NESTABLE CONTAINERS WITH HINGEDLY ATTACHED CLOSURES

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Related U.S. Application Data
Continuation-in-part of application No. 10/974,553, filed on Oct. 27, 2004.

Embodyments include retail displays of reusable containers and coverings for the containers. For example, materials and methods are described for making and using a retail display for showing a food storage or general purpose storage apparatus having reusable containers and coverings for the containers, the apparatus including a plurality of nested containers each having an opening, and a plurality coverings for the containers, with the containers being nestable with each other and having the covers disposed inside the containers while the containers are nested, whereby an advantageously compact and readily manageable display system is deployed.
NESTABLE CONTAINERS WITH HINGEDLY ATTACHED CLOSURES

RELATED APPLICATIONS

[0001] This application is a continuation-in-part of U.S. patent Ser. No. 10/974,553, filed Oct. 27, 2004, which claims priority to U.S. Patent Nos. 60/514,956, filed Oct. 28, 2003, and 60/514,940, filed Oct. 28, 2003, each of which are hereby claimed priority documents and are all hereby incorporated by reference herein. The application is also related to U.S. Patent Ser. No. _____. entitled “Nestable Containers with Coverings Having a Fold” which has been filed the same day as the present application.

TECHNICAL FIELD

[0002] The technical field is related to nestable containers having hingedly attached coverings for the containers.

BACKGROUND

[0003] Food storage containers are popularly used to store food that is left over after a meal. The food is packed into the storage container, sealed, and placed into a refrigerator. Such food containers may be reusable and made of plastic and have a lid. The lid seats snugly on the container to help preserve the food and isolate it from the environment. A plastic used for a food storage container is carefully selected for its properties in contact with food.

SUMMARY

[0004] Many consumers own a variety of types of reusable food containers. Each type has its own lid. As a result, there is often a need to search through a variety of lids and containers to identify ones that match. The searching process is often inconvenient and frustrating. This application identifies this problem, which is a long-felt unmet need, and provides certain inventive embodiments that address these difficulties.

[0005] One solution to this problem is to store the containers with the coverings that fit them. Storage of the coverings with the containers, however, is difficult because conventional containers cannot be nested with each other while the covering is on the container. Therefore containers having hingedly attached coverings are described herein that can be moved from a first covering position during use for food containment to a second storage position while the containers are nested. The coverings are in a first position while covering the containers, and are movable to another position so that the containers may be nested with each other. Thus the coverings can be stored with the containers so that they are not separated during storage.

BRIEF DESCRIPTION OF THE FIGURES

[0006] FIG. 1A is a perspective view of a plurality of nestable containers having hingedly attached coverings;

[0007] FIG. 1B is a perspective view of the embodiment of FIG. 1A with the containers being nested with the coverings in a storage position that allows for the nesting;

[0008] FIG. 2 is a perspective view of a plurality of nestable containers having hingedly attached coverings that have folds;

[0009] FIG. 3A is a perspective view of a plurality of nestable containers having elastic coverings;

[0010] FIG. 3B is a perspective view of the embodiment of FIG. 3A with the containers being nested with the elastic coverings in a position that allows for the nesting;

[0011] FIG. 4 is a perspective view of an alternative embodiment of a nestable container having a hingedly attached covering;

[0012] FIG. 5 is a perspective view of an alternative embodiment of a nestable container having a hingedly attached covering;

[0013] FIG. 6 is a perspective view of an alternative embodiment of a nestable container having a hingedly attached covering;

[0014] FIG. 7A is a plan view of a hinge for hingedly attaching closures with containers;

[0015] FIG. 7B is a plan view of a reversibly connectable hinge for hingedly attaching closures with containers;

[0016] FIG. 7C is a cross-sectional view of a living hinge for hingedly attaching closures with containers; and

[0017] FIG. 7D is a cross-sectional view of a ball and socket type hinge for hingedly attaching closures with containers.

DETAILED DESCRIPTION

[0018] Containers having hingedly attached coverings may be stored in association with the coverings even when the containers are nested with other containers. This method of storage conveniently keeps the containers and coverings together. An embodiment is a covering, e.g., a lid, for a container, the covering having a hinge that attaches the covering to the container. The covering may be moved from a first position to a second position so that the covering to be used/stored in a first position and stored/used in a second position. The Figures depict various embodiments having a covering hingedly attached to a container.

[0019] The hinge on a container having hingedly attached coverings refers to device that allows the turning or pivoting of a closure or covering relative to the container, e.g., by a jointed or flexible mechanism of action. The hinge may be, for example, a living hinge. A living hinge is typically formed by creating a thin portion of a plastic in a relatively thinner plastic member. The living hinge allows for repeated folding and unfolding. Various hinges are known to persons of ordinary skill, included those referred to as butt, door, strap, concealed, take-apart & two-pin hinges. Other hinge types are, for example: ball-and-socket, and mortise-and-tenon. Additional hinges are, for example: projection hinge, parliament hinge, tee hinge, and bands & gudgeons. And a hinge may be made, for example, from at least one piece of a flexible material that joins two other members that are to be pivoted relative to each other.

[0020] The containers and coverings may be reusable. Reusable refers to a structure that allows a user to use a container to hold items a first time, to place empty containers into a storage position, and to again use the container to store an item. In the case of food storage, the containers will typically be cleaned by a user after a food storage use to remove residue from the food.
Reusable food storage containers are distinct from single-use containers. A variety of single-use food containers are known that are intended to be used once, and thrown away. An example of such a container is a polystyrene foam or clear polystyrene container having a base and a lid that both have a concave shape and are joined with a hinge. These types of containers are favored by, for example, fast-food establishments that dispense hamburgers for consumption off site. Some single-use containers are made of a transparent, thin, and rigid polystyrene material, with this material being familiar to persons of ordinary skill in these arts; embodiments described herein may exclude such polystyrenes, or exclude all polystyrenes, or exclude plastic materials made of at least 50%, 75%, or 90% polystyrene by weight. Another type of disposable container has a base and a covering made of a single folded piece of paper having a coating for contact with the food. Many consumers are accustomed to receiving Chinese take-out food in these containers.

Although it might be argued that it is possible for consumers to "reuse" such containers, that reuse is not intended by the makers of such products. Such single-use products are made of materials and with methods intended to make them last for only about one use and without consideration of design features that are helpful for reuse. Makers and users of these products can distinguish between reusable and disposable containers. Distinguishing features may be, for example, the physical properties of the material (e.g., strength, hardness, tactile feel, brittleness, durability), the durability of a coating, the aesthetic appeal of the product, and the intended use based on the source of the container. For instance, such containers are often advertised or marketed in the basis of their single-use disposability. A "reusable" container is thus distinct from single-use products. Moreover, some embodiments are a reusable container and/or a lid made of materials that do not include paper, or have less than 50%, 75%, or 90% paper by weight. The term paper is intended to include, for example, materials processed to include wood or plant portions.

Container is a term that includes a container that fully encloses a space, or partially encloses a space. Certain embodiments involve the use of containers that have a shape that encloses a space on all sides except for an opening. For example, a bowl, box, carton, envelope, bottle, or jug may be enclosed on all sides except for an opening. Alternatively, a container may be prepared with multiple openings. Certain embodiments relate to a container that is fully or partially enclosed. Certain embodiments relate to a container that has multiple detachable sections. A container may be reusable or disposable after a single use. While a food storage container is described as a preferred embodiment, other types of containers are also contemplated. A closure refers to a structure or device designed to close off the opening of a container and prevent loss of its contents. Closures may involve various means of securing the closure to the container, e.g., fasteners, friction fit, threads, ribs, force-fit, and other means known to artisans in these fields. The term cover or covering refers to a closure for the largest opening in a container.

Containers, closures, and sections of the containers may be assembled from materials that are used for conventional containers. Such materials include, for example, woods, plastics, ceramics, cloths, textiles, fabrics, weaves, and metals. Plastics include, for example, polyethylene, polycarbonate, polyvinylchloride, high density polyethylene, polypropylene, polystyrene, polytetrafluoroethylene, polyurethane, silicones, and various elastomers. Containers for food storage should be made of food grade materials that do not undesirably contaminate the food with undesirable substances. Some materials for containers or coverings, however, are suitable for single-use and not reuse; such materials would be excluded from application to a reusable container or covering. There are many types of plastics available for use with containers, including combinations of these and other plastics as blends, copolymers, thermosets, and thermoplastics.

In some embodiments, the cover and the nestable container are made of a class of material(s) that consist essentially of polyethylene, polycarbonate, polypropylene, polyurethane, thermoplastic elastomer, or a combination thereof. Alternatively, such container may be made of at least about 50%, 70%, 80%, 90%, or 95% w/v of particular materials, e.g., polyethylene, polycarbonate, polypropylene, polyurethane, thermoplastic elastomer, or a combination thereof. One reason for using these materials in the weight or combination specified is to make a reusable container.

Containers and closures, and sections thereof, may be made with materials that are reversibly deformable, for example, from natural or synthetic rubbers, or rubbery materials. Examples of materials for deformable sections include neoprene, nitrile, polysisoprene, fluorocarbons, ethylene/acrylics, silicones, butyl rubbers, SBR, EPDM, VITON, combinations and derivatives thereof, and other materials, e.g., as in the Handbook of Plastics and Elastomers. Liquid silicone rubbers are expensive, but are useful materials that are highly elastic, food-compatible, and suitable in a range of temperatures from freezing to boiling. Other specific materials that may be suitable, depending upon specific designs and uses, are DYNAFLEX, SANTOPRENE, KRAYTON, ENGAGE, ESTATE, and DOW CORNING SILASTIC. Sources for materials include, for example, American Cyanamid Company, B. F. Goodrich Chemical Company, Copolymer Rubber & Chemical Corporation, Dow Corning Corporation, E. I. DuPont de Nemours, Federal Mogul Corporation, Goodyear Tire and Rubber Company, Malaysian Rubber Bureau, Parker Seal Company, Polysar Limited, Precision Rubber Products Corporation, Sargent Industries, Thielol Corporation, 3 M Company, Dow, and Uniroyal Industries Products.

An alternative to reversibly deformable elastic material is a reversibly deformable material or structure that is not elastic. For example, a structure or material that is deformed by a first mechanical force and requires a second mechanical force to restore the material to its first configuration is reversibly deformable. Such structures may be, e.g., a corrugated plastic that has a first shape and is stretched to achieve a second shape, such as a substantially flat shape. Alternative structures are telescoping, nested, stacked, folded, and layered structures.

For example, a closure may be prepared that is folded in a storage position so that it has a relatively small projected area relative to its unfolded state. Thus a user may fold a closure, dispose it in or under a container, and nest the container with other containers of a similar or substantially identical size and shape. Then the closure may be unfolded...
and used as a lid for the container. Or, for example, a closure may be prepared that is collapsed in a storage position so that it occupies a relatively small volume relative to its uncollapsed state. Thus a user may expand the closure, dispose it in or under a container, and nest the container with other containers of a similar or substantially identical size and shape. Then the closure may be expanded and used as a lid for the container. The collapsing and expanding may be accomplished, for example, by use of corrugations in the closure. Alternatively, a telescoping or layering structure may be used to accomplish the same.

[0029] For example, a covering may be made that has a fold so that the covering is disposable essentially on the interior bottom of a container while the container is nested with other containers. The projected area of the cover is less than the area of the interior bottom of the container. When the cover is unfolded, it has a projected area that is greater than the interior bottom of the container.

[0030] A cover that is stored between nested containers may be designed to occupy a specified height. The height of a container would be the vertical distance between a cover and an opposing bottom of the container. The height of a cover would be measured parallel to the height of the container when the cover is disposed inside the container. Thus a cover may be made so that, when folded and placed approximately parallel to the bottom of the container, it has a height that is less than about 50%, 40%, 33%, 20%, 10%, or less than 10% of the container’s height; a person of ordinary skill in these arts will appreciate that all ranges and values from more than 0% to less than 50% are intended although they are not explicitly set forth.

[0031] Alternatively, elastic materials may be joined with less elastic materials, or rigid materials to make a reversibly deformable closure. For example, two essentially rigid portions of a closure may be joined by an elastic portion. In use, the closure is expanded by pulling in the rigid portions and fastening to the container to cover it. The closure is removed, and the elastic portion causes it to contract to a shape with a smaller surface area. The closure is then stored in the container, and the containers may be nested with each other. Alternatively, the elastic portion may serve as a hinge to allow folding of the closure to achieve a smaller projected surface area. Or these embodiments may be combined. For example, a cover made of a central inelastic portion surrounded by an elastic portion may have a hinge that crosses both the elastic portion and the inelastic portion. In use, the cover is folded along the hinge and placed into the container, which, if nestable, may be nested with other containers. Then the cover may be removed, unfolded, and placed over the opening of the container, optionally by stretching the elastic portion to change the surface area of the cover to fit over the opening.

[0032] Alternatively, two or more essentially rigid portions of a closure may be joined by an elastic or resilient portion that functions as a hinge. In one embodiment, two rigid portions are joined by a resilient hinge that allows for folding and storage with containers, including nestable containers. Or four rigid portions are joined by two intersecting resilient members to create two hinges at approximately right angles. In use, the hinges may be used to fold the covers. In some embodiments, the resilient members serve as points for collapsing or otherwise deforming the cover, e.g., to fold the portions to create angle(s) between them at about 15 to about 60 degrees.

[0033] One measure of the change in the state of a closure between two positions is the change in surface area. A measurement of a surface area is accomplished by adding up the entire area of the surface, and is not to be confused with the projected surface area of an object. For example, a stretchable rubber sheet increases its surface area when it is stretched. In contrast, an essentially unstretchable material bounded by an elastic band of rubber material can have its projected area changed by stretching the band over an object, but the band’s stretching essentially does not change the surface area of the object because the unstretchable material remains the same size. A projected surface area is the projection of an object onto a two-dimensional surface. For example, a corrugated closure has substantially no change in its surface area as the corrugations are flattened, but the projected surface area is changed.

[0034] Elastic materials for the reversibly deformable closure embodiments are those materials that can have their surface area appreciably changed using the manual force generated by an average man or woman. It is appreciated that most materials have some measurable elasticity, especially if the appropriate machine is harnessed to stretch the material. Suitable materials, however, are those that can be stretched using manual force. To determine a range for manual force, a digital, spring scale (0 to 50 pounds) was attached to one of the narrow ends of a rectangular food storage container. A standard cover that had been cut in half across the width was placed onto the container to restrain the sides and to make the area that would be held by the user during application of the closure more realistic. The load applied was measured at peak applied load and at steady applied load approximately 15 seconds after the person began to pull the scale. A steady state load would be a comfortable load for most persons and the peak load would approach the amount of force that would not be comfortable. Four persons were tested two or three times each, and an average steady applied load was measured as being 6.7, 7.0, 14.9, and 8.4 pounds, for an average of about 9.7 pounds. The average peak values were 11.5, 9.2, 17.3, and 10.2 pounds, for an average of 12.1 pounds. These values serve as benchmarks to indicate the approximate range of some values for some typical users. A resilient material is a material that is deformable by a force generated by an average man or woman, but returns to its original shape thereafter; many thermoplastic elastomers are resilient, e.g., many grades of silicone, DYNAFLEX, or KRAYTON.

[0035] The closures, if they apply a compressive force to a container, should not exceed the crush strength of the container. A GLADWARE polypropylene food storage container was tested using an INSTRON mechanical tester, and determined in compression to deform at about 109 lbf. with a stress of about 9.6 ksi. In tension, the container was determined to have a maximum wall strength of about 104 lbf at 2.25 inches. Although only one container was tested, these values are benchmarks for the tensile and compressive strength of this category of container.

[0036] Some embodiments are food storage containers for home use, e.g., for meal leftovers. Although food storage containers for home use have a multiplicity of uses that are not limited to storage of food or use at a home, such
containers are made to comply with certain requirements for food safety. Some embodiments are directed to using food-grade materials, microwaveable materials, materials resistant to deformation in the conditions typically encountered in automatic dishwashers, freezeable materials, materials for use in a household oven, and/or materials that do not give off harmful substances in normal use.

[0037] Moreover, food storage containers for home use have limited dimensions so that a plurality of them may be accommodated within a home storage space, e.g., a refrigerator or pantry. Sizes and suitable ranges of sizes may be described volumetrically in terms of the number of ounces of water that they hold: from about one ounce to about 512 ounces, and every size therebetween, every range of sizes therebetween, and ranges from any size therebetween to almost zero. Such sizes therefore include, for example, about one half-pint, about one pint, about one quart, about two quarts, and about one gallon. Such ranges therefore include, for example, from about one quarter pint to about one gallon or to about two quarts. Such ranges therefore include, for example about 5 ounces to about 20 ounces.

[0038] Various features may be incorporated into containers for food uses. For example, a vent for microwaving may be present on a cover or a container to allow gas from the container interior to escape after being heated. And, for example, indicia for a day of the week may be added, e.g., as semispherical buttons or bulges on a cover that may be depressed to indicate a day of the week, or other date.

[0039] Other embodiments are directed to containers for general purpose storage. While food grade plastics may advantageously be used to provide for maximum potential uses, other materials may be used, e.g., engineering plastics, or non-plastics. Such containers may be provided in a range of sizes, e.g., from 8 ounces to 50 gallons, or even more. Such containers may have detachable covers that are storable on the sides or bottom of the containers, as described herein, or may have detachable covers that are stored inside the containers while the containers are nested. The association between the covers and the containers advantageously minimizes logistical challenges for sellers that must stow both the containers and covers. For example, large retailers such as KMART, WALT MARK, and TARGET carry general purpose storage containers that are shelved in proximity to their covers. The user must find a suitable cover and match it to the container, and the retailer must stow the cover and the container separately on the shelves.

[0040] In one embodiment, a retail display unit is provided with a plurality of nested or nestable containers that have cover stored inside and/or under each container and/or between containers. In use, for example, a consumer chooses a container, removes the container from the shelf or other display unit, and finds the cover inside or otherwise attached to the container. The consumer may take the container from a nested stack of containers. Or, for example, a retailer may place a set of nested containers that each have a cover associated with the container on a support surface of a display unit, e.g., a shelf, rack, or table for retail display, with the cover-container association being a cover placed under each container, a cover placed inside each unit, or at least some of the covers being placed between the containers while they are nested.

[0041] In another embodiment, a storage area is used to store a plurality of nested or nestable containers that have a cover stored inside and/or under each container and/or between containers. In use, for example, a user chooses a container, removes the container from the storage area, and finds the cover inside or otherwise attached to the container. The user may take the container from a nested stack of containers. Or, for example, a user may place a set of nested containers that each have a covering associated with the container on a storage unit, e.g., a shelf, rack, or table for storage, with the cover-container association being a cover placed under each container, a cover placed inside each unit, or at least some of the covers being placed between the containers while they are nested. For example, warehousing operations, order fulfillment centers, and other business storage applications will benefit from the easy association of the lids and containers. The advantages of such a process are particularly realized when a variety of containers and coverings are used.

[0042] Examples of containers include containers used for general purpose storage. Some containers are plastic, while others are, e.g., metal, steel, glass, tempered glass, PYREX-style glass, wood, wood-plastic composites. Indeed, the use of closures disposable between nesting containers is applicable to wide varieties of containers. Reversible expandable coverings may be plastic or other materials, e.g., metal, steel, glass, tempered glass, PYREX-style glass, wood, wood-plastic composites.

[0043] Industrial containers are also contemplated. Many containers are known for various shipping, storage, warehousing, picking, and packing purposes. The use of foldable or otherwise reversibly expandable coverings is generally applicable to containers in a wide variety of circumstances. The container/closure combinations may be sold with or without other contents. Various items may be placed in the containers, including food, drink, crafts, office supplies, and industrial goods.

[0044] Containers include shape stable containers. A shape stable container essentially maintains its shape when items are placed within it, for example, a bucket, a carton, a milk jug, or a box. A shape stable container does not typically tend to conform its shape to accommodate the items placed within it. A shape stable container may have an elastic portion but still retain its classification as a shape stable container because the elastic member does not typically conform to the items within it, even though the elastic member may sometimes bend or be displaced. For example, many consumers are familiar with plastic food storage bags dispensed from rolls that are not shape stable, e.g., those bags popularly referred to as sandwich bags or freezer bags.

[0045] Another embodiment is a storage device having a closure and a container comprising an opening, with the closure being securable over the opening and comprising a reversibly deformable portion having a surface area or a projected surface area that is increased by at least about 15%, e.g., by at least about 25%, by at least about 50%, or by at least about 100%, when the closure is secured over the opening.

[0046] In some embodiments, the closure may be stored on the bottom or a side of the container without occluding the opening. In general, an increase in surface area in a reversibly deformable covering is associated with conve-
nience in storage, since a small covering may be conveniently stored. This increase, however, is, in general, often offset by an increased force for use, which is less convenient for a user. Further, an increase in elasticity is often accompanied by changes to other material properties, such as hardness, tackiness, and toughness. The balancing of these factors can be achieved by using design principles described herein in association with consideration of the properties of the materials that are chosen.

[0047] Embodiments include a container that comprises a nestable shape wherein a plurality of the containers occupy less space when nested as compared to the space occupied when the plurality of containers are not nested. Some nestable containers have openings that receive the bottom of another container, e.g., a nested stack of reusable/disposable food containers that are commonly available at retail stores. The nesting may be essentially complete or partially complete. Essentially complete refers to containers that are nested so that the interior volume of one container is essentially filled by another. Partially complete refers to nesting wherein a first container fits inside a second container but leaves a portion of the second container’s interior volume unfilled, e.g., between about 1% and about 75% of the volume of the container (i.e., 99% to 25% of the container is filled); persons of ordinary skill in these arts will immediately appreciate that all values and ranges between the explicitly stated range are contemplated.

[0048] Closures may be made to have a surface area or projected surface area that is increased when placed over an opening of a container. The increase of the surface area or projected surface area may be, for example, at least about 5%, e.g., at least about 15%, at least about 25%, at least about 50%, and at least about 100%. Ranges of increased surface area may be, e.g., 5%-1000%, and all ranges therebetween, e.g., 5%-500%, and 15%-350%; persons of ordinary skill in these arts will immediately appreciate that all values and ranges between the explicitly stated ranges are contemplated. As already described, embodiments include containers with a volume in the range between about 1 ounce and about 512 ounces, and coverings or containers made of plastic that is at least about one sixteenth of an inch thick. A sampling of reusable food container designs in the range from 4 ounces to 56 ounces shows approximate dimensions for the interior bottom compared to the exterior top edge of the containers, see Table 1. The ratio of the outside top to inside bottom circumference ranged from about 1.3 to about 2.0, and the ratio of the top opening size to interior bottom ranged from about 1.6 to 3.1. These ratios provide some indication of some closure dimensions from a manufacturing and end-user applications perspective, and provide insight into the amount of stretch or change in area that is required when using a reversibly deformable closure as described herein.

### TABLE 1-continued

<table>
<thead>
<tr>
<th>Dimensions of some commonly available reusable food containers</th>
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<td>Size OZ.</td>
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<tr>
<td>8</td>
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<tr>
<td>32</td>
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<td>20</td>
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Note for Table:
Do is outer diameter or length of a side;
Di is inner diameter or length of a side at interior bottom;
measures performed using a ruler and are approximate.

[0049] Embodiments of closures include those having a surface area of any size suitable for the intended container. For example, the closure, when placed in a position to cover an opening, may have a surface area that is a range of about 1 to about 1,000 square inches, including all ranges therein, e.g., about 4 to about 64 square inches, about 9 to about 36 square inches, and about 9 to about 36 square inches; persons of ordinary skill in these arts will immediately appreciate that all values and ranges between the explicitly stated ranges are contemplated.

[0050] In certain embodiments, a storage apparatus may have a plurality of containers and coverings, e.g., two, three, four, five, six, or between 3 and 20, or more. The coverings and containers may be joined by hinges. The containers may have openings defined by sides joined to a bottom 120. Edges of the coverings interact with edges of the containers to make a substantial seal so that contents of the containers are substantially isolated within the containers. Persons of ordinary skill in these arts will immediately appreciate that various structures may be incorporated in the coverings and containers to accomplish a substantial sealing even if the “edges” in the very strictest sense of that term are not directly involved. In use, containers may be nested with each other with the coverings in a storage position wherein the coverings do not cover the openings. The containers may be removed from a nesting position, and coverings may be pivoted about a hinge, or a plurality of hinges, to cover the openings.

[0051] Many options for making the substantial seal between the edges of the coverings and containers are known to persons of ordinary skill in these arts. Users may use the containers by, for example, storing food in them. The food may be removed and then the containers may be washed or otherwise cleaned. After cleaning, the containers may be nested. The coverings advantageously remain attached to the containers throughout all of these processes. Alternatively, the containers and coverings may be reversibly attachable to each other by separating them at the hinge: the hinge allows pivoting of the covering and container relative to each other and also allows the reversible detachment of the covering and the container. Persons of ordinary skill in these arts are able to make hinges for this type of reversible attachment and detachment.

[0052] Various fasteners and seals may be used to join a closure to a container. Further, the degree of sealing may be controlled and varied, so that some seals are water tight while others merely provide a snug sealing arrangement to
generally isolate the container contents from the outside environment. For example, flanges, grooves, beads, and various means for establishing a seal between a container and a closure, as known to persons in these arts, may be used. For example, means for joining a lid to a container as employed in food containers sold under the GLADWARE, ZIPLOC, RUBBERMAID, LOCK AND LOCK, SNAPWARE, CLICK AND CLACK, or DIXIEWARE brands may be used.

[0053] In some embodiments, latching mechanisms may be employed to enhance a seal between a closure and a container. For example, see WO 2004/035411 or U.S. Pat. Nos. 6,793,096, 5,775,483, and U.S. Pat. Pub. Nos. 20040099669 and 20030015534, which are hereby incorporated by reference herein. For example, plastic latches that pivot between a storage position for sealing the container and an open position for removing a cover from the container may be used. A plurality of latches may be used, e.g., between one and four. Alternatively, a combination of latch(es) and living hinges may be used to affix a covering to a container, e.g., a closure affixed to a container by a living hinge with latch(es) to provide additional sealing action.

[0054] Gaskets may be employed between a closure and a container. An elastic or a resilient material is preferred for the gasket so that it may be deformed at least slightly during sealing to assure a high quality seal. For example, silicones and thermoplastic elastomers, e.g., KRAYTON, DYNAFLEX, are suitable. A latch may be used in combination with the gasket to provide a further enhanced seal.

[0055] The opening of the containers may be located in the top, side, or bottom of the container and the closure may be placed over the opening in such embodiments. In one embodiment, the containers and the coverings may be made of polypropylene, polycarbonate, or polyethylene and a thermoplastic elastomer or a silicone may be introduced to interface between them, with the thermoplastic elastomer or silicone being affixed to the covering, the cover, or both.

[0056] Referring to FIG. 1, storage apparatus 100 has containers 110, coverings 112, and hinges 114. Containers 110 have openings 116 defined by sides 118, which are joined to bottom 120. Edges 122 of coverings 112 interact with edges 124 of containers 110. In use, containers 110 may be nested with each other as shown in FIG. 1B. When nested, coverings 112 are placed in a storage position wherein the coverings do not cover openings 116. Containers 110 may be removed from a nesting position, and coverings 112 may be pivoted about hinges 114 to cover openings 116. Edges 122 of coverings 112 interact with edges 124 of containers 110 to make a substantial seal so that contents of containers 110 are substantially isolated within the containers.

[0057] FIG. 2 shows nested apparatus 200 with containers 210, coverings 212, and hinges 214. Containers 210 have openings 216 defined by sides 218, which are joined to bottom 220. Edges 222 of coverings 212 interact with edges 224 of containers 210. Coverings 212 have hinges or folds 250. In use, containers 210 may be nested with each other (as shown in FIG. 1B for the embodiment of FIG. 1A). When nested, coverings 212 are placed in a storage position wherein the coverings do not cover openings 216. Containers 210 may be removed from a nesting position, and coverings 212 may be pivoted about hinges 214 to cover openings 216. Folds 250 advantageously allow the coverings to be reduced in projected area for a more compact storage of the containers; for instance. Edges 222 of coverings 212 interact with edges 224 of containers 210 to make a substantial seal so that contents of containers 210 are substantially isolated within the containers.

[0058] Referring to FIG. 3, storage apparatus 300 has containers 310, coverings 312, and hinges 314. Containers 310 have openings 316 defined by sides 318, which are joined to bottom 320. Edges 322 of coverings 312 interact with edges 324 of containers 310. In use, containers 310 may be nested with each other as shown in FIG. 3B. When nested, coverings 312 are placed in a storage position wherein the coverings do not cover openings 316. Containers 310 may be removed from a nesting position, and coverings 312 may be pivoted about hinges 314 to cover openings 316. Edges 322 of coverings 312 interact with edges 324 of containers 310 to make a substantial seal so that contents of containers 310 are substantially isolated within the containers. The covering 312 may be a flexible material or elastic so that storage of the containers is facilitated. A reversibly deformable, e.g., corrugated or elastic covering may be used that requires stretching to cover the opening, with the elastic covering having a surface area in a stored position that is less than its surface area when stretched.

[0059] FIG. 4 depicts a storage system 400 having nestable container 410 being nestable with other containers of substantially identical configuration (not shown). A covering is provided by covering members 412, 413, which are each hingedly attached to the container by hinges 414, 415. Edges 422, 423 of covering members 412, 413 interact with each other and edges 424 of the container to provide a substantial seal.

[0060] FIG. 5 depicts a storage system 500 having nestable container 510 and covering 512 joined by hinge 514. Container 510 is nestable with other containers of substantially the same size and shape (not shown). Container 510 has flanges 520 that mate with flanges 522 on covering 512. Covering 512 has a raised surface 524 (raised by a thickness 525) that frictionally engages the interior faces of sides 526 so that flanges 520, 522 are held together and substantially seal.

[0061] Referring to FIG. 6, storage apparatus 600 with nestable containers 610 that are nestable with each other (only one is shown), each with covering 612, and hinge 614. Containers 610 each have opening 616 defined by sides 618, which are joined to form bottom 620. Edge 622 of coverings 612 interacts with edges 624 of containers 610. In use, containers 610 may be nested with each other (not shown). When nested, coverings 612 are placed in a storage position wherein the coverings do not cover openings 616. Containers 610 may be removed from a nesting position, and coverings 612 may be pivoted about hinges 614 to cover openings 616. Edges 622 of coverings 612 interact with edges 624 of containers 610 to make a substantial seal so that contents of containers 610 are substantially isolated within the containers.

[0062] FIGS. 7A-8D show various embodiments of hinges. The hinges join a covering or a closure to a container by having a first member on a covering and a second member on a container. One or more hinges may be used.
FIG. 7A shows hinge 710 having pin 712 joining members 714 and 715, with member 714 having portions 716 and 718 for engaging pin 712 and member 715 having portions 717 and 719 for engaging pin 712, which may be permanently or reversibly affixed within hinge 712. FIG. 7B shows a reversibly detachable hinge 720 having members 722 and 724 with pins 726 and 728 that interact to engage each other to form a hinge. A user may reversibly assemble and disassemble hinge 720 by forcing member 722 and 724 apart or together. FIG. 7C depicts a cross section of a living hinge 730 with plastic members 732 and 734 being connected by relatively thinner hinge portion 736, with the thinner portion being dimensionable by persons of ordinary skill in these arts. FIG. 7D depicts hinge 740 having ball member 742 and socket member 744. Ball member 742 has ball 746 that is received by socket 748, with the ball 748 being pivotable in socket 748; optional ears 750 for limiting the direction of rotation are shown.

[0063] In some embodiments, non-identical containers are nested with each other, with covers over them. For example, containers of different heights are made that are nestable with each other. Then the coverings for at least one of the containers are disposed between them for storage.

[0064] Sets of containers having hingedly closures (e.g., coverings) and/or hingedly attached closures may be assembled. The closures may be disposed between the containers while the containers are nested with each other. The number of containers in such a set may be, e.g., at least 2, at least 3, at least 4, or at least 5. Or, for example, the number of such containers may be between 2 and 10, or between, e.g., 3 and 8. The set may have one closure per container. Alternatively, the number of closures may be more or less than the number of containers, e.g., as when providing a closures that fits many sizes of containers. The containers may be similar to each other in size and shape, e.g., essentially identical, or essentially identical for nesting purposes. The containers may all have openings that are essentially the same size, e.g., having the same dimensions, e.g., length, width, or diameter. Alternatively, variously sized containers may be used in the set. The closures may be essentially identical to each other, e.g., having essentially the same dimensions, e.g., length, width, or diameter, or may be variously sized. Sets of nested containers may be packaged with the containers in a nested position. Many types of packaging may be used, e.g., cardboard or shrink-wrap.

[0065] Embodiments with various features have been described herein. Other embodiments may combine these features. The various embodiments are intended to convey the spirit of the invention so that persons of ordinary skill in the art can practice the invention in its full scope without being limited to the particular embodiments herein. Further, all publications and patent applications described herein are hereby incorporated by reference.

1-20. (canceled)

21. A display for a storage apparatus comprising:

a retail display unit comprising a plurality of reusable shape stable storage containers that each have an opening, with each of the plurality of the containers being nested with each other and each of the plurality of the containers having a detachable hinged cover stored inside the container, with the cover being movable by articulation of the hinge between a first position for covering the opening and a second position that allows for the containers to be nested with each other, wherein the openings each have the same dimensions.

22. The apparatus of claim 21, wherein the edges of the covers interact with edges of the containers when the containers are not nested so as to make a substantial seal so that contents of the containers are substantially isolated within the containers.

23. The apparatus of claim 21, wherein the substantial seal is water tight.

24. The apparatus of claim 21, wherein each of the plurality of containers is a general purpose storage container.

25. The apparatus of claim 21, wherein each of the plurality of containers is a food storage container.

26. The apparatus of claim 21, wherein at least one of the coverings or at least one of the containers comprises an elastic material.

27. The apparatus of claim 21, wherein each of the plurality of coverings has a surface area of less than about one half square foot when disposed over one of the openings.

28. The apparatus of claim 21, wherein at least one of the hinges comprises an elastic material.

29. The apparatus of claim 21, wherein the retail display unit comprises a shelf, rack, or table.

30. The apparatus of claim 21 wherein the retail display unit is located in KMART, WAL-MART, or TARGET.

31. A method comprising:

placing a display unit in a retail sales area and providing the retail display unit with a plurality of reusable shape stable storage containers that each have an opening, with each of the plurality of the containers being nested with each other and each of the plurality of the containers having a detachable hinged cover stored inside the container, with the cover being movable by articulation of the hinge between a first position for covering the opening and a second position that allows for the containers to be nested with each other, wherein the openings each have the same dimensions.

32. The apparatus of claim 31, wherein the edges of the covers interact with edges of the containers when the containers are not nested so as to make a substantial seal so that contents of the containers are substantially isolated within the containers.

33. The apparatus of claim 31, wherein the substantial seal is water tight.

34. The apparatus of claim 31, wherein each of the plurality of containers is a general purpose storage container.

35. The apparatus of claim 31, wherein each of the plurality of containers is a food storage container.

36. The apparatus of claim 31, wherein at least one of the coverings or at least one of the containers comprises an elastic material.

37. The apparatus of claim 31, wherein each of the plurality of coverings has a surface area of less than about one half square foot when disposed over one of the openings.
38. The apparatus of claim 31, wherein the retail display unit comprises a shelf, a rack, or a table.

39. The method of claim 29, comprising placing the plurality of the containers on display at KMART, WAL-MART, or TARGET.

40. The method of claim 29, further comprising removing one of the plurality of the containers from the display unit and then removing the cover from within the container.

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