

(12)

EUROPEAN PATENT APPLICATION

(43)

Date of publication:

16.11.2005 Bulletin 2005/46

(51)

Int Cl.7:

B65D 75/58

(21)

Application number:

05252944.3

(22)

Date of filing:

12.05.2005

<div>(84)</div> <div>Designated Contracting States:</div> <div>AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR</div> <div>Designated Extension States:</div> <div>AL BA HR LV MK YU</div>	<div>(72)</div> <div>Inventors:</div> <div> <ul style="list-style-type: none"> <li>Berbert, Otacilio Teixeira</li> <li>Oshkosh Wisconsin 54904 (US)</li> <li>Fuller, Scott A.</li> <li>Oshkosh Wisconsin 54904 (US)</li> </ul> </div>
<div>(30)</div> <div>Priority:</div> <div>14.05.2004 US 845988</div>	<div>(74)</div> <div>Representative:</div> <div>W.P. Thompson &amp; Co.</div> <div>Eastcheap House</div> <div>Central Approach</div> <div>Letchworth Garden City,</div> <div>Hertfordshire SG6 3DS (GB)</div>
<div>(71)</div> <div>Applicant:</div> <div>CURWOOD, INC.</div> <div>Oshkosh, Wisconsin 54904 (US)</div>	

(54)

Easy-open handle bag for medium to heavy duty applications

(57)

A bag for carrying medium to heavy loads comprising a body formed from a flexible thermoplastic film, such that the body comprises a first panel and an opposing second panel, a receptacle cavity formed the first and second panels, an integral handle opening, and an easy-open feature which extends longitudinally from a

top seal to an opposing bottom seal and positioned adjacent to a first side seal of the body. The easy-open feature comprises at least one of (i) at least one line of structural weakness in the thermoplastic film, (ii) a re-closable fastener adhered to the thermoplastic film, or (iii) a combination of (i) and (ii).

FIG. 1

Printed by Jouve, 75001 PARIS (FR)

EP 1 595 815 A1

## Description

## BACKGROUND OF THE INVENTION

5 **[0001]** The present invention generally relates to thermoplastic handle bags suitable for storing and transporting medium to heavy loads, e.g., frozen foods such as chickens, turkeys, and the like comprising an easy-open feature, and more particularly, to thermoplastic handle bags having an easy-open feature adapted for the removal of large or bulky medium to heavy loads contained therein.

10 **[0002]** Thermoplastic bags having a handle opening and/or an easy-open feature which support heavy granulated items such as salt pellets, pet food, fertilizer, etc. are known in the art. U.S. Patent No. 6,231,232 to Warr is directed to synthetic bags primarily for granulated contents which are capable of carrying loads of from 10 to 50 pounds and which include a hand-insertion slit below the top seal of the bag that may serve as a handle. U.S. Patent Nos. 5,482,376 and 5,601,369, both to Moseley *et al.* also disclose bags adapted to hold pourable contents from 20 to 150 pounds. These bags include a handle which is either attached or formed from the bag and further disclose a curved line of perforations in the corner portion of the bag which permits easy opening of the bag. U.S. Patent Nos. 5,482,376 and 15 5,601,369 both to Warr further disclose thermoplastic bags designed for heavy-duty applications which include a die-cut handle opening similar to that described in U.S. Patent No. 6,231,232 and an easy-open feature which comprises a line of perforations which extends from the top edge to the side edge at the corner of the bag. While these bags are capable of carrying medium to heavy load and are easy to open, they are not suitable for large or bulky items contained therein which require a different means of removal from the package.

20 **[0003]** It is also known in the art that flexible bags may include both a handle and an opening zone in the side of the package which facilitates in the removal of bulky items contained therein. U.S. Patent Nos. 4,966,286 to Muckenfuhs; 5,036,978 to Frank *et al.* and 5,054,619 to Muckenfuhs describe thermoplastic packages which are suitable for storing and transporting compressed flexible articles, such as disposable absorbent products, e.g., diapers, bandages, sanitary napkins and the like. These packages have a carrying handle and an easy-open feature which consists of one or more arcuate lines of weakness in a side panel or gusset of the bag. While these bags allow for easy removal of relatively bulky contents, they will neither separately support medium to heavy loads nor will the perforated tear lines of the easy-open feature resist tearing or bursting during transportation or storage of medium to heavy loads.

## 30 SUMMARY OF THE INVENTION

**[0004]** The present invention provides flexible bags that resists tearing or bursting during the storage and transportation of medium to heavy duty loads which may range in weight from about five pounds to about fifty pounds or more. The present invention also provides flexible bags formed from thermoplastic films which include a handle opening and 35 an easy-open feature. The present invention further provides flexible bags suitable for supporting medium to heavy duty loads which include an easy-open feature suitable for removing large or bulky items contained therein.

**[0005]** Accordingly, one aspect of the present invention is directed to flexible bags for medium to heavy duty packaging applications which have a body formed from a thermoplastic film having an inner surface and an outer surface relative to the bag. Preferably, the flexible bags include a body formed from a thermoplastic film having an unrestrained 40 linear thermal shrinkage in both the machine direction and the transverse direction of between 0-10 % at 85° C. as measured in accordance with ASTM D-2732-96, which is hereby incorporated, in its entirety, by reference thereto. Preferably, the thermoplastic film has a minimum tensile strength at break in the machine direction of at least 3000 psi ( $2 \times 10^7$  N/m<sup>2</sup>) as measure at a rate of 12 inch/min. (30.5 cm/min.) in accordance with ASTM D-882, which is hereby incorporated, in its entirety, by reference thereto. Preferably, the thermoplastic film has a maximum elongation at break 45 in the machine direction of between 0-150 % as measure at a rate of 12 inch/min. (30.5 cm/min.) in accordance with ASTM D-882, which is hereby incorporated, in its entirety, by reference thereto. Preferably, the film has a total thickness of from about 2.0 to 7.0 mils (0.005 to 0.018 cm). Although the thermoplastic film may be a monolayer film or a multilayer film, preferably the film is a multilayer film. Preferably, the film is a multilayer film comprising at least a first polymer layer, a second polymer layer, and a third polymer layer. The first polymer layer of the thermoplastic multilayer film comprises a material selected from the group consisting of polyester, polyamide, polyolefin or blends thereof, preferably, 50 a material selected from the group consisting of polyester terephthalate, polyamide, polypropylene or blends thereof, and most preferably, either a biaxially-oriented polyester terephthalate or a biaxially-oriented polyamide. The second polymer layer of the thermoplastic multilayer film comprises an adhesive material. The third polymer layer of the thermoplastic multilayer film comprises a sealant material. Preferably, the second polymer layer is directly adhered to the first and third polymer layer. For certain packaging applications, it may be beneficial to include the three-layer thermoplastic film as a substructure in a larger multilayer flexible film in forming the body of a bag. In such a configuration, the larger multilayer film incorporating three-layer structure as a substructure may advantageously possess properties and benefits resulting from the three-layer structure as discussed herein, but may also possess additional properties

and benefits arising from the additional layers. Larger multilayer film structures which incorporate three-layer structure as a substructure may have at least one additional layer adhered to this substructure by various methods known to those skilled in the art which include thermal lamination, adhesive lamination, coextrusion coating, coextrusion lamination.

**[0006]** The present invention is also directed to bags which include a first panel and a second panel where each of the panels have a perimeter which includes a first peripheral side edge and an opposing second peripheral side edge, connected by a peripheral top edge and an opposing peripheral bottom edge. The body also includes a plurality of seals which joins the first panel to the second panel. In one embodiment of the present invention, the plurality of seals include a first side seal, a first top seal and an opposing bottom seal. The first side seal, first top seal and opposing bottom seal can be connected together to form a seal perimeter between the first and second panels. Alternatively, the plurality of seals may further include a first side seal and an opposing second side seal, a first top seal and an opposing bottom seal. In this regard, the first side seal and opposing second side seal, the first top seal and opposing bottom seal can be connected together to form a seal perimeter. In another embodiment, the plurality of seals may still further include a first side seal and an opposing second side seal, a first top seal, a second top seal and an opposing bottom seal. Preferably, the second top seal is parallel with the first top seal and positioned below the handle opening of the bag extending transversely across the bag from the first peripheral side edge to the second peripheral side edge. In this particular embodiment, the first side seal and opposing second side seal, the second top seal and opposing bottom seal can be connected together to form a seal perimeter. The body of the bags are provided with a receptacle cavity which is formed between the first and second panels and defined by the seal perimeter. While the flexible bags of the present invention need not necessarily include side gussets, for some applications it may be beneficial to include at least one of: a first side gusset and a second side gusset, a bottom gusset, or a first side gusset, a second side gusset and a bottom gusset.

**[0007]** As a second aspect, the present invention is directed to flexible bags for medium to heavy duty packaging applications which include an integral handle opening. The integral handle opening is disposed in a pre-determined area below the peripheral top edge and extends transversely across the bag from a first peripheral side edge to a second peripheral side edge. The integral handle opening may be formed in the first and second panels of the body of the bag as either a hole, slit, cut and the like. Preferably, the pre-determined area in the first panel and the second panel is a reinforced portion of the body of the bag.

**[0008]** As a third aspect, the present invention is directed to flexible bags for medium to heavy duty packaging applications having an easy-open feature adapted such that large and/or bulky items may be easily removed from the receptacle cavity of the bag. Examples of large or bulky items include, but are not limited to, fresh or frozen meat and poultry, such as turkey, chicken, duck and the like. The easy-open feature extends longitudinally from the peripheral top edge to the peripheral bottom edge in either the first panel or the second panel and is positioned adjacent to either the first peripheral side edge or the second peripheral side edge of the body of the bag.

**[0009]** In one embodiment of the invention, the easy-open feature may include at least one line of structural weakness in either the inner surface or the outer surface of the thermoplastic film. Preferably, the at least one line of structural weakness further includes a tear-initiation feature. A tear-initiation feature may be formed as a cut, notch or surface-roughening area and the like, in the external surface of film positioned above the at least one line of structural weakness. In this regard, the bag can be easily opened by a relatively weak manual force at the tear-initiation feature and in combination with the at least one line of structural weakness obviating the need to cut the bag with a knife, scissors or any other sharp implement.

**[0010]** Alternatively, the easy-open feature may be provided as a reclosable fastener attached to the inner surface of the thermoplastic film forming the body of the bag. Suitable reclosable fastener, in general, are known and are taught, for example, in U. S. Patent Nos. 5,063,644; 5,301,394; 5,442,837; 5,964,532; 6,409,384; 6,439,770; 6,524,002; 6,527,444; 6,609,827; 6,616,333; 6,632,021; 6,663,283; 6,666,580; 6,679,027; and U.S. Patent Application Nos. 2002/0097923; and 2002/0196987, each of which is incorporated by reference herein.

**[0011]** Preferably, the reclosable fastener comprises a first interlocking member and a second interlocking member. Preferably, the first and second interlocking members each have an attachment flange for securing each member to the inner surface of the thermoplastic film forming the body of the bag. Preferably, the reclosable fastener further comprises a slider device which facilitates the manual operation of the fastener by engaging and dis-engaging the first interlocking member with the second interlocking member.

**[0012]** In another embodiment, the easy-open feature may include a combination of both the at least one line of structural weakness in either the inner surface or the outer surface of the thermoplastic film and the reclosable fastener attached to the inner surface of the thermoplastic film.

**[0013]** The present invention is also directed to flexible bags for medium to heavy duty packaging applications which further comprises at least one removable thermoplastic inner package disposed within and separate from the bag. Preferably, the at least one removable thermoplastic inner package comprises a freezer storage package.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0014]** FIG. 1 is a partially schematic, front plan view of one embodiment of a flexible bag according to the present invention showing one example of an easy-open feature.

**[0015]** FIG. 2 is a partially schematic, front plan view of an alternative embodiment of a flexible bag according to the present invention showing another example of an easy-open feature.

**[0016]** FIG. 3 is a partially schematic, front plan view of still another embodiment of a flexible bag according to the present invention having an easy-open feature similar to that depicted in FIG. 1.

**[0017]** FIG. 4 is a cross-sectional view of a thermoplastic film which forms the body of the flexible bags according to the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

**[0018]** As used herein, the term "multilayer" refers to a plurality of layers in a single film structure generally in the form of a sheet or web which can be made from a polymer material or a non-polymer material bonded together by any conventional means known in the art, i.e., coextrusion, extrusion coating, and lamination, vacuum vapor deposition coating, solvent coating, emulsion coating, or suspension coating or combination of one or more thereof. The multilayer film of the present invention may include as many layers as desired, preferably, at least three polymer layers.

**[0019]** As used herein, the phrase "thermoplastic" refers to a polymer or polymer mixture that softens when exposed to heat and returns to its original condition when cooled to room temperature. In general, thermoplastic materials include, but are not limited to, synthetic polymers such as polyamides, polyolefins, polyalkyl acrylates, polyesters, ethylene/vinyl alcohol copolymers, and the like. Thermoplastic materials may also include any synthetic polymer that are cross-linked by either radiation or chemical reaction during a manufacturing process operation.

**[0020]** As used herein, the term "polymer" refers to the product of a polymerization reaction, and is inclusive of homopolymers, copolymers, terpolymers, etc. In general, the layers of a film can consist essentially of a single polymer, or can have still additional polymers together therewith, i.e., blended therewith.

**[0021]** As used herein, the term "copolymer" refers to polymers formed by the polymerization of reaction of at least two different monomers. For example, the term "copolymer" includes the co-polymerization reaction product of ethylene and an  $\alpha$ -olefin, such as 1-hexene. The term "copolymer" is also inclusive of, for example, the co-polymerization of a mixture of ethylene, propylene, 1-propene, 1-butene, 1-hexene, and 1-octene. As used herein, a copolymer identified in terms of a plurality of monomers, e.g., "propylene/ethylene copolymer", refers to a copolymer in which either monomer may copolymerize in a higher weight or molar percent than the other monomer or monomers. However, the first listed monomer preferably polymerizes in a higher weight percent than the second listed monomer.

**[0022]** As used herein, the term "extrusion" refers to the process of forming continuous shapes by forcing a molten polymeric material through a die, followed by cooling.

**[0023]** As used herein, the term "coextrusion" refers to the process by which the outputs of two or more extruders are brought smoothly together in a feed block, to form a multilayer molten mixture that is fed to a die to produce a layered extrudate. Coextrusion can be employed in film blowing, sheet and flat film extrusion, blow molding, and extrusion coating.

**[0024]** As used herein, the term "biaxially-oriented" refers to a polymer web which forms a film structure in which the web has been elongated in two directions at elevated temperatures followed by being "set" in the elongated configuration by cooling the material while substantially retaining the elongated dimensions. This combination of elongation at elevated temperature followed by cooling causes an alignment of the polymer chains to a more parallel configuration, thereby improving the mechanical properties of the polymer web. Upon subsequently heating of certain unrestrained, unannealed, biaxially-oriented sheet of polymer to its orientation temperature, heat-shrinkage may be produced. Following orientation, the biaxially-oriented polymer web is preferably cooled and then heated to an elevated temperature, most preferably to an elevated temperature which is above the glass transition temperature and below the crystalline melting point of the polymer. This reheating step, which may be referred to as annealing or heat setting, is performed in order to provide a polymer web of uniform flat width. In accordance with the present invention, the biaxially-oriented polymer web may be used to form a film layer is heated to an elevated temperature in order to provide a packaging film with an unrestrained linear thermal shrinkage in the machine direction of between 0-10 % at 85° C. as measured in accordance with ASTM D-2732-96 test method, which is incorporated herein by reference.

**[0025]** As used herein, the terms "joins" or "joining" are used in its broad sense to mean either two formerly separate sheets connected together, or integrally formed by, for example, folding over a film or laminate to define an edge.

**[0026]** As used herein, the phrase "machine direction" refers to a direction "along the length" of the film, i.e., in the longitudinal direction the film is formed during extrusion. In contrast, the "transverse direction" refers to the direction across the film or perpendicular to the machine direction.

**[0027]** As used herein, terminology employing a "/" with respect to the chemical identity of a copolymer (e.g., poly-

vinylidene chloride/methyl acrylate copolymer), identifies the comonomers which are copolymerized to produce the copolymer.

**[0028]** As used herein, the term "polyester" refers to homopolymers or copolymers having an ester linkage between monomer units which may be formed, for example, by condensation polymerization reactions between a dicarboxylic acid and a glycol. The dicarboxylic acid may be linear or aliphatic, *i.e.*, oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, pimelic acid, suberic acid, azelaic acid, sebacic acid, and the like; or may be aromatic or alkyl substituted aromatic, *i.e.*, various isomers of phthalic acid, such as paraphthalic acid (or terephthalic acid), isophthalic acid and naphthalic acid. Specific examples of alkyl substituted aromatic acids include the various isomers of dimethylphthalic acid, such as dimethylisophthalic acid, dimethylorthophthalic acid, dimethylterephthalic acid, the various isomers of diethylphthalic acid, such as diethylisophthalic acid, diethylorthophthalic acid, the various isomers of dimethylnaphthalic acid, such as 2,6-dimethylnaphthalic acid and 2,5-dimethylnaphthalic acid, and the various isomers of diethylnaphthalic acid. The glycols may be straight-chained or branched. Specific examples include ethylene glycol, propylene glycol, trimethylene glycol, 1,4-butane diol, neopentyl glycol and the like. In one example a preferred embodiment of this invention, the first layer comprises polyethylene terephthalate copolymer and most preferable, biaxially-oriented polyethylene terephthalate copolymer.

**[0029]** As used herein, the term "adhesive" refers to a polymer material serving a primary purpose or function of adhering two surfaces to one another. In the present invention, the adhesive may adhere one film layer surface to another film layer surface or one area of a film layer surface to another area of the same film layer surface. The adhesive may comprise any polymer, copolymer or blend of polymers having a polar group thereon, or any other polymer, homopolymer, copolymer or blend of polymers including modified and unmodified polymers, *e.g.*, grafted copolymers, which provide sufficient interlayer adhesion to adjacent layers comprising otherwise nonadhering polymers. Adhesive compositions of the present invention may include, but are not limited to, modified and unmodified polyolefins, preferably polyethylene, such as for example, low-density polyethylene, linear low-density polyethylene, medium-density polyethylene, and modified and unmodified copolymers of ethylene with one or more  $\alpha$ -olefins ( $\alpha$ -olefins) such as butene-1, hexene-1, octene-1, or the like as a comonomer.

**[0030]** As used herein, the term "polyolefin" refers to homopolymers, copolymers, including *e.g.* bipolymers, terpolymers, etc., having a methylene linkage between monomer units which may be formed by any method known to those skill in the art. Suitable examples of polyolefins include polyethylene, low density polyethylene, linear low density polyethylene, very low density polyethylene, ultra low density polyethylene, medium density polyethylene, high density polyethylene, polyethylenes comprising ethylene/ $\alpha$ -olefin which are copolymers of ethylene with one or more  $\alpha$ -olefins ( $\alpha$ -olefins) such as butene-1, hexene-1, octene-1, or the like as a comonomer, linear low density polyethylene, very low density polyethylene, ultra low density polyethylene, ethylene/propylene copolymers, polypropylene, propylene/ethylene copolymer, polyisoprene, polybutylene, polybutene, poly-3-methylbutene-1, poly-4-methylpentene-1, ionomers and the like.

**[0031]** As used herein, the phrase "ethylene/ $\alpha$ -olefin" refers to a modified or unmodified copolymer produced by the co-polymerization of ethylene and any one or more  $\alpha$ -olefin. The  $\alpha$ -olefin in the present invention may have between 3-20 pendant carbon atoms. The co-polymerization of ethylene and an  $\alpha$ -olefin may be produced by heterogeneous catalysis, *i.e.*, co-polymerization reactions with Ziegler-Natta catalysis systems, for example, metal halides activated by an organometallic catalyst, *i.e.*, titanium chloride, optionally containing magnesium chloride, complexed to trialkyl aluminum and may be found in patents such as U.S. Patent No. 4,302,565 to Goeke, *et al.* and U.S. Patent No. 4,302,566 to Karol, *et al.*, both of which are hereby incorporated, in their entireties, by reference thereto.

**[0032]** As used herein, the term "modified" refers to a chemical derivative, *e.g.*, one having any form of anhydride functionality, such as anhydride of maleic acid, crotonic acid, citraconic acid, itaconic acid, fumaric acid, *etc.*, whether grafted onto a polymer, copolymerized with a polymer, or blended with one or more polymers, and is also inclusive of derivatives of such functionalities, such as acids, esters, and metal salts derived therefrom.

**[0033]** As used herein, the term "polyamide" refers to homopolymers, copolymers, or terpolymers having an amide linkage between monomer units which may be formed by any method known to those skill in the art. Useful polyamide homopolymers include nylon 6 (polycaprolactam), nylon 11 (polyundecanolactam), nylon 12 (polylauryllactam), and the like. Other useful polyamide homopolymers also include nylon 4,2 (polytetramethylene ethylenediamide), nylon 4,6 (polytetramethylene adipamide), nylon 6,6 (polyhexamethylene adipamide), nylon 6,9 (polyhexamethylene azelamide), nylon 6,10 (polyhexamethylene sebacamide), nylon 6,12 (polyhexamethylene dodecanediamide), nylon 7,7 (polyheptamethylene pimelamide), nylon 8,8 (polyoctamethylene suberamide), nylon 9,9 (polynonamethylene azelamide), nylon 10,9 (polydecamethylene azelamide), nylon 12,12 (polydodecamethylene dodecanediamide), and the like. Useful polyamide copolymers include nylon 6,6/6 copolymer (polyhexamethylene adipamide/caprolactam copolymer), nylon 6/6,6 copolymer (polycaprolactam/hexamethylene adipamide copolymer), nylon 6,2/6,2 copolymer (polyhexamethylene ethylenediamide/hexamethylene ethylenediamide copolymer), nylon 6,6/6,9/6 copolymer (polyhexamethylene adipamide/hexamethylene azelamide/caprolactam copolymer), as well as other nylons which are not particularly delineated here.

**[0034]** As used herein, the term "sealant" refers to a layer which is heat sealable to itself, *i.e.*, be capable of fusion bonding by conventional indirect heating means which generate sufficient heat on at least one film contact surface for conduction to the contiguous film contact surface and formation of a bond interface therebetween without loss of the film integrity. Advantageously, the bond interface must be sufficiently thermally stable to prevent gas or liquid leakage therethrough. Suitable examples of sealants for the present invention include, but are not limited to, polyolefins, including polyethylenes, polypropylenes, polybutylenes, ionomers, ethylene/ $\alpha$ -olefin copolymers and blends thereof.

**[0035]** As used herein, the term "surface-roughened" refers to dimples, indentations, scratches, bores, holes, perforations, and the like, on an external surface of a film. It will be recognized by those skilled in the art, that the dimples, indentations, scratches, bores, holes, perforations, and the like may have a random or regular repeating arrangement. Generally, a predetermined portion (less than the entire area) of a surface of the film is treated in order to provide a surface-roughened portion. The surface-roughened portion may be formed by mechanical means, *e.g.*, subjecting the external surface of the film layer to knurling by a roller formed with a plurality of circumferentially extending projections as described, for example, in U.S. Patent Nos. 4,543,279 and 4,778,058, which are incorporated herein by reference. Alternatively, non-mechanical methods may be used which include corona discharge, plasma discharge, ultrasonic wave, and optical ablation.

**[0036]** The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

**[0037]** Referring now to FIG. 1, bag **10** represents one example of a flexible bag according to the present invention having one embodiment of an easy-open feature. As shown, bag **10** is depicted as comprising a body **11** which is formed from a thermoplastic film **12** having an inner surface **13a** (See FIG. 4) and an outer surface **13b** (See FIG. 4) relative to the bag. It should be appreciated by a person of ordinary skill in art that body **11** may comprise one or more monolayer or multilayer thermoplastic films suitable for use with medium to heavy duty packaging applications. The body **11** of bag **10** comprises a first panel **14a** and a second panel **14b** (See FIG. 2) such that the panels, **14a** and **14b**, each have a perimeter **15** and **15'** (See FIG. 2). Perimeter **15** includes a first peripheral side edge **16a** and an opposing second peripheral side edge **16b** connected by a peripheral top edge **16c** and an opposing peripheral bottom edge **16d**. Body **11** also includes a plurality of seals **17** comprising at least a first side seal **17a**, a first top seal **17b** and an opposing bottom seal **17c**, all which join first panel **14a** to second panel **14b**. It should be appreciated by a person of ordinary skill in art that the body **11** of bag **10** may be integrally formed by folding a thermoplastic film **12** over onto itself and sealing first panel **14a** to second panel **14b** (See FIG. 2) thus creating a seal perimeter **18** which is comprised of first side seal **17a**, first top seal **17b** and opposing bottom seal **17c**. Alternatively, body **11** may be fabricated from more than one thermoplastic films which may include thermoplastic film **12** by sealing the four peripheral edges of first panel **14a** and **14b** (See FIG. 2) together thereby providing a seal perimeter **18** having a first side seal **17a**, a second side seal **17d** (See FIG. 2), a first top seal **17b** and an opposing bottom seal **17c**.

**[0038]** Body **11** further comprises an inner receptacle cavity **19** (not shown) which is formed between first panel **14a** and opposing second panel **14b** and defined by a seal perimeter **18**, and an integral handle opening **20** which extends transversely across the bag **10** from the first peripheral side edges **16a** to the second side edges **16b**. Integral handle opening **20** may be fabricated, for example, by slitting or die cutting into first panel **14a** and second panel **14b** at the same time such that the slit or cut in first panel **14a** is in registration with the slit or cut in second panel **14b**. Body **11** also includes an easy-open feature **21** which extends longitudinally from the first top seal **17b** to opposing bottom seal **17c** and is disposed adjacent to peripheral side edge **16a** of the first panel **14a**. Easy-open feature **21**, by way of example, is depicted as being at least one line of structural weakness **21a** in the first panel **14a** and may be formed in either the inner surface **13a** (See FIG. 4) or the outer surface **13b** (See FIG. 4) of thermoplastic film **12**. Alternatively, the at one line of structural weakness **21a** may be formed in second panel **14b** (see FIG. 2) in either inner surface **13a** (See FIG. 4) or outer surface **13b** (See FIG. 4) of thermoplastic film **12**.

**[0039]** Formation of the at least one line of structural weakness **21a** may be accomplished by methods disclosed in U.S. Patent Nos. 3,626,143; 3,909,582; 4,778,058; 4,834,245; 5,001,325; 5,613,779; 5,630,308; and 6,427,420, which are hereby incorporated by reference. These methods include *e.g.*, forming grooves, scores, scratches, cuts, slits or surface roughening *e.g.*, with a laser, by corona or plasma discharge, by contact with a rough surface roller or roughened surface such as sand paper, emery paper, or by cutting devices or blades. For example, the at least one line of structural weakness may be provided by any of the methods disclosed in the aforementioned documents, such as using a cutting device to form the at least one line of structural weakness in a first moving web or layer followed by lamination of the first moving web or layer to a second moving web or layer with or without tear-initiation features or the like. It will be appreciated that at least one line of structural weaknesses **21a** may be provided in a variety of shapes including curves or sinusoidal and may also be provided either continuously or intermittently along the inner surface **13a** (See FIG. 4) or the outer surface **13b** (See FIG. 4) of thermoplastic film **12** of first panel **14a** or second panel **14b**. While at least

one line of structural weaknesses **21 a** may be provided having a depth of the entire thickness of thermoplastic film **12**, e.g., by intermittent perforations or slits, it is preferred that the at least one line of structural weaknesses has a depth of less than the entire thickness of the panel that it is formed on. It will be appreciated that the at least one line of structural weakness may be provided in any length along either panel between from first top seal **17b** to opposing bottom seal **17c**.

[0040] Referring now to FIG. 2, bag **20** represents another example of an embodiment of the present invention. Bag **20** comprises a body **11** of a first panel **14a** (See FIG. 1) and second panel **14b** such that second panel **14b** has a perimeter **15'** which includes a first peripheral side edge **16a'** and an opposing second peripheral side edge **16b'**, connected by a peripheral top edge **16c'** and an opposing bottom edge **16d'**. Body **11** includes a plurality of seals **17** which joins first panel **14a** to second panel **14b** and comprises a first side seal **17a** and a second side seal **17d**, a first top seal **17b** and a second top seal **17e**, and a bottom seal **17c**. In this particular example, the seal perimeter **18** which defines receptacle cavity **19** (not shown) consists of first side seal **17a** and second side seal **17d**, second top seal **17e** and bottom seal **17c**. Body **11** also includes integral handle opening **20** that is formed in a reinforced portion **27a** (See FIG. 3) of the first panel **14a** and in a reinforced portion the second panel **27b** of second panel **14b**. It should be appreciated by a person of ordinary skill in art that the reinforced portions **27a** (See FIG. 3) and **27b** may be fabricated from a patch of film such as thermoplastic film **12** which is adhered to the portion overlaying and surrounding handle opening **20**. The film patch is typically applied before the handle opening **20** is formed and may be secured to first and second panels, **14a** and **14b** by an adhesive or heat-fusing process. Body **11** of bag **20** also comprises a reclosable fastener **21b** as the easy-opening feature **21** which is positioned adjacent to first side seal **17a** and extends longitudinally from first top seal **17b** to opposing bottom seal **17c**. Reclosable fastener **21b**, may include, but is not limited to, a reclosable fastener having interlocking members, preferably, interlocking members and a slider device **26**. Suitable reclosable fasteners, in general, are known and are taught, for example, in U.S. Patent Nos. 5,063,644; 5,301,394; 5,442,837; 5,964,532; 6,409,384; 6,439,770; 6,524,002; 6,527,444; 6,609,827; 6,616,333; 6,632,021; 6,663,283; 6,666,580; 6,679,027; and U.S. Patent Application Nos. 2002/0097923; and 2002/0196987, each of which is incorporated by reference herein. It will be noted that the reclosable fastener **21b** is not limited to any particular number of interlocking members and/or slider device structure. It will be appreciated that the reclosable fastener **21b** may be chosen which does not include a slider device **26** and/or interlocking members.

[0041] Turning now to FIG. 3, bag **30** is still another embodiment of flexible bags for medium to heavy duty packaging applications according to the present invention. Bag **30** is depicted having a body **11** comprising first panel **14a** and second panel **14b** (See FIG. 2), and a plurality of seals which includes a first top seal **17b**, a second top seal **17e** and an opposing bottom seal **17c**, a first side seal **17a** and opposing second side seal **17d**. The easy-open feature **21** of body **11** of bag **30** comprises at least one line of structural weakness that includes a tear-initiation feature **23**. Tear-initiation feature **23** is provided to further facilitate the opening of the package by obviating the need to cut bag **30** at the peripheral side of the easy-open feature **21**. In this regard, tear-initiation feature **23** may be formed as a cut, slit, notch, score or surface-roughened area in thermoplastic film **12** at a peripheral side edge which affords easy opening of bag **30** by a relatively weak manual force. In this way, a tear begins at tear-initiation feature **23** and then propagates in the direction of the at least one line of structural weakness **21a**.

[0042] FIG. 4 represents an across-sectional view of one embodiment of a thermoplastic film suitable for forming a bag according to the present invention. Thermoplastic film **12** is depicted as a multilayer thermoplastic film having an inner surface **13a** and an outer surface **13b** relative to the bag and comprising at least three layers of a first polymer layer **12a**, a second polymer layer **12b**, and a third polymer layer **12c**, such that second polymer layer **12b** is positioned between first polymer layer **12a** and third polymer layer **12c**. Preferably, first polymer layer **12a** may include a material selected from the group consisting of polyester, polyamide, polyolefin or blends thereof, more preferably, polyester terephthalate, polyamide, polypropylene or blends thereof, and most preferably, biaxially-oriented polyester terephthalate or biaxially-oriented polyamide. Preferably, first polymer layer **12a** comprises a biaxially-oriented polyester terephthalate having a thickness of 0.48 mils (1.22 cm), a ultimate tensile strength in the machine direction of 27000 psi, an elongation at break in the machine direction of 110 %, a modulus of 550 kpsi. It will be appreciated that first polymer layer **12a** may also be treated on at least one surface with an anchor coating to improve the adhesion to an adjacent layer. An example of a commercially available biaxially-oriented polyester terephthalate is sold under the trademark Mylar® LBT which is supplied by E.I. de Pont de Nemours and Company, Wilmington, Delaware, U.S.A. Preferably, second polymer layer **12b** comprises an adhesive material. Preferably, polymer layer **12b** is a low density polyethylene having a melt index of 1.9, a density of 0.922 and a melting point of 110° C., such as that sold under the trademark Escorene® LD-134 and available from ExxonMobil Chemical Company of Houston, TX, U.S.A. Preferably, polymer layer **12c** comprises a sealant material such as low density polyethylene. An example of a suitable low density polyethylene having melt index of 4.1, a density of 0.923, and a melting point of 112° C., such as that sold under the trademark Escorene® LD-201 and available from ExxonMobil Chemical Company of Houston, TX, U.S.A. It should be appreciated by a person of ordinary skill in the art that one or more of the polymer layers described hereinabove may also, if desired, include well known additives such as processing aids, slip agents, anti-blocking agents and pigments,

printed indicia and mixtures thereof.

**[0043]** Thermoplastic film **12** has an unrestrained linear thermal shrinkage in both the machine direction and the transverse direction of between 0-10 % at 85° C. as measured in accordance with ASTM D-2732-96, a minimum tensile strength at break in the machine direction of at least 3000 psi ( $2 \times 10^7$  N/m<sup>2</sup>) as measured at a rate of 12 inch/min. (30.5 cm/min.) in accordance with ASTM D-882, and a maximum elongation at break in the machine direction of between 0-150 % as measured at a rate of 12 inch/min. (30.5 cm/min.) in accordance with ASTM D-882. Preferably, thermoplastic film **12** has a total thickness of between 2.0-7.0 mils (0.005-0.018 cm).

**[0044]** Unless otherwise noted, the physical properties and performance characteristics reported herein were measured by test procedures similar to the following methods.

Density	ASTM D-1505
Melting Point	ASTM D-3418
Melt Index	ASTM D-1238
Percent Elongation at Break	ASTM D-882
Tensile strength at Break	ASTM D-882
Modulus	ASTM D-882
Unrestrained Linear Thermal Shrinkage	ASTM D-2732-96

**[0045]** Many modifications and other embodiments of the invention will come to mind to one skilled in the art to which this invention pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

## Claims

**1.** A flexible bag for medium to heavy duty packaging applications comprising:

a) a body formed from a thermoplastic film which has an inner surface and an outer surface relative to said bag, wherein said body comprises:

- (i) a first panel;
- (ii) a second panel opposite said first panel;
- (iii) wherein said first panel and said second panel each have a perimeter having a first peripheral side edge and an opposing second peripheral side edge, connected by a peripheral top edge, and an opposing peripheral bottom edge;

b) a plurality of seals which joins said first panel to said second panel, wherein said plurality of seals comprises at least a first side seal, a first top seal and an opposing bottom seal, wherein said plurality of seals are connected to form a seal perimeter between said first panel and said second panel;

c) a receptacle cavity formed between said first panel and said second panel and delimited by said seal perimeter;

d) an integral handle opening which extends transversely across said bag from said first peripheral side edge to said opposing second peripheral side edge of said perimeter of both said first panel and said second panel; and

e) an easy-open feature which extends longitudinally from said first top seal to said opposing bottom seal in either of said first panel or said second panel and is positioned adjacent to one of said peripheral side edges of either said first panel or said second panel; wherein said easy-open feature comprises at least one of:

- (i) at least one line of structural weakness in either said inner surface or said outer surface of said thermoplastic film,
- (ii) a reclosable fastener affixed to said inner surface of said thermoplastic film,
- (iii) a combination of (i) at least one line of structural weakness in either said inner surface or said outer surface of said thermoplastic film and (ii) a reclosable fastener affixed to said inner surface of said thermoplastic film.



## EP 1 595 815 A1

2. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in claim 1, wherein said thermoplastic film has an unrestrained linear thermal shrinkage in both the machine direction and transverse direction of between 0-10% at 85°C as measured in accordance with ASTM D-2732-96.
- 5 3. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in claim 1 or claim 2, wherein said thermoplastic film has a minimum tensile strength at break in the machine direction of at least 3000 psi ( $2 \times 10^7$  N/m<sup>2</sup>) as measured at a rate of 12 inch/min. (30.5 cm/min.) in accordance with ASTM D-882.
- 10 4. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any preceding claim, wherein said thermoplastic film has a maximum elongation at break in the machine direction of between 0-150% as measured at a rate of 12 inch/min. (30.5 cm/min.) in accordance with ASTM D-882.
- 15 5. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any preceding claim, wherein said thermoplastic film has a total thickness of between 2.0-7.0 mils (0.05-0.18mm).
- 20 6. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any preceding claim, wherein said thermoplastic film is a multilayer thermoplastic film.
- 25 7. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in claim 6, wherein said multilayer thermoplastic film comprises at least:
  - a) a first polymer layer;
  - b) a second polymer layer;
  - c) a third polymer layer; and
  - d) wherein said second polymer layer is positioned between said first polymer layer and said third polymer layer.
- 30 8. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in claim 7, wherein said first polymer layer comprises a material selected from polyester, polyamide, polyolefin or blends thereof.
- 35 9. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in claim 8, wherein said first polymer layer comprises a material selected from polyester terephthalate, polyamide, polypropylene or blends thereof.
- 40 10. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in claim 9, wherein said first polymer layer comprises either a biaxially-oriented polyester terephthalate or a biaxially-oriented polyamide.
- 45 11. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any of claims 7 to 10, wherein said second polymer layer comprises an adhesive material.
- 50 12. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any of claims 7 to 11, wherein said third polymer layer comprises a sealant material.
- 55 13. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any preceding claim, wherein said plurality of seals further comprises a second top seal which is parallel to said first top seal and positioned below said integral handle opening.
14. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any preceding claim, wherein said plurality of seals further comprises a second side seal opposite said first side seal.
15. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any preceding claim, wherein said body further comprises:
  - a) a first side gusset; and
  - b) a second side gusset opposite said first side gusset.
16. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any preceding claim, wherein said bag further comprises a tear-initiation feature.

## EP 1 595 815 A1

17. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any preceding claim, wherein said reclosable fastener comprises a first interlocking member and a second interlocking member.

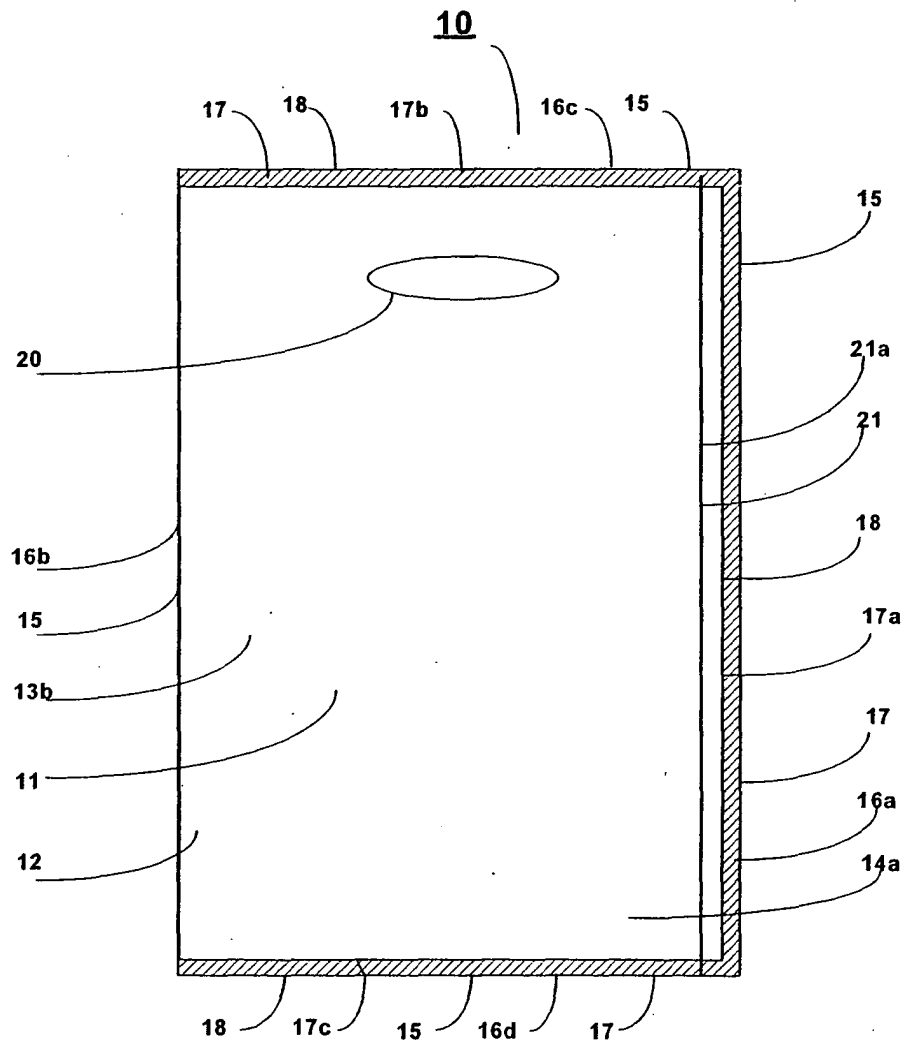
5 18. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in claim 17, wherein said first interlocking member and second interlocking member each have an attachment flange.

19. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any preceding claim, wherein said reclosable fastener further comprises a slide device.

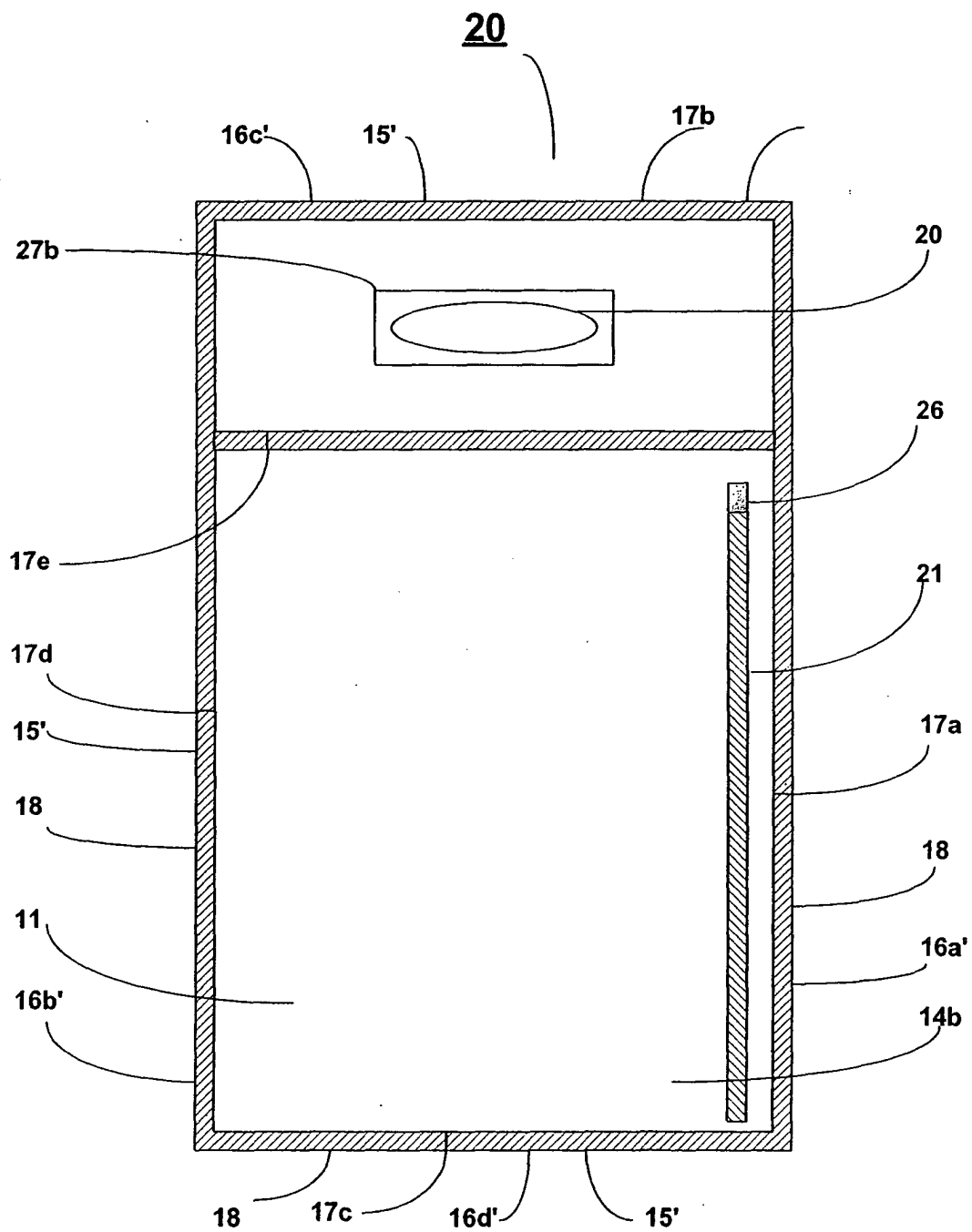
10 20. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any preceding claim, wherein said integral handle opening is formed in a reinforced portion of both said first panel and said second panel.

15 21. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in any preceding claim, wherein said bag further comprises at least one removable thermoplastic inner package disposed within and separate from said bag.

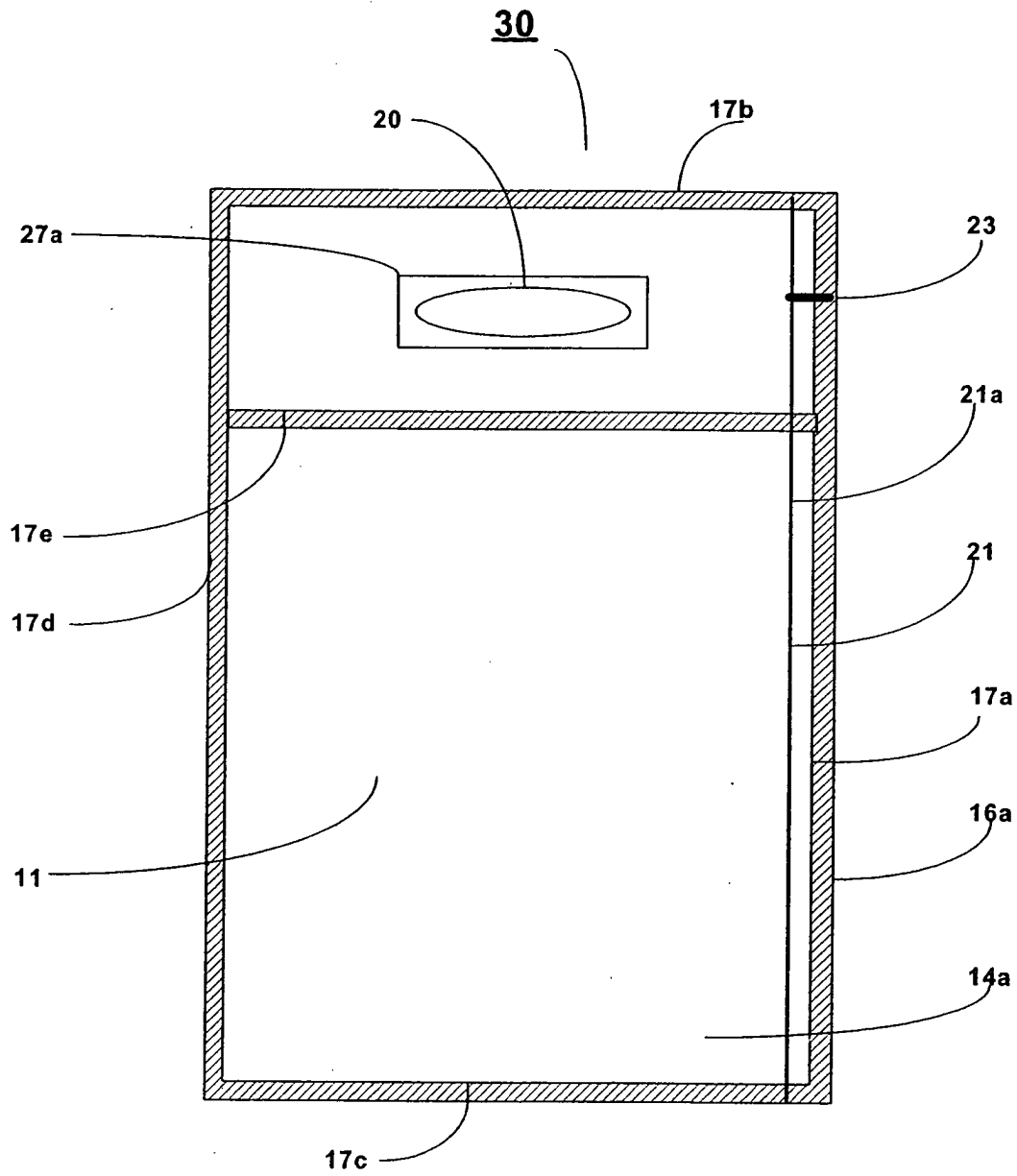
22. A flexible thermoplastic bag for medium to heavy duty packaging applications as claimed in claim 21, wherein said at least one removable thermoplastic inner package comprises a freezer storage package.



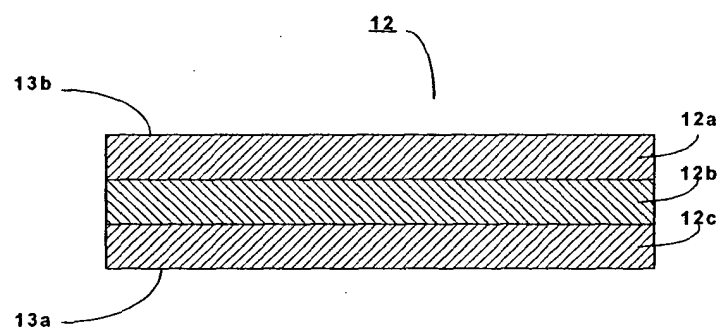
**FIG. 1**



**FIG. 2**



**FIG. 3**



**FIG. 4**



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 05 25 2944

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	US 2003/041564 A1 (SCHMIDT JOHN A) 6 March 2003 (2003-03-06) * paragraph [0063]; figure 7 *	1-22	B65D75/58
Y	US 5 561 966 A (ENGLISH ET AL) 8 October 1996 (1996-10-08) * column 7, lines 1-41; figure 3 *	1-22	
Y	US 5 613 779 A (NIWA ET AL) 25 March 1997 (1997-03-25) * column 4, lines 14-45 - column 6, lines 1-21; figures 2,3A *	16	
Y	EP 0 519 251 A (FUJI PHOTO FILM CO., LTD) 23 December 1992 (1992-12-23) * page 11, line 17 - page 13, line 14 *	6-12	
A	US 4 663 915 A (VAN ERDEN ET AL) 12 May 1987 (1987-05-12) * column 5, lines 24-47; figure 5 *	1-22	
A	JP 11 001240 A (OJI PAPER CO LTD) 6 January 1999 (1999-01-06) * abstract *	1-22	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 04, 30 April 1999 (1999-04-30) & JP 11 001240 A (OJI PAPER CO LTD), 6 January 1999 (1999-01-06) * abstract *	1-22	B65D B32B
A	US 6 120 860 A (BOWEN ET AL) 19 September 2000 (2000-09-19) * column 3, line 31 - column 6, line 65 *	6-12	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 August 2005	Examiner Cazacu, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

3  
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 25 2944

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-08-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003041564 A1	06-03-2003	US 6481183 B1	19-11-2002
US 5561966 A	08-10-1996	US 5417035 A	23-05-1995
US 5613779 A	25-03-1997	NONE	
EP 0519251 A	23-12-1992	JP 3109751 B2	20-11-2000
		JP 4372396 A	25-12-1992
		DE 69221217 D1	04-09-1997
		DE 69221217 T2	27-11-1997
		EP 0519251 A2	23-12-1992
		JP 2627591 B2	09-07-1997
		JP 5050568 A	02-03-1993
		US 5804020 A	08-09-1998
		US 5358785 A	25-10-1994
		JP 2799796 B2	21-09-1998
		JP 5045803 A	26-02-1993
US 4663915 A	12-05-1987	US 4589145 A	13-05-1986
		AU 572570 B2	12-05-1988
		AU 3419284 A	09-05-1985
		CA 1225070 A1	04-08-1987
JP 11001240 A	06-01-1999	NONE	
US 6120860 A	19-09-2000	NONE	