Title: LINER FOR USE WITH FLEXIBLE CONTAINERS

Abstract: A flexible liner has a planar base and multiple sides extending up from the planar base. The base and sides of the flexible liner define a cavity for receiving foodstuffs or other items. The flexible liner is generally dimensioned to fit within a cavity of a flexible container bag, such as a soft-sided cooler, duffle bag, gym bag or reusable grocery tote bag. The flexible liner provides increased rigidity and durability for the flexible container bag. While manual force deforms the flexible liner from its original shape, the liner is elastic and has shape memory such that when the force is removed, the liner will return to its original shape. The liner is made from a viscoelastic polymer material. Further, the liner can be attached to or configured to be removable from the flexible container bag.

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LINER FOR USE WITH FLEXIBLE CONTAINERS

CROSS-REFERENCE TO RELATED APPLICATION

TECHNICAL FIELD
[0002] The technical field relates generally to liners for flexible containers, and more particularly, to flexible, semi-rigid liners for soft-sided container bags.

BACKGROUND
[0003] Soft container bags are used for a number of applications. For example, soft cooler bags, or cut-and-sew bags, are typically used to store items that need to remain cool. Generally, a soft cooler bag is lined with heat-sealed vinyl sheeting, such as polyethylene vinyl acetate (PEVA) or polyvinyl chloride (PVC) sheeting. The soft cooler bag may then be layered with foam insulation to create an insulated bag. A number of problems have been identified in the use of vinyl sheeting in coolers. The vinyl sheeting is typically very thin and punctures relatively easily, thereby creating leaks in the bag, which reduces the insulating properties of the cooler. In addition, the seams of fabricated liners tend to leak. To address this problem, manufacturers insert a hard plastic liner, such as a rigid polypropylene bucket, into the cooler bag to add strength and improve leak resistance. However, the use of the hard plastic liner eliminates the benefits of collapsibility and flexibility of the soft cooler bag.

[0004] Some other examples of soft container bags include duffel or gym bags, and beach bags. Duffel bags and beach bags are typically constructed from flexible materials, such as nylon and/or polyester, that have a tendency to absorb moisture. In a number of instances, users store damp or wet clothing or shoes in the bags, for example, after working out or going swimming. Generally, the material of the bag absorbs moisture from these items and creates an unpleasant odor within the bag. In addition, the moisture build-up can even lead to the formation of mildew in the bag. To address this problem, manufacturers have typically used heat sealed seams or sewn seams in fabricated non-woven plastic liners.
However, the seams in these liners eventually leak, thus causing moisture to contaminate the fabric of the bag.

[0005] Another example of a soft container bag is a tote bag or a carry bag, such as a grocery tote. Tote bags are typically constructed from a flexible cloth material, such as canvas, nylon or other easy-care synthetics, recycled matter, or minimally-processed natural fibers. When a user stores a cold item, such as cold milk from the grocery store, in the tote bag, condensation forms and makes the interior of the tote bag wet. In some instances, moisture exposure compromises the fabric of the tote bag, and causes the tote bag to stretch or tear. In some other cases, the fabric of the tote bag absorbs the condensation and causes the exterior of the bag to become undesirably wet. In addition, condensation from the cold item may cause other dry items in the tote bag to also become wet.

[0006] Therefore, a need exists for a system to address the problems associated with various soft container bags.

SUMMARY

[0007] The present invention provides soft container bags having a flexible liner that can generally insulate items stored therein, while providing strength and flexibility, as well as improved leak resistance over conventional soft container bags. An example of a soft material is one that is pliable, bendable, or gives way easily under pressure. An example of a flexible material is one that is capable of being bent or flexed repeatedly without significant damage. In one aspect of the invention, a container system can include a flexible housing or bag having a cavity, and a flexible, semi-rigid liner positioned within the cavity. An example of a semi-rigid material is one that is partly or moderately rigid, and can maintain its shape. The liner can be the same size and shape as the cavity, or be sized to fit in a portion of the cavity. The liner can include one or more openings for storage or insulation purposes. Generally, the liner has shape memory, such that it can deform when a force is applied thereon, and resume its original shape without being damaged when the deforming force is removed. The liner can be manufactured from a viscoelastic polymer, such as a thermoplastic or a thermostet material. The liner can be secured to the flexible housing by stitches, snaps, clips, and the like, or remain removable from the flexible housing.

[0008] In another aspect of the invention, a container bag can include a flexible housing having a flexible liner. The flexible housing has a base having a first perimeter, a cover having a second perimeter, and one or more sidewalls extending between the first perimeter and the second perimeter. The first perimeter can be the same size as the second
perimeter. The cover can be secured to the one or more sidewalls using a zipper, clip, or other fastening device. The base, one or more sidewalls, and cover define an interior cavity in which the liner can be housed. The liner has one or more openings, and readily deforms from its original shape to a deformed shape when a force is applied to the liner without damage to the liner. When the force is removed from the liner, the liner returns to the original shape.

[0009] In yet another aspect of the invention, a container bag can include a flexible housing having a flexible, semi-rigid liner. The flexible housing has a base having a first perimeter, a cover having a second perimeter, and one or more sidewalls extending between the first perimeter and the second perimeter. The first perimeter can be the same size as the second perimeter. The cover can be secured to the one or more sidewalls using a zipper, clip, or other fastening device. The base, one or more sidewalls, and cover define an interior cavity in which the liner can be housed. The liner has a base and one or more sidewalls extending from a perimeter of the base to define an opening for housing a item. The liner readily deforms from its original shape to a deformed shape when a force is applied to the liner without damage to the liner. When the force is removed from the liner, the liner returns to the original shape. The liner can also include a flexible, semi-rigid partition positioned within the opening to form two compartments within the liner. The liner can be secured to the flexible housing by stitches, snaps, clips, Velcro®, and other fastening devices.

[0010] These and other aspects, objects, features, and embodiments of the present invention will become apparent to those having ordinary skill in the art upon consideration of the following detailed description of illustrative embodiments exemplifying the best mode for carrying out the invention as presently perceived.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] For a more complete understanding of the exemplary embodiments of the present invention and the advantages thereof, reference is now made to the following description in conjunction with the accompanying drawings, which are described below.

[0012] Figure 1A is a perspective view of a soft cooler bag having a semi-rigid liner therein, according to an exemplary embodiment.

[0013] Figure 1B is a perspective view of the soft cooler bag of Figure 1A, with the semi-rigid liner removed, according to an exemplary embodiment.

[0014] Figure 1C is a perspective view of the soft cooler bag of Figure 1A, with the semi-rigid liner removed and partially compressed, according to an exemplary embodiment.
Figure 2A is a top perspective view of another soft cooler bag having a semi-rigid liner therein, according to another exemplary embodiment.

Figure 2B is a top perspective view of the soft cooler bag of Figure 2A, being partially deformed, according to an exemplary embodiment.

Figure 3 is a perspective view of a duffel bag having semi-rigid liners therein, according to yet another exemplary embodiment.

Figure 4 is a top perspective view of a tote-bag having a semi-rigid liner therein, according to yet another exemplary embodiment.

Figure 5 is a flow diagram illustrating an exemplary method for manufacturing a semi-rigid liner, according to an exemplary embodiment.

Figure 6 is a flow diagram illustrating an exemplary method for manufacturing a semi-rigid liner, according to another exemplary embodiment.

Figure 7 is a flow diagram illustrating an exemplary method for manufacturing a soft container bag having a semi-rigid liner, according to an exemplary embodiment.

The drawings illustrate only exemplary embodiments of the invention and are therefore not to be considered limiting of its scope, as the invention may admit to other equally effective embodiments. The elements and features shown in the drawings are not necessarily drawn to scale, emphasis instead being placed upon clearly illustrating the principles of exemplary embodiments of the present invention. Additionally, certain dimensions may be exaggerated to help visually convey such principles. In the drawings, reference numerals designate like or corresponding, but not necessarily identical, elements.

DETAILED DESCRIPTION OF THE INVENTION

The exemplary soft container bags generally include a semi-rigid liner or a semi-rigid compartment to provide insulation to items placed therein and/or to contain moisture therein. The semi-rigid liner or compartment can be bent or bent or flexed repeatedly without being damaged, and is effective in adding strength and durability to the soft container bag without the confinements of conventional hard plastic inserts. The semi-rigid liner or compartment also provides improved leak resistance over conventional soft container bags without the inclusion of rigid interior parts. The invention may be better understood by reading the following description of non-limiting, exemplary embodiments with reference to the attached drawings.

Figure 1A is a perspective view of a soft cooler bag 100 according to an exemplary embodiment. The soft cooler bag 100 includes a flexible bag 102 and a removable
liner 104 positioned within an interior cavity 112 of the flexible bag 102. Figure 1B is another perspective view of the soft cooler bag 100 showing the liner 104 removed from the interior cavity 112 of the flexible bag 102. Figure 1C is yet another perspective view of the soft cooler bag 100 showing the liner 104 removed from the interior cavity 112 of the flexible bag 102 and partially compressed. In certain exemplary embodiments, the soft cooler bag 100 is a lunch bag or a bag used to store drinks, such as cans of soda or bottles of water.

[0025] Referring to Figures 1A-C, the flexible bag 102 includes a rectangular base 108 and four sidewalls 110a, 110b, 110c, 110d, collectively referred to herein as sidewalls 110, and a cover or lid 116. In one exemplary embodiment, the base 108 includes a top planar surface, an opposing bottom planar surface, and four side edges. The sidewalls 110 are coupled to and extend up from each of the sides of the base 108 in a direction generally orthogonal to the base 108. In certain embodiments, the sidewalls 110 extend at an angle less than about 135 degrees from the base 108. The base 108 and the sidewalls 110 form the cavity 112 within the bag 102 that is configured to receive the liner 104. In certain exemplary embodiments, the flexible bag 102 also includes the cover 116 for covering the cavity 112. The cover 116 can be coupled to the sidewalls 110 by any number of securing means, such as a zipper 118 or other fastener. The flexible bag 102 can be constructed from a wide range of woven and non-woven textiles and materials including, but not limited to, polyester, neoprene or polychloroprene, nylon, cotton, polyethylene terephthalate (PET) such as Dacron™, recycled polyethylene terephthalate (RPET), leather, polyethylene, polyurethane, and canvas. In certain embodiments, the flexible bag 102 is constructed from soft materials and/or foam, and includes any combination of soft materials arranged in layers with foam therebetween. In one exemplary embodiment, the flexible bag 102 is an insulating, soft-sided cooler.

[0026] The liner 104 is configured to be placed in (Figure 1A) and removed from (Figure 1B) the cavity 112 of the flexible bag 102. In certain exemplary embodiments, the liner 104 includes a rectangular base 120 and four sidewalls 122a, 122b, 122c, 122d, collectively referred to herein as sidewalls 122. The rectangular base 120 has a substantially planar top surface, an opposing substantially planar bottom surface, and multiple sides defining the outer edges of the base 120. Each sidewall 122 is coupled to or integral with and extend from at least one of the sides of the base 120 in a direction generally orthogonal to the planar surface of the base 120. The base 120 and the sidewalls 122 define a cavity 126 within which items, such as food and beverages, are stored. In certain exemplary embodiments, the general dimensions of the liner 104 and the volume of the cavity 126 is
sized to fit within the cavity 112. When the liner 104 is placed within the cavity 112, the sidewalls 122 typically contact the sidewalls 110 of the flexible bag 102. In certain alternative embodiments, the general dimensions of the liner 104 and the overall volume of the cavity 126 of the liner 104 are smaller than those of the cavity 112. In this alternative embodiment, items such as food and beverages, can be isolated from other items stored in the cavity 112 of the flexible bag 102. In certain other embodiments, the liner 104 has a substantially cylindrical shape and is capable of receiving cylindrical container within the cavity 126, such as a water bottle or can of soda. In certain embodiments, multiple liners 104 are placed within the cavity 112 to create separate compartments within the flexible bag 102.

In certain exemplary embodiments, the general dimensions of the liner 104 and the volume of the cavity 126 are sized to carry nine standard twelve-ounce beverage cans. In certain other embodiments, the general dimensions of the liner 104 and the volume of the cavity 126 are sized to carry eighteen standard twelve-ounce beverage cans. In certain other embodiments, the general dimensions of the liner 104 and the volume of the cavity 126 are sized to carry forty-eight standard twelve-ounce beverage cans. One having ordinary skill in the art will recognize that the soft cooler bags of the present invention can be sized any number of ways to accommodate any desired number of drink containers or food items.

[0027] The exemplary liner 104 is flexible and semi-rigid, and is constructed from any viscoelastic polymer generally having a notably low Young's modulus and a high yield strain when compared with other materials used in constructing conventional soft-sided collapsible container bags. The polymers typically includes thermoplastic (TPE) or thermoset (TSE) materials that resemble rubber, whereby the material resumes its original shape when a deforming force F1 (Figure 1C) is removed. The amount of force required to cause a deflection or deformation in the material depends upon the type of material and the thickness of the material, and is generally very small. In certain exemplary embodiments, the amount of force required to cause a deflection is less than about one Newton. In certain exemplary embodiments, the liner 104 is insulating. In certain exemplary embodiments, the liner 104 provides a waterproof barrier between items stored within the cavity 126 and the flexible bag 102. Generally, the strength of the liner 104 is not compromised upon exposure to moisture. In certain exemplary embodiments, the liner 104 does not absorb moisture or condensation. Suitable examples of materials of construction include, but are not limited to styrenic block copolymers, polyolefin blends, elastomeric alloys such as thermoplastic elastomer vulcanizates (TPE-v or TPV), thermoplastic polyurethanes, thermoplastic copolyesters, thermoplastic polyamides, silicone, latex, nitrile butadiene rubber, ethylene-
propylene terapolymers, fiuorosilicone, and polychloroprene or neoprene. The liner 104 can be constructed using a number of manufacturing processes. Suitable examples of manufacturing processes include, but are not limited to, injection molding, rotational molding, blow molding, dip molding, casting, compression molding, reaction injection molding (RIM), vacuum casting, and transfer molding.

[0028] Figure 2A is a perspective view of a soft cooler bag 200, and Figure 2B is a perspective view of the soft cooler bag 200 having a deforming force F2 applied thereon, according to another exemplary embodiment. The soft cooler bag 200 is similar to the soft cooler bag 100, the difference being in the dimensions of the soft cooler bags and in the removability of the liner 104. Referring to Figures 2A-B, the soft cooler bag 200 includes a liner 204 that is coupled to an interior of a flexible bag 202. The liner 204 can be coupled to the flexible bag 202 by any suitable means known to one having ordinary skill in the art, including securing the liner 204 to the flexible bag 202 with threads or stitches 230. In certain alternative embodiments, the liner 204 is secured to the flexible bag 202 by clips, Velcro®, and other mechanical fasteners.

[0029] In certain exemplary embodiments, the liner 204 includes grooves or ridges 232 for added structural strength. The grooves or ridges 232 extend longitudinally along the top planar surface of the base of the liner 204. In the exemplary embodiment containing grooves, the grooves are generally an elongated linear depression in the top planar surface of the base of the liner 204. In the exemplary embodiment containing ridges 232, the ridges 232 are generally a linear raised surface extending up from the top planar surface of the base of the liner 204.

[0030] Figure 3 is a perspective view of a duffel bag 300, according to an exemplary embodiment. In certain exemplary embodiments, the duffel bag 300 is a gym bag or a beach bag used to store clothing, shoes, towels, drink containers, and any other items typically used at the gym, pool, or beach. The duffel bag 300 includes a flexible exterior bag 302. The flexible exterior bag 302 can be constructed from a wide range of woven and non-woven textiles and materials including, but not limited to, polyester, neoprene, polychloroprene, nylon, cotton, polyethylene terephthalate (PET) such as Dacron™, recycled polyethylene terephthalate (RPET), leather, polyethylene, polyurethane, and canvas. In certain embodiments, the flexible exterior bag 302 is constructed from soft materials and/or foam, and can include any combination of soft materials arranged in layers with foam therebetween. The exemplary flexible exterior bag 302 includes a central or main compartment 302a and two smaller side compartments 302b, 302c positioned on opposite ends of the main
compartment 302a. The main compartment 302a and the side compartments 302b, 302c include openings or apertures 312a, 312c to allow users access to an interior cavity 326a, 326c of each of the compartments 302a-c. The openings can be closed using any suitable closure means known to one having ordinary skill in the art, such as zippers 318a, 318c, collectively referred to herein as zippers 318, snaps or the like. The main compartment 302a and the side compartments 302b, 302c can be any geometric and non-geometric shape suitable for storing items, including, but not limited to, cylindrical, cubic, spherical, rectangular, oval, and trapezoidal. In certain embodiments, the duffel bag 300 includes a rigid or semi-rigid base for support.

[0031] The duffel bag 300 also includes a liner 304a that is positioned within the interior cavity 326a of the main compartment 302a, a liner (not shown) that is positioned within an interior cavity (not shown) of the side compartment 302b, and a liner 304c that is positioned within an interior cavity 326c of the side compartment 302c. The liners 304a, 304c are collectively referred to herein as liners 304, and can be constructed from any of the materials described with respect to the liner 104. In certain exemplary embodiments, the liners 304 are sized and shaped to correspond to the interior cavities of the compartments 302a-c. In certain exemplary embodiments, the liners 304 are secured to the interior of the compartments 302a-c by any means known to one having ordinary skill in the art, such as by stitches, clips, Velcro®, or other fasteners. In alternative embodiments, the liners 304 are removable from the flexible exterior bag 302 and are sized smaller than the compartments 302a-c to allow separation of items stored within a single compartment. In exemplary embodiments, a flexible, semi-rigid separator 324 is included in the main compartment 302a to separate the interior cavity 326a into two sections.

[0032] Figure 4 is a top perspective view of a tote bag 400, according to an exemplary embodiment. The exemplary tote bag 400 is, for example, an open beach bag or a grocery tote, typically used to store different items, including drinks, such as cans of soda or bottles of water, therein. The tote bag 400 includes a flexible bag 402 having a liner 404 therein. The flexible bag 402 includes a rectangular base 408 having a generally planar top surface, an opposing substantially planar bottom surface and four sides that define the perimeter of the base 408. The tote bag 400 also includes four sidewalls 410a-d, collectively referred to herein as sidewalls 410. One or more sidewalls 410 are coupled to or are integrally formed with and extend from each of the sides of the base 408 in a direction generally orthogonal to the top planar surface. In certain embodiments, the base 408 is rigid or semi-rigid to provide added strength or support. The base 408 and the sidewalls 410 form a cavity 412 configured
to receive the liner 404. The exemplary flexible bag 402 can be constructed from a wide range of woven and non-woven textiles and materials, including, but not limited to, canvas, nylon or other easy-care synthetics, recycled matter, and minimally-processed natural fibers.

[0033] In one exemplary embodiment, the liner 404 is coupled to the interior of the flexible bag 402 by stitches, clips, Velcro®, or other fasteners. Alternatively, the liner 404 is removable from the flexible bag 402. The liner 404 is constructed from any of the materials described with respect to the liner 104. In certain exemplary embodiments, the liner 404 includes a rectangular base (not shown) having substantially planar top surface, an opposing substantially planar bottom surface and multiple sides defining the perimeter of the base, four exterior sidewalls 422a-c (fourth sidewall not shown) (collectively referred to herein as sidewalls 422), and at least one separator 424 extending up from the base and extending between at least two of the sidewalls 422 to create separate compartments within a cavity 426 of the liner 404. In one exemplary embodiment, one or more sidewalls 422 extend from each of the sides of the base in a direction generally orthogonal to the planar top surface of the base. The base, the sidewalls 422, and the separator 424 define cavities 426a, 426b, collectively referred to herein as cavities 426, within which items, such as a beverage carton 440 and dry food containers 442, are stored. Generally, the dimensions of the liner 404 and the volume of the cavity 426 are sized to fit within the cavity 412 of the flexible tote bag 402. When the liner 404 is positioned within the cavity 412 of the bag 402, the sidewalls 422 contact the sidewalls 410 of the flexible bag 402 and the substantially planar bottom surface of the base 420 contacts the substantially planar top surface of the base 408. In certain alternative embodiments, the general dimensions of the liner 404 and the volume of the cavities 426 are sized substantially smaller than the cavity 412, so that items stored within the liner 404 are separated from other items stored in the cavity 412 of the flexible bag 402. In certain other embodiments, the liner 404 is cylindrically-shaped and dimensioned to house a single cylindrical container, such as a water bottle or standard twelve-ounce aluminum beverage container. In certain embodiments, multiple liners 404 are placed within the cavity 412. One having ordinary skill in the art will recognize that the liners of the present invention can be sized and configured any number of ways to accommodate any desired number of sections within the tote bag 400.

[0034] The liners 104, 204, 304, and 404 can be manufactured a number of ways, including using compression molding. Figure 5 is a flow diagram illustrating an exemplary method 500 for manufacturing a liner. The exemplary method 500 begins at step 502, where heaters in a molding machine heat a mixture having a viscoelastic polymer to form a
preheated viscoelastic polymer material. Any of the various exemplary viscoelastic polymer materials described previously can be used. In step 504, an extruder of the molding machine places the preheated viscoelastic polymer material into a heated mold for a liner. In an exemplary embodiment, the size, shape, dimension, and configuration of the mold is selected based upon the desired size, shape, dimension, and configuration of the liner. The mold is closed with a top force or a plug member in step 506. In step 508, molding machine platens apply pressure and heat until the viscoelastic polymer material has cured or solidified. The liner is removed from the mold in step 510. In step 512, an inquiry is conducted to determine if the liner has fully hardened. In one exemplary embodiment, determining if the liner has fully hardened is completed by a machine operator. If the liner has not completely hardened, the "No" branch is followed to step 514, where an oven or a heated conveyer further heats the liner using a post-cure process until fully cured. Otherwise, the "Yes" branch is followed to the End step.

[0035] Referring now to Figure 6, the liners 104, 204, 304, and 404 can be manufactured using transfer molding. Figure 6 is a flow diagram illustrating an exemplary method 600 for manufacturing a liner, according to another exemplary embodiment. The exemplary method 600 begins at step 602, where heaters in a molding machine heat a mixture having viscoelastic polymer materials in a chamber, or transfer pot. Any of the various exemplary viscoelastic polymer materials described previously can be used. In step 604, a plunger is used to force the preheated viscoelastic polymers from the pot through channels known as a sprue into a heated mold for a liner. In step 606, molding machine platens apply pressure and heat until the materials in the mold has cured or solidified. The liner is removed from the mold in step 608. In step 610, an inquiry is conducted to determine if the liner has fully hardened. In one exemplary embodiment, determining if the liner has fully hardened is completed by a machine operator or inspector. If the liner has not completely hardened, the "No" branch is followed to step 612, where an oven or a heated conveyer further heats the liner using a post-cure process until fully cured. Otherwise, the "Yes" branch is followed to the End step.

[0036] Figure 7 is a flow diagram illustrating an exemplary method 700 for manufacturing a soft-sided container bag having a flexible, semi-rigid liner, according to an exemplary embodiment. The liner can be manufactured using injection molding. The exemplary method 700 begins at step 702, where a user feeds viscoelastic polymer resin into a heated barrel of an injection molding machine. The heated barrel heats and mixes the viscoelastic polymer resin. Any of the various exemplary viscoelastic polymer materials
described previously can be used. In step 704, an extruder of the molding machine forces the heated mixture through a screw or a ramming device into a mold for a liner. In step 706, molding machine platens apply pressure and chilled fluids flowing through the mold cool the liner until the liner is hardened to the configuration of the mold. The liner is removed from the mold in step 708. The liner is placed into a flexible bag in step 710. In step 712, an inquiry is conducted to determine if the liner is to remain removable from the flexible bag. If the liner is coupled to the flexible bag, the "No" branch is followed to step 714, where the liner is secured to the interior of the flexible bag. In certain exemplary embodiments, the liner is sewn to the flexible bag. Otherwise, the "Yes" branch is followed to the End step.

[0037] Therefore, the semi-rigid liners for soft container bags described herein are adapted to attain the ends and advantages mentioned as well as those that are inherent therein. The particular embodiments disclosed above are illustrative only, as the present invention may be modified and practiced in different but equivalent manners apparent to those having ordinary skill in the art having the benefit of the teachings herein. Having described some exemplary embodiments of the present invention, it is believed that the use of alternate liner configurations is within the purview of those having ordinary skill in the art. In addition, the liner and/or soft container bag is not limited to having a rectangular shape or a cylindrical shape. While numerous changes may be made by those having ordinary skill in the art, such changes are encompassed within the spirit of this invention as defined by the appended claims. It is therefore evident that the particular illustrative embodiments disclosed above may be altered or modified and all such variations are considered within the scope and spirit of the present invention.
CLAIMS

What is claimed is:

1. A container system comprising:
   a flexible housing defining a cavity; and
   a flexible, semi-rigid liner positioned within the cavity, wherein the liner
   comprises at least one opening for housing an item therein, wherein the liner deforms from an
   original shape to a deformed shape when a force is applied to the liner, and wherein the liner
   returns to the original shape when the force is removed.

2. The container system of claim 1, wherein the liner comprises a viscoelastic polymer.

3. The container system of claim 1, wherein the liner comprises one of a
   thermoplastic and a thermoset material.

4. The container system of claim 1, wherein the liner comprises an insulating material.

5. The container system of claim 1, wherein the liner comprises at least one selected from the group consisting of styrenic block copolymers, polyolefin blends, elastomeric alloys, thermoplastic polyurethanes, thermoplastic copolyesters, thermoplastic polyamides, silicone, latex, nitrile butadiene rubber, ethylene-propylene terapolymers, fluorosilicone, and polychloroprene.

6. The container system of claim 1, wherein the liner has a size and shape
   substantially similar to a size and shape of the flexible housing.
7. The container system of claim 1, wherein the flexible housing comprises a material selected from the group consisting of polyester, polychloroprene, nylon, cotton, polyethylene terephthalate, leather, polyethylene, polyurethane, and canvas.

8. The container system of claim 1, wherein the liner comprises a planar base having a perimeter, and one or more sidewalls extending from the perimeter of the planar base, wherein the planar base and the one or more sidewalls define the at least one opening.

9. The container system of claim 8, wherein the planar base is rectangular, and the one or more sidewalls comprises four sidewalls extending from the planar base in a direction substantially orthogonal to the planar base.

10. The container system of claim 8, wherein the planar base is circular, and the one or more sidewalls comprises one sidewall extending from the planar base in a direction substantially orthogonal to the planar base to form a substantially cylindrical liner.

11. The container system of claim 8, wherein the liner comprises a semi-rigid partition positioned within the at least one opening and coupled to at least one of the planar base and one or more sidewalls.

12. The container system of claim 1, wherein the liner is secured to the flexible housing by at least one selected from the group consisting of stitches, snaps, clips, and Velcro®.

13. The container system of claim 1, further comprising an insulation layer between the liner and the flexible housing.
14. A container bag comprising:
   a flexible housing comprising
     a planar base having a first perimeter,
     at least one sidewall having a first end and a second end, the first end
     of the at least one sidewall coupled to the first perimeter of the planar base,
   a cover having a second perimeter, the second end of the at least one
   sidewall coupled to the second perimeter of the cover,
     wherein the planar base, at least one sidewall, and cover define a
     cavity; and
   a flexible liner positioned within the cavity, wherein the liner comprises at
   least one opening for housing an item therein, wherein the liner deforms from an original
   shape to a deformed shape when a force is applied to the liner without damage to the liner,
   and wherein the liner returns to the original shape when the force is removed.

15. The container bag of claim 14, wherein the liner comprises a viscoelastic
    polymer.

16. The container bag of claim 14, wherein the liner comprises one of a
    thermoplastic and a thermoset material.

17. The container bag of claim 14, wherein the first perimeter is substantially
    equal to the second perimeter.
18. A container bag comprising:
   a flexible housing comprising
      a planar base having a first perimeter,
      at least one sidewall having a first end and a second end, the first end of the at least one sidewall coupled to the first perimeter of the planar base,
      a cover having a second perimeter, the second end of the at least one sidewall coupled to the second perimeter of the cover,
   wherein the planar base, at least one sidewall, and cover define a cavity; and
   a flexible, semi-rigid liner positioned within the cavity, the liner comprising
      a liner base having a liner base perimeter,
      at least one liner sidewall coupled to the liner base perimeter, wherein the liner base and the at least one liner sidewall define an opening for housing an item therein,
   wherein the liner deforms from an original shape to a deformed shape when a force is applied without damage to the liner, and wherein the liner returns to the original shape when the force is removed.

19. The container bag of claim 18, wherein the liner comprises a flexible, semi-rigid partition positioned within the opening to form two compartments within the liner.

20. The container bag of claim 18, wherein the liner is secured to the flexible housing by at least one selected from the group consisting of stitches, snaps, clips, and Velcro®.
FIG. 3
METHOD FOR MANUFACTURING A LINER

PREHEAT A MIXTURE HAVING A VISCOELASTIC POLYMER

PLACE MIXTURE INTO HEATED MOLD FOR A LINER

CLOSE MOLD WITH A TOP FORCE OR A PLUG MEMBER

APPLY PRESSURE AND HEAT UNTIL MIXTURE IS HARDENED

REMOVE HARDENED LINER FROM MOLD

POST-CURE PROCESS

IS LINER FULLY HARDENED?

YES

END

NO

FIG. 5
600 METHOD FOR MANUFACTURING A LINER

602 HEAT VISCOELASTIC POLYMER IN CHAMBER

604 FORCE POLYMER FROM CHAMBER THROUGH SPRUE INTO MOLD USING PLUNGER

606 APPLY PRESSURE AND HEAT UNTIL MIXTURE IS HARDENED

608 REMOVE HARDENED LINER FROM MOLD

610 IS LINER FULLY HARDENED?

612 POST-CURE PROCESS

END

FIG. 6
Method for Manufacturing a Soft Container Bag

8/8

Place viscoelastic polymer resin into heated barrel of injection molding machine

Force heated mixture into mold for liner

Apply pressure and cool until mixture is hardened

Remove hardened liner from mold

Place liner into flexible bag

Is liner removable?

Secure liner to flexible bag

End

FIG. 7
INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/022633

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B65D 6/16 (2011.01)
USPC - 220/529

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - B65D 6/16; F25D 3/08 (2011.01)
USPC - 220/23.83, 23.86, 23.87, 23.88, 23.9, 529, 530, 592.01, 592.09, 592.1, 592.2, 592.23, 592.24, 592.25, 592.26

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatBase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 5,622,276 A (SIMMONS) 22 April 1997 (22.04.1997) entire document</td>
<td>1, 6, 8-9, 12-14, 17-18, 20</td>
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<td>2-5, 7, 10-11, 15-16, 19</td>
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<td>Y</td>
<td>GB 2 155 168 A (LOPEZ) 18 September 1985 (18.09.1985) entire document</td>
<td>3, 16</td>
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Further documents are listed in the continuation of Box C.

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Date of the actual completion of the international search
09 March 2011

Date of mailing of the international search report
28 MAR 2011

Name and mailing address of the ISA/US
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