039] FIG. 24 is a side view of a bag according to another embodiment of the invention.

[0040] FIG. 25 shows a series of handle braces prior to stamping, the braces being for the bag shown in FIG. 23.

[0041] FIG. 26 is a section view on the line B-B of FIG. 25.

DETAILED DESCRIPTION OF THE INVENTION INCLUDING THE PRESENTLY PREFERRED EMBODIMENTS

[0042] Referring to FIG. 1, there is shown a pouch bag 10 formed of plastic sheet material having side panels 12, 14. The side panels are joined at the rear and front of the bag by respective thermoplastic welded seams 16, 18. At the bottom of the bag, a gusset 20 extends between the two side panels 12, 14 and is welded to them. Attached to the rear seam 16 is a generally vertically extending brace 22. The bag may be orientated so that the brace 22 is located atop the bag to provide a rudimentary carrying handle. Alternatively, for use when the bag has a vertical orientation as shown in FIG. 1, the brace 22 assists upright storage by providing a backbone for the bag 10 when set down on a surface such as a table top so that materials contained in the bag are not spilled. The brace 22 also provides a rudimentary pouring handle that is more easily gripped than if the bag alone is gripped so as to enable pouring.

[0043] The bag of FIG. 1 is particularly adapted for use as a pouring bag for containing and storing granular materials and fluids. Between the front weld 18 and a top welded seam 24 at the front top corner of the bag 10, a corner is cut as shown at 19 and a pouring spout/cap combination 26 is partially inserted between the cut side panels 12, 14. The cut edges at the front top corner are seam welded to each other and around the outer surface of the pouring spout device 26. Whereas one form of reclosable pouring device is shown,

alternative forms of reclosable pouring device can be implemented such as a slide fastener or zip, a Velcro® fastener, or, if sealing is not important, by a simple opening which is cut at the time the container is first used. While a braced bag has particular value as a pouring bag, the design principles of the invention may find application in plastic bags which are not for use in pouring.

[0044] As shown in FIG. 1, the brace 22 is an elongate plastic element separate from, but attached mechanically to, the main part of the bag. FIGS. 3 to 7 show several different embodiments of such a brace and the manner of their attachment to rear seam 16 of the bag.

[0045] Referring in detail to FIG. 3, the brace 22 is a U-section plastic strip 28 which is fitted over the rear seam weld 16 after the weld has been formed. Once in place, the channel section piece 22 is fixed by rivets 30 although other fastening means can be employed. In the alternative embodiment of FIG. 4, a similar structural principle is adopted but, instead of a single U-channel piece, two separate elongate rods or leaves 32 are positioned against opposite sides of the seam 16 and are then fastened together.

[0046] In an alternative arrangement illustrated in FIG. 5 to a larger scale, one wall 34 of a channel-form piece has inwardly projecting tangs 36 while the other wall 38 has cooperating inwardly facing, anchoring recesses or apertures 40. The tangs 36 are made sharp enough to penetrate the seam 16 when the two walls 34, 38 of the channel-form piece 28 are pressed together after the channel piece 28 has been threaded onto the seam 16. After penetrating the seam 16, the tangs 36 enter and are retained in the anchor recesses or apertures 40.

[0047] In a further alternative embodiment shown in FIG. 6, a U-channel brace member 90 is formed with channel walls 34, 38 in their rest position angled in towards each other. During post-processing of a bag, the walls 34, 38 are forced apart to enable positioning of the seam 16 within the channel. In the deformed position, the walls 34, 38 seek to return to the rest position, so that the outer ends of the walls apply localized spring pressure along the length of the seam 16 as to pinch and clamp the channel brace member 90 to the seam.

[0048] Referring to FIG. 7, a brace member is in the form of a star-shaped rod 47. The rod is received in a pocket formed between rear seam sections 16A and 16B. The pocket may be formed in the course of bag manufacture with the rod 46 subsequently being threaded along the pocket. Alternatively, the rod is positioned between the two side panels 12, 14 at the intended site of the rear seam. The seam, including the seam sections 16A and 16B, is then formed with the rod in place. The rod 47 may be of any convenient shape depending on the appearance or other characteristics desired in terms of a brace of handle. For example, the rod can be made relatively wide and orientated in the pocket so as to particularly resist side-to-side bending or front-to-back bending.

[0049] Referring to FIGS. 8 and 9, there is shown a pouch bag 10 similar to the bag of FIGS. 1 and 2. However, instead of a separate brace, the bag has at its rear seam 16 a brace 23 that is formed as a generally vertically extending, thickened region of plastic material. The thickened region brace 23 is obtained by welding a starter rod 46 of plastic material to the sheet plastic material of the bag at the site of the rear seam 16. The starter rod 46 can be welded to the bag side panels in the course of bag manufacture or can be welded in a post-processing stage after the bag is essentially fully formed.

[0050] FIGS. 10 to 14 show in cross-section several forms of a bag brace 23 where the brace is joined to the main part of

the bag by thermoplastic welding so that it becomes an integral part of the bag. Each of the structures shown in these figures can, however, alternatively be made using an adhesive to cement elements of the structure together as an alternative to thermoplastic welding, such a structure being particularly applicable in cases where a thermoplastic weld is impossible or difficult to implement. While the embodiments in these figures show a brace 23 used to strengthen a rear seam 16, thermoplastic welded braces of the forms shown can be used for locally strengthening other or additional seams of a bag as desired.

[0051] FIG. 10 shows an internal brace produced by putting a starter rod or strip 46 of thermoplastic material between margins 42, 44 of the side panels 12, 14 in the course of bag manufacture, the margins 12, 14 and the starter rod material then being welded together at the time the seam weld 16 is made. FIGS. 11 to 14 show external braces in which starter rods or strips 46 of thermoplastic material are positioned against the outside of the bag and are then thermally welded against one or both side panels 12, 14 at the seam location. Generally, from a manufacturing perspective, external brace structures are preferred over internal brace structures because it is difficult to retain a starter rod of thermoplastic material in a desired registration position with flanking sheet plastic panels during a heat welding operation.

[0052] Referring in detail to FIG. 10, in the course of manufacture, the starter rod 46 of thermoplastic material is sandwiched between the front and back panel margins 42, 44 at the site of a rear seam 16 and a seam weld is then implemented at the site. In the course of seam welding, adjacent regions of the panels 12, 14 wrap around and are welded to the rod 46 which is deformed from its initial shape by the application of temperature and pressure. The bracing rod 46 may initially be of circular, square, rectangular, polygonal or other convenient cross-sectional shape. The rod loses its initial cross-sectional shape during welding, but remains as a localized thickened region extending down the seam 16 after the thermal welding operation is complete.

[0053] As shown in FIG. 11, a starter rod 46 is alternatively positioned on the outside of one or both side panels 12, 14. Again, a localized general thickening is achieved by thermally welding the rod(s) and the panel edge margin(s) together but, in this instance, the rod material is on the outside of the weld while the panel material is on the inside. In a variant of the FIG. 11 embodiment, a single rod is applied to one panel without a corresponding rod being applied to the other panel to achieve the localized braced region. In the embodiment of FIG. 11, rods are welded to each side of the bag so as to be made integral with the respective side panels 12, 14 with the thickened region 22 spaced forwardly from the rear edge of the bag. Alternatively, starter rods 46 are placed so that they overlap the rear edges of the panels 12, 14. Consequently, when thermal welding is applied, the fused material from the rods 46 spreads around the rear edges of the panels 12, 14 as shown in the embodiment of FIG. 12. In the finished structure, after the thermal weld is implemented, the strengthening plastic from the starter rod 46 and the material of the side panels 12, 14 will normally be indistinguishable from one another when viewed with the naked eye. Referring to FIG. 13, an alternative embodiment of seam brace 23 is shown. Initially, the starter rod 46 is placed against the margin regions 42, 44 of overlapping panels 12, 14 so that a part of the margin regions projects beyond the rod. The overlapping margin regions are then rolled around the starter rod 46 and

held in the rolled position as the thermal weld is effected. Overlaps of each side panel **12, 14** can alternatively be rolled in opposite directions around two starter rods **46** placed on opposite sides of the bag before thermal welding is effected as shown by FIG. **14**. It will be appreciated that FIGS. **8 to 14** show the shape of the starter rod material after the rod **46** has been somewhat deformed from a more regular cross-section following the application of welding heat.

[0054] In each of the embodiments of FIGS. **8 to 14**, the welds are effected with a hot press tool in the form of a flat plate **48** as shown in FIG. **15**. Consequently, a brace profile is obtained which typically has a relatively smoothly varying contour as shown in FIG. **16**, the exact contour depending on the fluidity of the several plastic elements at the weld location, and the extent to which the fluid material of each element flows. A hot welding tool **50** of different configuration is used to shape the thermal weld to a different cross-sectional shape as shown in FIGS. **17 and 18**. Such a cross-sectional shape may be implemented for mechanical purposes, for example to render the thickened region less susceptible to bending in a particular plane. It may alternatively be implemented for aesthetic purposes. As an alternative to hot plate welding, especially to generate heat at the centre of a relatively large piece of plastic which is the case with a starter rod **46** of the types shown, ultrasonic welding can be applied.

[0055] The material of the starter rod **46** must, in the embodiments of FIGS. **8 to 14** have at least a surface ply that consists of thermoplastic material and which faces a thermoplastic sheet or ply of the bag panels **12, 14** to enable the thermoplastic weld to be effected. While this does not present a problem with bag panels that are made of thermoplastic material throughout, most plastic bags have panels that have an outer ply of polyester or material having like characteristics. An outer ply of polyester is desirable because it is amenable to printing using generally available commercial inks. Also, polyester does not melt when heat is applied, which means that heat can be transmitted without difficulty through to a thermoplastic layer at the opposite surface of a starter rod. To effect a thermoplastic weld between such a panel/starter rod combination, the panel and the starter rod are configured to ensure that at least part of the starter rod thermoplastic surface is brought into contact with another thermoplastic surface. In the exemplary embodiment of FIG. **19**, the side panels **12, 14** have vias **52** spaced along their rear edge margins. The starter rods **54, 56** each have a polyester layer **58** and a polyethylene layer **60**. The rods **54, 56** are positioned to cover the vias **52** so that when a thermoplastic weld is effected, melted material from a thermoplastic layer **58** of the rod **54** flows down as shown in FIG. **19** into the vias **52**, while thermoplastic material from the lower starter rod **56** flows up into the vias, with the flowing material from each side fusing to effect the weld. At the same time, thermoplastic material of facing plies **62, 64** of the side panels **12, 14** outside the region of the vias fuses to weld the side panels to each other.

[0056] A starter rod, as an alternative to being of solid, homogeneous plastic material, may have other plies or components which add desired characteristics to the rod material and the bag to which the resulting brace is applied. For example, as previously indicated, especially for a starter rod of rectangular or leaf form, the rod can have a polyester surface layer on the opposite face from a thermoplastic layer in order that the outwardly facing surface of the thickened region of the bag will take a conventional printing ink. Alter-

natively, or in addition, the starter rod can include a strength ply made, for example, of nylon.

[0057] As previously mentioned, the thickened region is advantageously effected at a bag rear seam to provide both a rudimentary handle function and a bracing function. A bag **10** somewhat different from the pouch bags previously illustrated is shown in FIGS. **20 to 22**. The bag is one of several forms of bag described and claimed in co-pending U.S. patent application Ser. No. 13/655,784 which is hereby incorporated by reference in its entirety. The exemplary form of bag **10** has side panels **12, 14** and a rear gusset panel **66**, with the side panels **12, 14** each having extensions **68** that are welded together at a handle seam **70**. The combined width of the extensions **68** is greater than the width of the gusset panel **66**, and the extensions are formed with carrying apertures **72**. The bag is shown partially filled and in cross-section in FIGS. **21 and 22**, these views corresponding to the section line A-A of FIG. **20**. As shown in FIG. **21**, a brace **22** is fixed to rear seam **70** which is spaced from the part **74** of the bag which is to contain fluid or granular materials. Any of the mechanically attached brace structures described with respect to the bags of FIGS. **3 to 7** can be adopted in the bag of the form shown in FIG. **20** and in bags of the form described and claimed in the aforementioned patent application Ser. No. 13/655,784. In the embodiment illustrated in FIG. **22**, a thickened region **23** is developed at the seam **70**. The thickened region **23** is ergonomically more easy to use as a handle because of the presence of the associated apertures and the spacing from the contents chamber **74**. The brace **23** is formed by welding a starter rod at the junction between the extensions **68**. Any of the thickened region brace structures described in FIGS. **10 to 14** can be adopted in the bag of the form shown in FIG. **22**.

[0058] While it is normally convenient and advantageous to apply a strengthening brace at the rear seam **16**, a strengthening brace can alternatively be applied at other seam positions where local or directional strengthening is desired. For example, as shown in the pouring bag illustrated in FIG. **24**, the bag **10** has, in addition to a rear brace **23**, a welded, vertically extending rib **76** at the front seam **18**. Particularly for a bag which may have good upright posture for most stages of fill, but which shows posture weakness in one location for a particular fill stage, a supporting rib such as rib **76** can be judiciously located and orientated to tailor support to mitigate that particular weakness. The shape and size of the rib can be similarly tailored to overcome a particular posture weakness or to provide strength at a region of structural weakness. As shown in FIG. **23**, a mechanically fixed brace **22** is shaped to offer greater ergonomic efficiency particularly tuned for any of carrying and pouring. The brace has a central part **92** permitting a user to insert his or her hand and has two wing parts **94** riveted to the rear seam **16**. The shape of the brace **22** lends itself to being stamped from a layer of sheet plastic as shown by FIG. **25**. In a preferred embodiment, a pair of the braces is located at each side of the rear seam and riveted together with parts of the rear seam **16** pinched between. As shown by FIG. **26**, which is a sectional view on the line B-B of FIG. **25**, the brace material can be stamped while still malleable so as to form in the cooled member angle elements **96** which add to the stiffness of the handle when the bag is assembled.

[0059] To obtain a high production rate when manufacturing bags, processing operations are typically performed on a continuous web of plastic sheet material. During a production run, the web is fed continuously under tension from an input

end where the web is unformed to an output end where, essentially, a complete bag has been produced and is cut from the web leading end. The web is led past a series of processing stations where processing operations are performed including, for example, positioning, stamping, cutting, folding and thermoplastic welding, depending on the stage of manufacture of the bag.

[0060] An important step in manufacturing the bag is making the seams. Essentially the parts of the perimeter of each bag panel is sealed to corresponding margin parts of the perimeter of other panels, including gusset panels, with one seam being left open to allow for filling by the customer. In the course of the production process, if the seams are to be thermally welded, then the bag parts to be welded must be made of a thermoplastics material or must have a thermoplastic ply which is brought against another thermoplastic material or ply in the course of the welding process. A hot press tool is used to apply heat and pressure to hot melt the polyethylene. The web may be subjected to several welding steps to form seams at or near the panel edges.

[0061] In the bag of FIG. 24, the welded brace 23 has a part 86 which is locally thicker than other parts of the brace to make it more comfortable for gripping by a human hand of normal size. While the brace of FIG. 24 is shown with the larger cross-section part 86 generally centered along the bag 10 when it is in an upright aspect, a thicker part or parts can be located at alternative positions along the brace. For example, such a brace might have both a hand grip enlarged portion 86 and a relatively sturdier anchor part (not shown) at the top of the bag to provide additional anchoring strength for a full bag when it is first tipped over to initiate pouring.

[0062] The embodiments of the invention illustrated describe pouch bags which are generally rectangular in side plan. In such a pouch bag, for efficient use of plastic sheet material and ease of manufacturability, each of the several panels of the bag is generally rectangular, with seam welds along the boundaries of each panel where it joins other panels including some that may be gusset panels. However, any of the bag panels can have a shape that is other than rectangular, provided that adjacent panels have appropriate shapes as needed to make the boundary welds possible. For example, the front and back panels, which are the major panels in terms of determining the overall shape of the bag, may have a generally elliptical or triangular configuration. In addition, bag volume can be increased by adding a gusset elsewhere than at the bottom of the bag as shown by the illustrated embodiments or at the rear of the bag as shown in the FIGS. 20 to 22 embodiments. Gussets can for example be inserted at the top or front seam locations, thereby doubling the number of seams at such locations. In each of the illustrated embodiments, seams are shown as being formed between two pieces of sheet plastic material which are placed in an overlapping disposition before a thermoplastic weld is effected. In plastic bag manufacture, the bag is typically made from a single web which may be folded at certain positions in such a way that two pieces of sheet plastic are in overlapping disposition at the fold. The term seam in this specification encompasses a thermoplastic weld made at such a fold.

[0063] In each of the embodiments of the invention described, the bag is formed from sheet plastic material that is at least partly a heat-sealable thermoplastic material and sealing/welding is effected by heat sealing. Such materials include, by way of example and not limitation, polyolefins such as polyethylene and polypropylene, vinyl polymers, and

the like. The materials may be low-, medium- or high-density polymers and may be single or multi-layer composite material. Composite laminated materials may include adhesive layers. Sealing resins such as ethylene vinyl acetate may be used to improve sealing of certain polymer layers and the use of such sealing resins may obviate the use of adhesive tie layers. The invention contemplates the use of thermoplastics films which are made of or which include, a barrier sheet material such as, for example, EVOH or a metal layer which provides a barrier generally preventing the transmission of gases. The thickness of the film material is selected mainly on the basis of the intended weight the bag must carry and generally ranges from about 2 to 20 mils.

[0064] The type of thermoplastic sheet material used will depend on the purposes to which the bag is to be put, whether it is easy to handle in manufacturing, whether it can be readily printed upon, whether it is waterproof, whether it is strong enough to resist tearing or bulging, etc.

[0065] A particular implementation uses a multi-ply plastic sheet material including a polyethylene layer which makes effective thermoplastic welds/bonds and has high strength, and a layer of polyester which accepts printed indicia very well. In the manipulation of the web portions, generally polyethylene surfaces are brought together where two parts of the sheet material have to be joined so that a bond/weld can be implemented by using thermoplastic heat sealing techniques rather than adhesive bonding. Similarly such manipulation is configured so as generally to present the polyester surfaces outwardly for application of print indicia. It will be understood however, that whereas thermoplastic welding of materials such as polyethylene is preferred, a bag according to this invention can be manufactured with any or all of the welded seams being substituted by adhesive seams.

[0066] In one example, the sheet plastic material of the bag has a polyethylene layer 1 to 7 mils thick, an adhesive polymer layer 0.1 to 0.5 mils thick, and a polyester layer 0.5 mils thick, the layers being coextruded or adhesively laminated. The layer thicknesses can be varied depending on desired sheet material characteristics. For example, the polyester layer which is better suited for accepting printed indicia than the polyethylene, can be made somewhat thicker to provide increased stiffness to the bag. This can be quite important where the bag is to function as a pouring bag and will be lodged or stored in an upright position similar to a jug. The multilayer plastic material can include additional layers of material depending on characteristics desired in the finished material. In another example, the plastic sheet material has outer layers of polyethylene so that both surfaces of the material are heat sealable. In yet another example, the plastic sheet material has a layer of nylon for added strength and/or a barrier layer such as metal foil, metallized polyester or EVOH. The selection of ply materials and the number of layers of each material is chosen for the particular properties desired in the bag. Thus, polyethylene has good heat sealing properties and relatively high strength. A copolymer polyethylene with high elastomeric content can be used where a softer material is required. The sheet film material or particular web portions used in the bag construction can be formed from thermoplastic film that has been oriented during manufacture to impart mechanical strength along a particular axis or at a critical stress site. Such oriented strength can be imparted by for example stretching at ambient temperatures, melt orienting during extrusion, etc. Heat sealing and bonding of layers of sheet material is effected by the application of

temperature and pressure for a predetermined time at locations where the layers are to be heat sealed. The temperature, pressure and time are selected based on the particular nature of the sheet materials being bonded together. Bonding is typically effected at multiple bonding stations, with the bonded material subsequently being cooled.

[0067] Whereas the various welded seams, whether or not they incorporate a strengthening element, are shown as straight lines, other more complex weld shapes can be adopted for functional and aesthetic reasons. Thus, a weld may contribute to any or all of structural shape, strength sealing and “posture” benefits. For effective sealing, both to prevent loss of contents and also to prevent intrusion from outside of contaminants, weld elements must overlap at their junctions. If the weld seams incorporate a strengthening element, then it may be appropriate to use a strengthening element which is non-linear.

[0068] There have been described herein various embodiments of a bag structure. Also described in brief detail are particular production process steps involved in manufacturing such bag structures. Such embodiments and processes have features that distinguish the present invention from the prior art. It will be apparent to those skilled in the art that the bags and the manufacture thereof may be modified in numerous ways and may assume many embodiments other than the preferred forms specifically set out and described above. Accordingly, it is intended by the appended claims to cover all modifications of the invention which fall within the scope of the invention.

What is claimed is:

1. A bag formed of plastic film material, the bag having a first side panel, a second side panel, a margin portion at a rear edge of the first side panel joining a margin portion at a rear edge of the second side panel at a rear seam, a brace fixed to the rear seam along at least a part of its length, the brace being an elongate solid plastic member.

2. A bag as claimed in claim 1, the rear seam being part of a complex of seams defining an interior storage space of the bag.

3. A bag as claimed in claim 1, the rear seam part being at least part of a handle, the bag further comprising a rear gusset extending between respective side seams, the respective side seams formed between the rear gusset and the first and second

side panels, the first and second side seams being part of a complex of seams defining an interior storage space of the bag, the handle being on the distal side of the rear gusset from the interior storage space.

4. A bag as claimed in claim 1, the brace attached to the rear seam by rivets.

5. A bag as claimed in claim 1, the plastic member positioned in an elongate pocket formed between the first and second panels at the rear seam.

6. A bag as claimed in claim 1, the plastic member fixed between the first and second side panels at the rear seam.

7. A bag as claimed in claim 1, the plastic member positioned against the rear seam on one side of the bag, and a second plastic member positioned against the rear seam on the other side of the bag.

8. A bag as claimed in claim 7, further comprising a third plastic member fixed between the first and second side panels at the rear seam.

9. A bag as claimed in claim 7, the rods being lamellar and joined by a spine portion to form a channel structure embracing a rear part of the rear seam.

10. A bag as claimed in claim 1, the plastic member having a cross-section which, along at least a part of its length, is one of round, rectangular, regular polygon, lamellar and star.

11. A bag as claimed in claim 1, the plastic member attached to the rear seam by adhesive.

12. A bag as claimed in claim 9, the channel structure attached to the sides of the rear seam by the rear seam being pinched between the lamellar rods.

13. A bag as claimed in claim 1, the cross-sectional shape of the plastic member varying along its length.

14. A bag as claimed in claim 1, the plastic member fixed to a part of the rear seam, another plastic member fixed to another part of the rear seam, the rods integral with an intermediate handle part extending between the two rods and spaced from a contents storage part of the bag.

15. A bag as claimed in claim 14, the brace bowed or angled outwardly to present a space between the handle part and the contents storage part of the bag.

16. A bag as claimed in claim 1, further comprising an openable and closeable pouring fixture at the front of the bag.

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