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(54) **SEALED CONTAINER AND METHODS OF USE THEREOF**

(75) Inventors: **Gerald S. Deeb**, Mendota Heights, MN (US); **Thomas P. Hanschen**, Mendota Heights, MN (US); **Paul T. Engen**, River Falls, WI (US); **Donna W. Bange**, Eagan, MN (US)

(73) Assignee: **3M INNOVATIVE PROPERTIES COMPANY**, St. Paul, MN (US)

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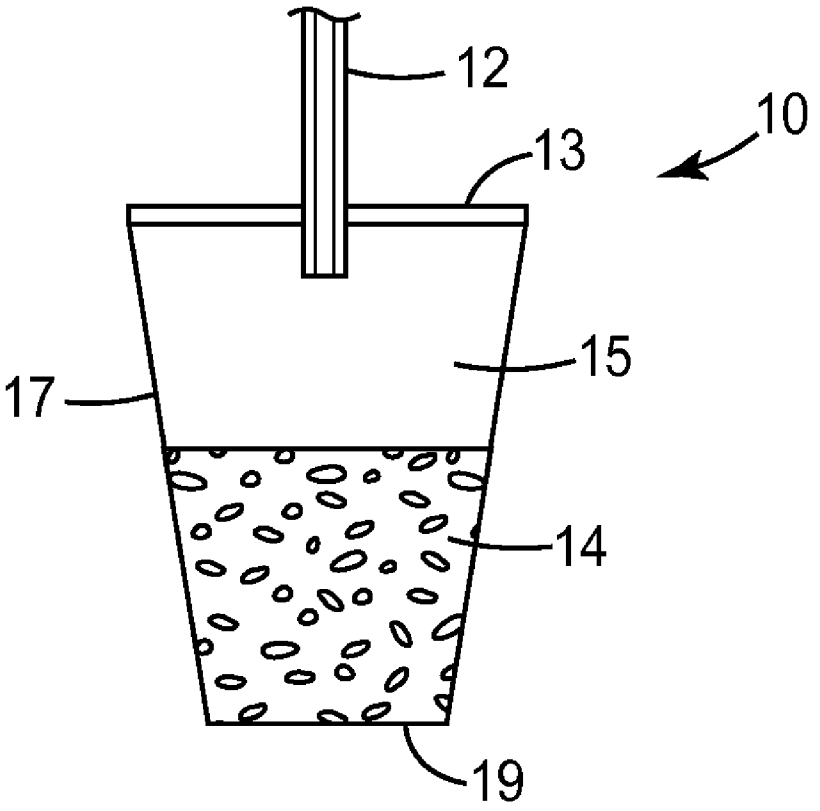
CPC ***B65D 47/36*** (2013.01); ***B65D 79/00*** (2013.01)
USPC **426/115**; 428/447; 428/421; 428/516; 428/523

(57) **ABSTRACT**

There is provided a container, comprising: (a) a cover comprising at least one elastomeric layer; and (b) a food component contained within the container, wherein the food component is a liquid food component or a solid food component, and further wherein the solid food component is configured for producing a fluid food product upon contact with a liquid; and wherein the cover is configured for puncturing by at least one liquid transfer device for injection or extraction of the liquid food component or the fluid food product, and further wherein, upon withdrawal of the at least one liquid transfer device from the container, the cover is configured for resealing itself against leakage of any of the liquid, liquid food component, fluid food product, or combinations thereof. There is also provided a container comprising a plunger and spring. There are provided methods of using the aforementioned containers.



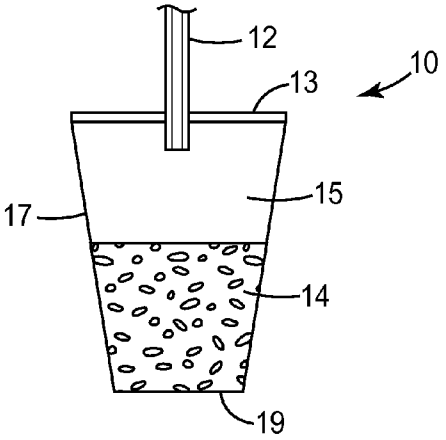


FIG. 1

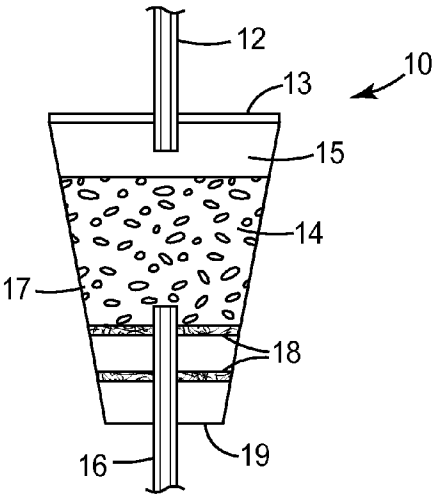


FIG. 2

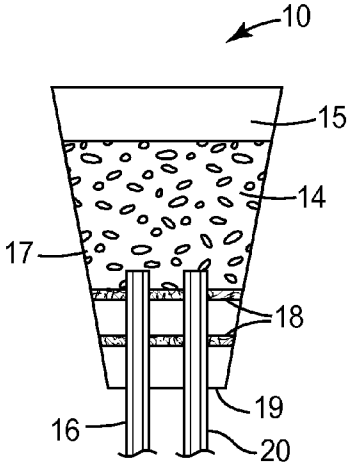


FIG. 3

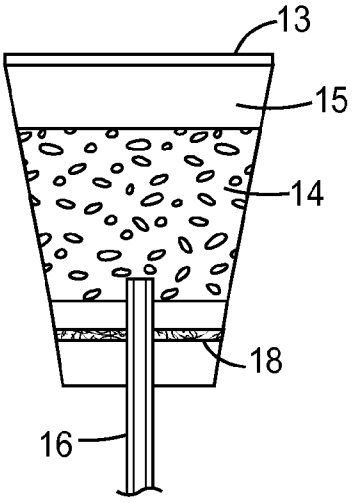


FIG. 4

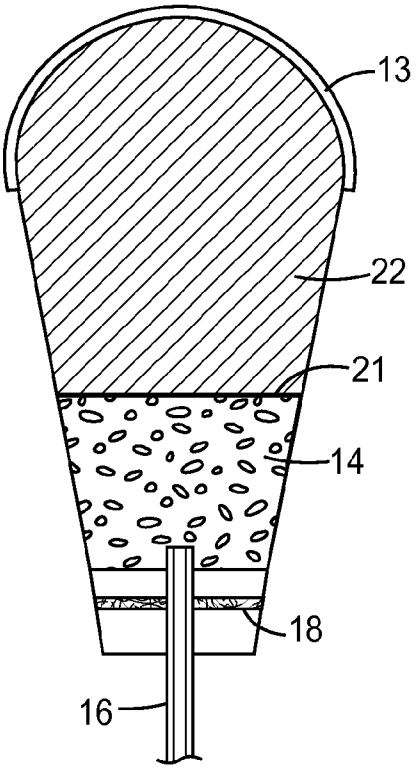


FIG. 5

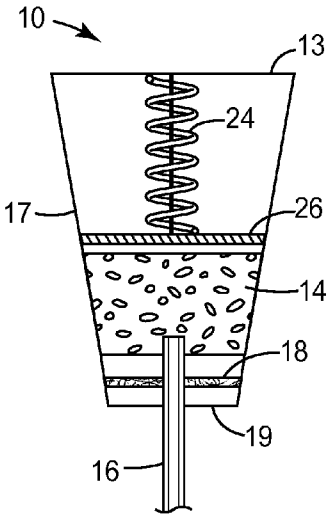


FIG. 6

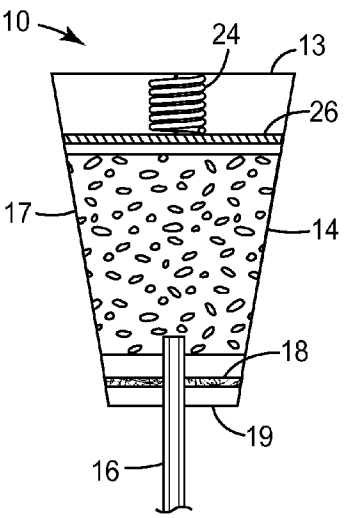


FIG. 7

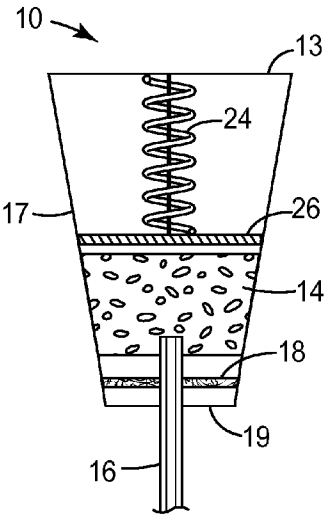


FIG. 8

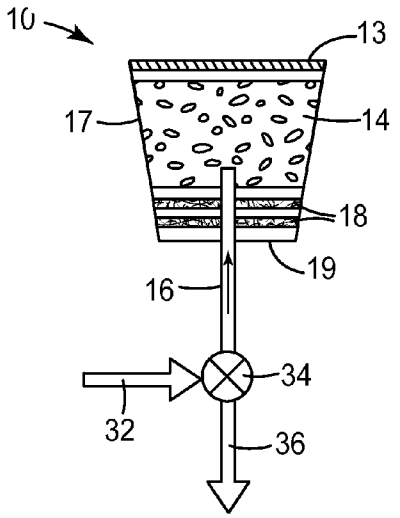


FIG. 9

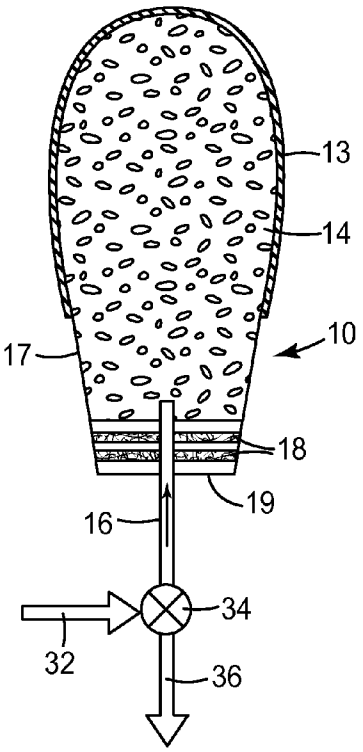


FIG. 10

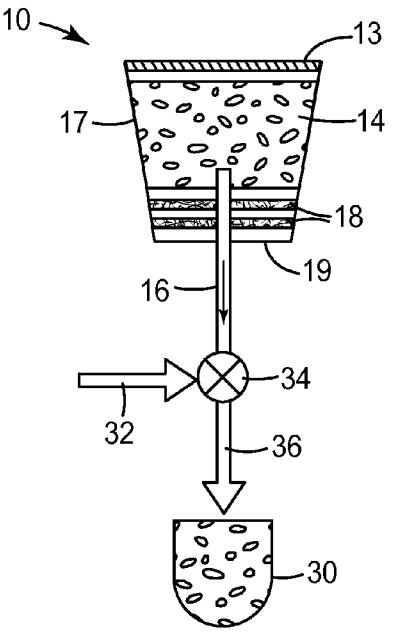


FIG. 11

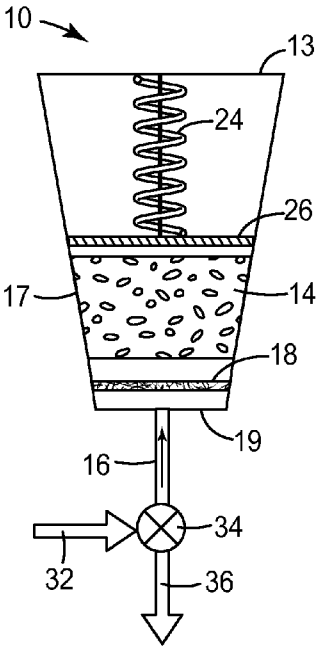


FIG. 12

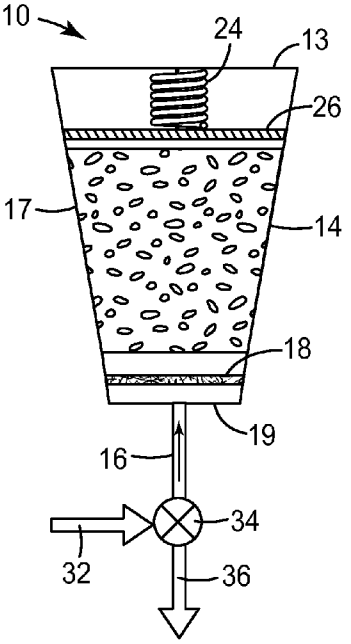


FIG. 13

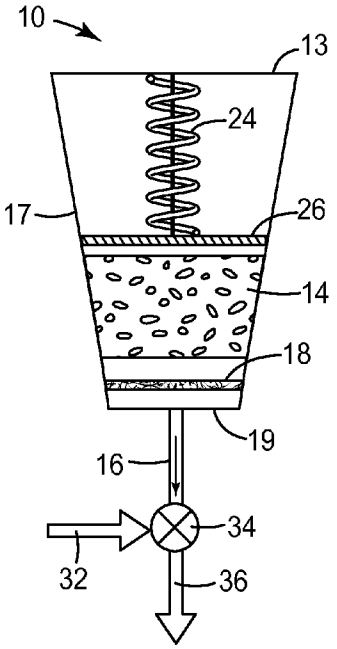


FIG. 14

SEALED CONTAINER AND METHODS OF USE THEREOF

FIELD

[0001] The present disclosure relates to a sealed container containing a liquid food component or a solid food component for producing a fluid food product when fluid is injected into the container. The present disclosure also relates to a sealed container with a cover to prevent leakage of the liquid food component or liquid food product upon withdrawal of a liquid transfer device.

BACKGROUND

[0002] Sealed containers containing a substance for the preparation of a food product, such as ground roasted coffee, tea, instant coffee, a mixture of ground coffee and of instant coffee, a chocolate-based product or any other dehydrated edible substance are known. In some instances, the sealed containers have a dish with a bottom and a side wall and a circular edge with a diameter greater than the bottom, and a cover welded to the periphery of the edge of the dish, in which the cover consists of a flexible material that has a low permeability to oxygen, chosen from the group consisting of aluminum, an aluminum/plastic composite, an aluminum/plastic/paper composite, pure or multi-layer plastic. These sealed containers are generally used in configurations in which the cover is pierced.

[0003] The contents of some sealed containers are extracted in the following manner. The container is inserted into a container holder and into an extraction cage. This extraction cage includes needles that pierce the top and bottom of the container. Fluid, typically water, is injected through the top needle and the food product drains through the piercing in the bottom of the container. At the end of this type of extraction, it is possible to remove the container from the extraction system in order to place the next one therein. When the container is removed, there is a piercing, or hole, in the bottom of the dish and this hole allows residual liquid food product and solid food component to escape. This leakage causes a problem because it soils part of the extraction machine. Alternatively, a needle or some other liquid transfer device may pierce the cover of the capsule and, as liquid is injected into the container, pressure builds and causes a rupture disk to fracture allowing extraction of the liquid, liquid food component and/or fluid food product.

[0004] In order to overcome leakage issues with the sealed containers previously discussed, some sealed containers include a dish at the level of the bottom, in which is provided a means guaranteeing the retention of solid food component when the containers is opened or ruptured. In these types of sealed containers, the means guaranteeing the retention of solid food component is chosen from the group consisting of a fabric, a valve and foam, and the means is placed, adhesively bonded or sealed to the bottom of the cartridge.

SUMMARY

[0005] The present disclosure provides a sealed container in which the cover may be pierced while still providing controllable release of the contents of the container.

[0006] In some embodiments, the presently disclosed container, comprises: (a) a cover comprising at least one elastomeric layer; and (b) a food component contained within the container, wherein the food component is a liquid food component or a solid food component, and further wherein the solid food component is configured for producing a fluid food product upon contact with a liquid; and wherein the cover is configured for puncturing by at least one liquid transfer device for injection or extraction of the liquid food component or the fluid food product, and further wherein, upon withdrawal of the at least one liquid transfer device from the container, the cover is configured for resealing itself or reducing or preventing leakage of any of the liquid, liquid food component, fluid food product, or combinations thereof. The presently disclosed container may further comprises (c) a barrier mounted to the container adjacent to the food component and being substantially impervious to the food component for retaining the food component within the container. In some embodiments, the barrier comprises at least one elastomeric layer. In some embodiments, the elastomeric layer comprises a material selected from at least one of silicone rubbers, synthetic rubber, fluoropolymer rubbers, olefinic elastomers, acrylic elastomers, polyester elastomers, polyurethane elastomers and combinations thereof.

[0007] As it is necessary for the liquid transfer device to puncture the cover in a predetermined travel distance of the liquid transfer device, it may be desirable to reinforce the elastomeric layer with a rigidifying layer(s). Such layers may be films such as biaxially oriented polyethylene or polypropylene, or cast film. Nonwovens, nets or metallic foils may also be used in the rigidifying layer

[0008] The presently disclosed barrier may be configured for puncturing by the liquid transfer device. In some embodiments, the barrier is configured for puncturing to extract the fluid food product.

[0009] The presently disclosed container may include a transparent cover or a cover that is not transparent. The container of any of the preceding claims where in the cover further comprises an oxygen barrier. The presently disclosed cover may be operably attached to the container using sonic welding. In some embodiments, the presently disclosed cover is operably attached to the container using heat sealing. In some embodiments, the cover is adhesively attached to the container. In some embodiments, the cover is mechanically attached to the container.

[0010] The presently disclosed cover may have a thickness that is less than 500 mm in some embodiments. In some embodiments, the cover comprises a resilient foam. The presently disclosed cover may be used to remove at least one of fluid, fluid food product and/or food component from the at least one liquid transfer device upon withdrawal of the at least one liquid transfer device from the container through the cover. In some embodiments, upon insertion of the at least one liquid transfer device through the cover, the cover forms a seal around an outer wall of the at least one liquid transfer device.

[0011] In another aspect, the present disclosure provides a container, comprising: (a) a food component contained within the container, wherein the food component is a liquid food component or a solid food component, and further wherein the solid food component is configured for producing a fluid food product upon contact with a liquid; (b) a plunger movably secured within the container between a spring operably connected to a first surface of the plunger and the food component in contact with a second surface of the plunger; and (c) at least one liquid transfer device configured for puncturing a portion of the container in which the food component is contained, wherein the spring is biased between

the first surface of the plunger and an inside surface of a portion of the container that is not in contact with the food component.

[0012] In another aspect, the present disclosure provides methods of using the container of any of the preceding claims to prepare the fluid food product or the liquid food component.

[0013] In another aspect, the present disclosure provides methods of using the container of any of the preceding claims to dispense the fluid food product or the liquid food component.

[0014] The above summary of the present disclosure is not intended to describe each embodiment of the present invention. The details of one or more embodiments of the invention are also set forth in the description below. Other features, objects, and advantages of the invention will be apparent from the description and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. **1** is a front cross section view of an embodiment of the presently disclosed container having a first liquid transfer device.

[0016] FIG. **2** is a front cross section view of an embodiment of the presently disclosed container having a first and second liquid transfer device.

[0017] FIG. **3** is a front cross section view of an embodiment of the presently disclosed container having a first and second liquid transfer device.

[0018] FIGS. **4** and **5** are front cross section views of an embodiment of the presently disclosed container having a first liquid transfer device and a deformable cover.

[0019] FIGS. **6** to **8** are front cross section views of an embodiment of the presently disclosed container having a first liquid transfer device, a spring and a plunger.

[0020] FIGS. **9** to **11** are front cross section views of various use embodiments of the container disclosed in FIGS. **4** and **5**.

[0021] FIGS. **12** to **14** are front cross section views of various use embodiments of the container disclosed in FIGS. **6** to **8**.

DETAILED DESCRIPTION

[0022] The presently disclosed container **10** may be any shape, such as conical, square, rectangular, and the like. In some embodiments, such as that depicted in FIG. **1**, the presently disclosed container **10** has a frustroconical shaped sidewall **17**, a bottom **19** and a cover **13**. Sidewall **17** generally comprises any materials that are impervious to air and water. For example, a polymeric film material, aluminum sheet material, or the like may be used as the cover. The container may be made from any suitable material including a plastic material (cast, injection molded, extruded, etc). Optionally, any manner of food grade coating may be used on the surface of the sidewall that will contact a food component **14** contained therein.

[0023] Cover **13** may be selected and constructed in various configurations depending on the use application for container **10**. For example, in some embodiments, cover may be a specific thickness in order to control the amount of force required to puncture it. In some embodiments, cover **13** may be a specific thickness in order to control the amount of fluid force required to deform the shape of cover **13** to some desired amount. In some embodiments, cover **13** may be 500 micrometers or less, 400 micrometers or less, 300 micrometers or less, 200 micrometers or less, 175 micrometers or less, 150 micrometers or less, 124 micrometers or less, or even 100 micrometers or less. The outer surface of cover **13** may also contain some printed information and/or pictorials. The printed information for example may be instructions or the company brand. Likewise the pictorial may be a picture of how to make the drinkable liquid or the company brand.

[0024] In some embodiments, cover **13** comprises at least one elastomeric layer. Elastomeric materials useful in the present disclosure are any materials that are capable of at least a moderate degree of elastic deformation. Elastomeric materials useful in the present disclosure are selected such that any perforation in cover **13** seals around any device used to create such a perforation.

[0025] Elastomeric materials useful in the present disclosure are also selected such that any perforation in cover **13** is resealed upon withdrawal of any device used to create such perforations. Elastomeric materials useful herein include silicone rubbers, synthetic rubber, fluoropolymer rubbers, and the like. Other elastomeric materials include natural or synthetic rubbers block copolymers that are elastomeric such as those known to those skilled in the art as A-B or A-B-A block copolymers. Other potentially useful elastomeric materials include, for example, styrene/isoprene/styrene (SIS) block copolymers, elastomeric polyurethanes, ethylene copolymers such as ethylene vinyl acetates, ethylene/propylene monomer copolymer elastomers of ethylene/propylene/diene terpolymer elastomers, polyester elastomers. One exemplary elastomer is a synthetic rubber, sold under the trade designation "KRATON" by Kraton Performance Polymers Inc., Houston, Tex. USA. These materials offer many properties of natural rubber, for example, flexibility and sealing properties, but in addition have higher heat resistance and chemical resistance. The chemistry of these synthetic rubbers may be based upon styrenic block co-polymers consisting of polystyrene blocks and rubber blocks. The rubber blocks usually comprise polybutadiene, polyisoprene or their hydrogenated equivalents. Typically these synthetic rubber polymers are blended with other materials such as polyolefins, polystyrene, tackifying resins or paraffinic oils to optimize the properties. End block modifiers may also be added to improve the thermal properties of these elastomers.

[0026] The present disclosure also includes other types of elastomers, such as gel elastomers, acrylic elastomers, polyester elastomers and polyurethane elastomers. Examples of these materials and/or trade names include tackified SIS, n-butyl acrylate-methyl methacrylate copolymer, thermoplastic polyester elastomer (such as that commercially available under the trade designation "HYTREL" from E.I. du Pont de Nemours and Company, Wilmington, Del., and thermoplastic urethanes commercially available under the trade designation "IROGRAN" from Huntsman Corporation, The Woodlands, Tex. Without being bound by theory, it is believed that gel elastomers may exhibit a faster flow rate after puncturing and thus enhance the speed at which a perforation can be sealed. It is also within the scope of the present disclosure to expose the elastomer or resulting cover (**13**) to an electron beam. Without being bound by theory, it is believed that electron beam treatment can further enhance cross link density of the elastomer. The elastomer layer may also be a natural rubber that may or may not contain crosslinked sites.

[0027] Blends of any of these types or specific elastomers with each other or with modifying non-elastomers are also

contemplated. It is also within the scope of this invention to incorporate conventional fillers, plasticizers, stiffening aids, dyes, pigments, processing additives and the like to the elastomeric layers. In some embodiments, cover **13** further includes an oxygen barrier, such as for example an aluminum vapor coat, polyvinylidene chloride (PVDC), ethylene vinyl alcohol copolymer (EVOH), and the like.

[0028] In some embodiments, the elastomeric layer also includes a tackifier or combination of tackifiers. Although not wishing to be bound by theory, the tackifier may enhance flow of elastomeric material in the elastomeric layer to provide perforation re-sealing properties. Examples of typical tackifiers include those commercially available under the trade designation "ESCOREX 2203" from ExxonMobil Chemical Company, Houston, Tex. Example of commercially available tackifiers are those commercially available under the trade designation "ESCOREZ" from ExxonMobil Chemical Company.

[0029] In some embodiments, cover **13** is transparent. In some embodiments, cover **13** is not transparent, such as for example having a particular color or pattern therein.

[0030] In some embodiments, cover **13** comprises the same material as sidewall **17**. Bottom **19** may be comprised of the same material as sidewall **17** or cover **13** depending of the application for which container **10** is made. Cover **13** and/or bottom **19** are integrally or operably attached to sidewall **17**. Examples of operably attachment include heat sealing, sonic welding, adhesively attaching, mechanically attaching, and the like. For adhesively attaching, the adhesive may be a pressure sensitive adhesive, a curing hot melt adhesive, a thermoplastic adhesive, a crosslinked polymer and the like. For mechanically attaching, cover **13** may be attached to sidewall **17** using a clamp sealing or ring sealing mechanism thereby sealing the outer edge of container **10** in which cover **13** may form a compression seal similar to using a gasket under a clamp ring.

[0031] Food component **14** is contained within a portion of container **10** while providing a volume **15** for receiving liquid. Food component **14** may be a liquid, a solid or a mixture thereof. A liquid transfer device **12** may be inserted in cover **13** in order to transfer liquid in and/or out of container **10**. Liquid transfer device **12** may be any device capable of delivering liquid, such as a device having a needle like configuration, a tube, a pipe, or the like. In some embodiments, liquid transfer device **12** is sharpened on the end that pierces cover **13** in order to facilitate puncture of cover **13**. In some embodiments, cover **13** is scored, indented, or otherwise mechanically altered to receive liquid transfer device **12**.

[0032] In some embodiments, container **10** may be pierced in more than one location by more than one liquid transfer device. For example, in FIG. **2** there is shown a second liquid transfer device **16** piercing bottom **19** of container **10**. Those skilled in the art can appreciate that liquid transfer devices **12**, **16** may facilitate the flow of liquid both into and out of container **10**. In some embodiments, it is desirable to provide a filter material **18** between food component **14** and bottom **19**. Filter material **18** comprises any type of woven or non-woven or open cell foam filter materials, including paper, metals, synthetics, and the like. In some embodiments filter material **18** may be a barrier comprising a material similar to that selected as cover **13**. For example, barrier may comprise at least one elastomeric layer similar to that disclosed with respect to cover **13**.

[0033] In some embodiments, container may be pierced in the same general location by more than one liquid transfer device. For example, in FIG. **3**, there is shown a second liquid transfer device **16** and a third liquid transfer device **20** both piercing bottom **19** of container **10**. One of skill in the art can appreciate that a plurality of liquid transfer devices may be used to pierce container **10** in a plurality if locations depending on the application for which container **10** is being used.

[0034] In some embodiments, cover **13** is elastomerically deformable to provide mechanical ejection of liquid food component or fluid food product provided in container **10**. As shown in FIGS. **4** and **5**, liquid may be injected into container via at least one liquid transfer device (such as second liquid transfer device **16** as depicted). One of skill in the art can appreciate that a plurality of liquid transfer devices may be used to pierce container **10** in a plurality of locations on container **10**. Injection of the liquid can be done during packaging of a liquid food component and/or during preparation of a fluid food product. In some embodiments, container **10** includes food component **14** that may optionally be separated from a volume **15** for receiving liquid or liquid food component using any type of separation layer. In some embodiments, separation of food component **14** from volume **15** is provided by using an upper filter **21**. Optionally, filter material **18** can be used between food component **14** and bottom **19**. Upper filter **19** and filter material **18** comprise any type of woven or non-woven or open cell foam filter materials, including paper, metals, synthetics, and the like.

[0035] FIGS. **6** to **8** depict various positions of another embodiment of the presently disclosed container **10** having a sidewall **17**, a cover **13** and a bottom **19**, which may comprise the same or different materials. In FIGS. **6** to **8** container **10** has a spring **24** operably connected to a plunger **26** where plunger **26** contacts or is adjacent to food component **14**. Spring **24** can be extended or compressed depending on the volume of food component, liquid and/or fluid food component in container **10**. In some embodiments, as depicted in FIG. **7**, spring **24** can be in a compressed position when a liquid is injected through at least one liquid transfer device **16**. Spring **24** may remain this compressed position while a certain amount of pressure is exerted on the liquid. Spring **24** and plunger **26** may then provide mechanical force by re-extension of spring, as shown in FIG. **8**, such that liquid food component, liquid and/or fluid food product is expelled from container **10**. Optionally, filter material **18** can be used between food component **14** and bottom **19**. One of skill in the art can appreciate that a plurality of liquid transfer devices may be used to pierce container **10** in a plurality of locations on container **10**. Injection of the liquid can be done during packaging of a liquid food component and/or during preparation of a fluid food product.

[0036] In some embodiments, container **10** may be operably connected to a liquid supply **32**, such as that depicted in FIGS. **9** to **11**. In exemplary embodiments, liquid supply **32** provides liquid to a directional control valve **34** useful for allowing liquid into container **10** via at least one liquid transfer device **16**. Control valve **34** may also be useful for preventing liquid to flow into container **10**. Control valve **34** may also be useful for allowing liquid, liquid food product and/or fluid food component to flow out of container **10** via discharge **36**. For example, in FIG. **9**, container **10** has a sidewall **17**, bottom **19** and cover **13**. Cover **13** is comprises at least one elastomeric layer such that it is elastomerically deformable. Container **10** also contains food component **14**. Container **10**

may also optionally include filter material **18** between food component **14** and bottom **19**. As shown in FIG. **9**, directional control valve **34** is in a "closed" position, meaning that liquid is not allowed to flow from liquid supply **32** to container **10** via at least one liquid transfer device **16**.

[0037] FIG. **10** depicts embodiments in which directional control valve **34** is in a "fill" position allowing liquid to flow from liquid supply **32** to container **10** via at least one liquid transfer device **16**. Cover **13** deforms as the volume of liquid in container **10** increases.

[0038] FIG. **11** depicts embodiments in which directional control valve **34** is in a "discharge" position allowing liquid to flow out of container **10** via at least one liquid transfer device **16** and through discharge **36** while preventing more liquid to flow into container **10** from liquid supply **32**. Embodiments according to FIG. **11** provide at least some degree of mechanical ejection of liquid food component or fluid food product contained in container **10** as cover **13** resumes its original shape. As shown in FIGS. **9** to **11**, liquid may be injected into container via at least one liquid transfer device (such as second liquid transfer device **16** as depicted). One of skill in the art can appreciate that a plurality of liquid transfer devices may be used to pierce container **10** in a plurality of locations on container **10**. Injection of the liquid can be done during packaging of a liquid food component and/or during preparation of a fluid food product.

[0039] In some embodiments, container **10** may be operably connected to a liquid supply **32**, such as that depicted in FIGS. **12** to **14**. In exemplary embodiments, liquid supply **32** provides liquid to a directional control valve **34** useful for allowing liquid into container **10** via at least one liquid transfer device **16**. Control valve **34** may also be useful for preventing liquid to flow into container **10**. Control valve **34** may also be useful for allowing liquid, liquid food product and/or fluid food component to flow out of container **10** via discharge **36**. For example, in FIG. **12**, container **10** has a spring **24** operably connected to a plunger **26** where plunger **26** contacts or is adjacent to food component **14**. Container **10** may also optionally include filter material **18** between food component **14** and bottom **19**. As shown in FIG. **9**, directional control valve **34** is in a "closed" position, meaning that liquid is not allowed to flow from liquid supply **32** to container **10** via at least one liquid transfer device **16**. Plunger **26** remains in a neutral state allowing spring **24** to remain in an extended position.

[0040] FIG. **13** depicts embodiments in which directional control valve **34** is in a "fill" position allowing liquid to flow from liquid supply **32** to container **10** via at least one liquid transfer device **16**. As liquid flows into container **10** from, plunger **26** is biased toward cover **13** causing spring **24** to move into a compressed position.

[0041] FIG. **14** depicts embodiments in which directional control valve **34** is in a "discharge" position allowing liquid to flow out of container **10** via at least one liquid transfer device **16** and through discharge **36** while preventing more liquid to flow into container **10** from liquid supply **32**.

[0042] Embodiments according to FIG. **11** provide at least some degree of mechanical ejection of liquid food component or fluid food product contained in container **10** as spring **24** moves into an extended position and plunger **26** resumes its original, neutral position. As shown in FIGS. **12** to **14**, liquid may be injected into container via at least one liquid transfer device (such as second liquid transfer device **16** as depicted). One of skill in the art can appreciate that a plurality of liquid transfer devices may be used to pierce container **10** in a plurality of locations on container **10**. Injection of the liquid can be done during packaging of a liquid food component and/or during preparation of a fluid food product.

[0043] The food component may be any desirable edible component. Some examples include ground roasted coffee, tea, instant coffee, a mixture of ground coffee and of instant coffee, a chocolate-based product, dehydrated milk based product or any other dehydrated edible substance are known. The food component may also be a liquid including water, fruit juice, vegetable juice, flavored liquids, alcohol containing beverages, carbonated beverages (including both alcoholic and non-alcoholic types). In some embodiments, the liquid coming into contact with the food component may range in temperature from about 0° C. to about 100° C., typically about 50° C. to about 90° C. The liquid that is injected into the container may be water (including deionized water, tap water, distilled water, carbonated water and the like), milk (including cream, whole milk, 2% milk, 1% milk, skim milk and the like) or any other suitable liquid.

[0044] The presently disclosed cover **13** may comprise layers in addition to the elastomeric layer. For example a non-elastomeric layer may be included above or below the elastomeric layer. Alternatively, the elastomeric layer may be sandwiched in between two other non-elastomeric polymer layers. In such constructions, the desired degree of puncture resistance and ability to seal and reseal may be affected by adjusting the properties of the film. Examples of plastic materials include thermoplastics such as polyethylenes, polypropylene, polymethylmethacrylate, polyethylene terephthalate, polyamides, ethylene vinyl alcohol and combinations thereof. Examples of thermosets include dyglycicyl esters of bisphenol A epoxy resins, bisphenol A dicynate esters, orthophthalic unsaturated polyesters, bisphenol A vinyl esters and the like. An example of a cover construction having three layers is polypropylene, synthetic rubber elastomer and polyethylene. Alternately, a construction may include three layers of polyolefin, synthetic rubber elastomer and polyester. In some embodiments, a three layer construction includes a polyolefin, synthetic rubber elastomer and an adhesive film layer. The adhesive layer may also bond the cover to the container. In some instances the synthetic rubber elastomer in these examples may be replaced with a silicone elastomer. These three layers each range in thickness from 20 to 500 micrometers. It is also within the scope of this invention to apply a vapor deposited barrier coating over one surface.

[0045] Multilayer films useful in the present disclosure may be formed by any conventional techniques, such as coating, laminating, co-extruding, stepwise extruding, cast films, blown films and the like. Examples of co-extrusion processes may be found in U.S. Pat. Nos. 3,557,265 and 3,479,425. The layers are typically coextruded through a specialized feedblock or specialized die that will bring diverse materials into contact while forming the film. Alternating layers of elastomeric films and non-elastomeric films may be used. Films useful in the present disclosure may have anywhere from 3 to 100 layers of different film combinations, such as 3 to 10 layers. In some embodiments, the multilayer film comprises two polyolefin layers having an elastomeric film layer therebetween. Additionally the elastomeric film layer(s) and non-elastomeric film layer(s) may be the same thickness or different thicknesses. The cover may be manufactured on a continuous basis and then converted into the desired shape and size of the end desired cover. This converting may be

accomplished using any conventional method including die cutting, rotary die cutting, laser cutting, water jet cutting and the like. The processing conditions will be optimized to achieve the desired polymer properties. These processing conditions include the chill and/or quench temperatures.

[0046] Although no wishing to be bound by any theory, in order to re-seal the elastomer needs to be free to flow after puncturing. If the elastomeric material in the elastomeric layer is held too tightly or constrained in the film construction, then the elastomeric material cannot effectively flow and thus rate of re-sealing is too slow to be effective in some embodiments. There are many ways to formulate the presently disclosed cover to enhance this re-sealing property.

[0047] In some embodiments, a porous material may be placed on top or bottom of the elastomeric layer. Examples of typical porous materials include: scrims, grids, screens, foamed substrate, nonwovens, patterned substrates and the like. The amount of porosity in the porous material can be optimized depending on the cover. Without being bound by theory, it is believed that the elastomeric material in the elastomeric layer can flow through the porous material to provide re-sealing of perforations. Likewise the porous material provides or acts as a spacer in the cover.

[0048] In some embodiments, re-sealing can be achieved by providing porosity in the cover itself. This can be accomplished through various techniques, such as foaming techniques or injecting gas into any of various layers in the cover during processing. In some embodiments, during processing, the elastomeric layer is applied such that it has porosity or air gaps between itself and the layer above or below it. During extrusion for example, the elastomeric layer is non-uniformly applied to the upper lid creating air bubbles or air gaps.

[0049] In some embodiments, expandable materials, such as expandable microspheres, can be used. Expandable microspheres include those commercially available under the trade designation "EXPANCEL" from Eka Chemicals Inc., Duluth, Ga. An exemplary cover made using expandable microspheres includes a multi-layer film construction of 2 or more layers in which one or more than one layer contains an additive/filler, which can be a blowing agent, such as expanding microspheres. This multi-layer film can be adhered to the top surface of the cover by using a pressure sensitive adhesive which is coated to one of the two outside layers of the multi-layer film. In some embodiments, the multi-layer film is a multi-layer film patch, which only covers a portion of the top (area) of the presently disclosed capsule cover. In some embodiments, this multi-layer film is laminated to previously disclosed cover films, which then cover the entire top (area) of the presently disclosed capsule cover.

[0050] In some embodiments, in order to enable the elastomeric material to flow, there is an intermediate layer between the elastomeric layer and the layer above and/or below it. This intermediate layer is selected such that there is poor or low adhesion between the elastomeric layer and the intermediate layer. After the cover is perforated, the low adhesion between the elastomeric layer and the intermediate layer enables the elastomeric layer to separate from the intermediate layer thereby allowing the elastomeric material in the elastomeric layer to flow through the perforation(s) for re-sealing For example, an elastomeric layer of polypropylene skins with a styrenic block copolymer core (styrene-ethylene/butylenes-styrene called "SEBS") can be formulated to have low adhesion to an ethylene vinyl acetate (EVA) film, which could be useful as an intermediate layer in the present disclosure.

[0051] In some embodiments, the presently disclosed cover includes a combination of a mesh layer with an elastomeric layer where the elastomeric layer includes a tackifier. Without being bound by theory, it is believed that the mesh layer provides space to enable the tackified elastomeric material in the elastomeric layer to flow and re-seal the perforation(s).

[0052] In some embodiments, the presently disclosed cover includes a combination of an elastomeric layer where the elastomeric layer is attached with an adhesive which softens at temperatures of the injected liquid. Without being bound by theory, it is believed that the elastomeric material is less constrained and therefore able to contract around the liquid transfer device to re-seal the perforation(s).

[0053] Various modifications and alterations of this invention will become apparent to those skilled in the art without departing from the scope and spirit of this invention.

1. A container, comprising:

(a) a cover comprising at least one elastomeric film layer; and

(b) a food component contained within the container, wherein the food component is a liquid food component or a solid food component, and further wherein the solid food component is configured for producing a fluid food product upon contact with a liquid; and

wherein the cover is configured for puncturing by at least one liquid transfer device for injection or extraction of the liquid food component or the fluid food product, and further wherein, upon withdrawal of the at least one liquid transfer device from the container, the cover is configured for resealing itself against leakage of any of the liquid, liquid food component, fluid food product, or combinations thereof

2. The container of claim **1** further comprising (c) a barrier mounted to the container adjacent to the food component and being substantially impervious to the food component for retaining the food component within the container.

3. The container of claim **2** wherein the barrier comprises at least one elastomeric layer.

4. The container claim **1** wherein the elastomeric layer comprises a material selected from at least one of silicone rubbers, synthetic rubber, fluoropolymer rubbers, olefinic elastomers, and combinations thereof

5. The container of claim **2** wherein the barrier is configured for puncturing by the liquid transfer device.

6. The container of claim **2** wherein the barrier is configured for puncturing to extract the fluid food product.

7. The container of claim **1** wherein the cover is transparent.

8. The container of claim **1** wherein the cover is not transparent.

9. The container of claim **1** where in the cover further comprises an oxygen barrier.

10. The container of claim **1** wherein the cover is operably attached to the container using sonic welding.

11. The container of claim **1** wherein the cover is operably attached to the container using heat sealing.

12. The container of claim **1** wherein the cover is adhesively attached to the container.

13. The container of claim **1** wherein the cover is mechanically attached to the container.

14. The container of claim **1** wherein the cover has a thickness that is less than 500 mm.

15. The container of claim **1** where in the cover comprises a resilient foam.

16. The container of claim **1** wherein cover removes at least one of fluid, fluid food product and food component from the at least one liquid transfer device upon withdrawal of the at least one liquid transfer device from the container through the cover.

17. The container of claim **1** wherein, upon insertion of the at least one liquid transfer device through the cover, the cover forms a seal around an outer wall of the at least one liquid transfer device.

18-20. (canceled)

21. A cover comprising:

(a) an elastomeric film layer selected from at least one of silicone rubbers, synthetic rubber, fluoropolymer rubbers, olefinic elastomers, and combinations thereof; and

(b) a polypropylene layer.

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