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(54) DECANTING AND DOSING CLOSURE SYSTEM

(75) Inventors: **Dennis Anderson**, Corvallis, OR (US); **Maynard E. Anderson**, Pebble Beach, CA (US)

Correspondence Address:
DENNIS CHARLES ANDERSON
7625 NW McDONALD PLACE
CORVALLIS, OR 97330 (US)

(73) Assignee: **RX General Corporation**, Pebble Beach, CA (US)

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(57) **ABSTRACT**

A closure system of the present invention preferably includes a flexible or rigid container having container mating surface, a stiffening ring having a first ring mating surface and a second ring mating surface, and a stopper having a stopper mating surface. The first ring mating surface is matable to the container mating surface and the second ring mating surface is matable to the stopper mating surface. In one preferred embodiment a dosing cavity is defined in the stopper mating surface. The container may be sealed to have inhalation energy stored therein. When the inhalation energy is released, dosing material within the dosing cavity is inhaled into the container. The inhalation energy is stored as inhalation means such as vacuum or the deflection of at least one panel of the container or the closure system.

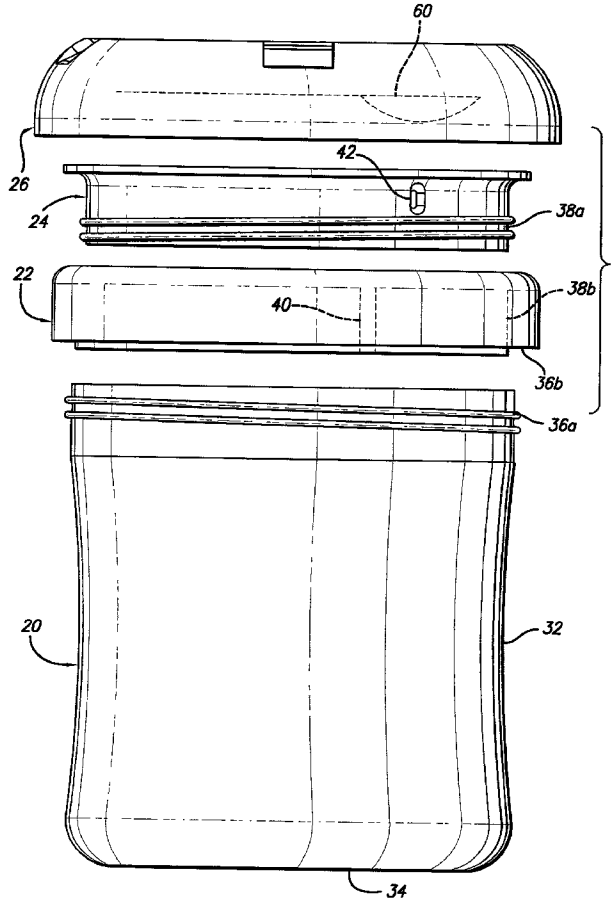


FIG. 1

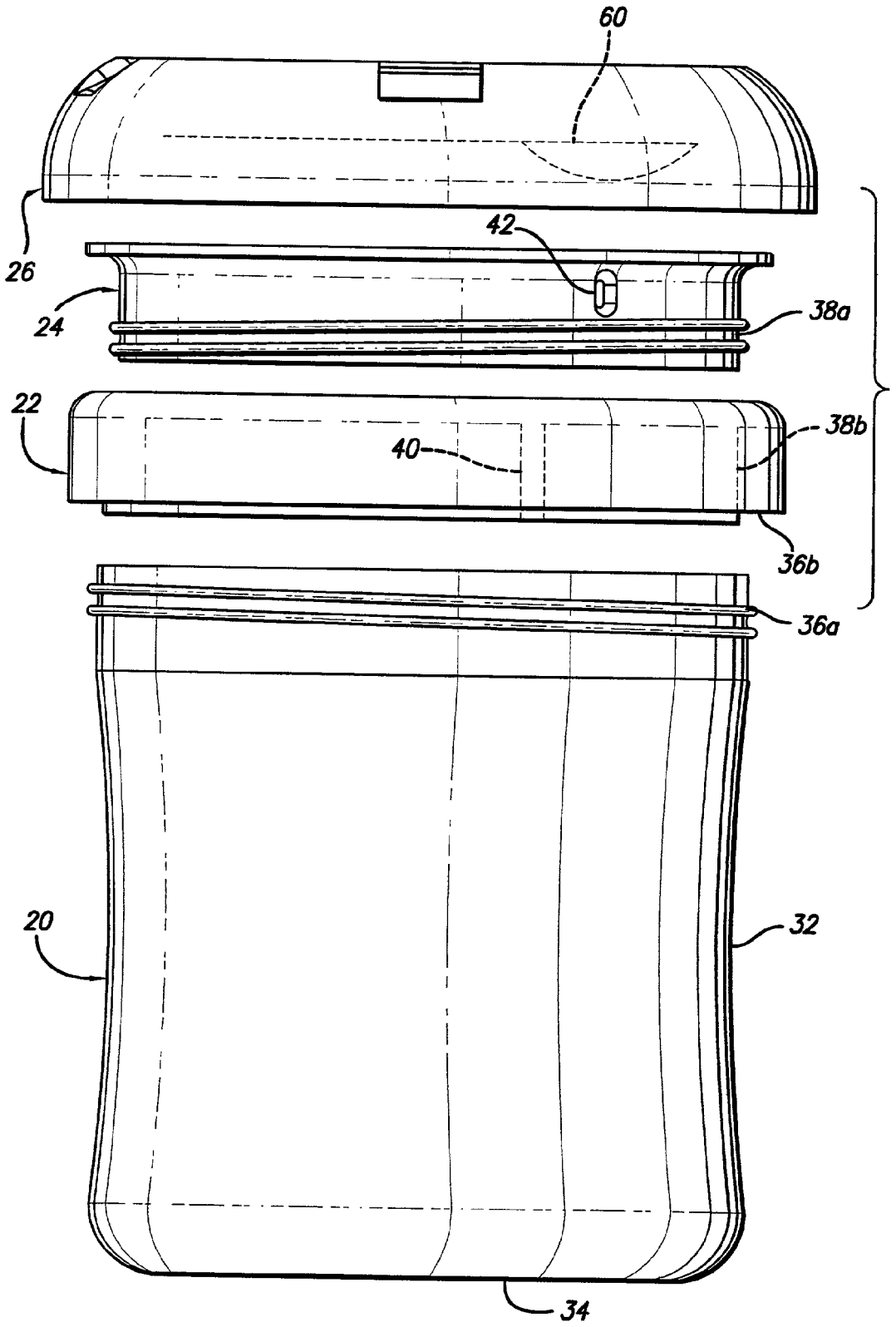


FIG. 2

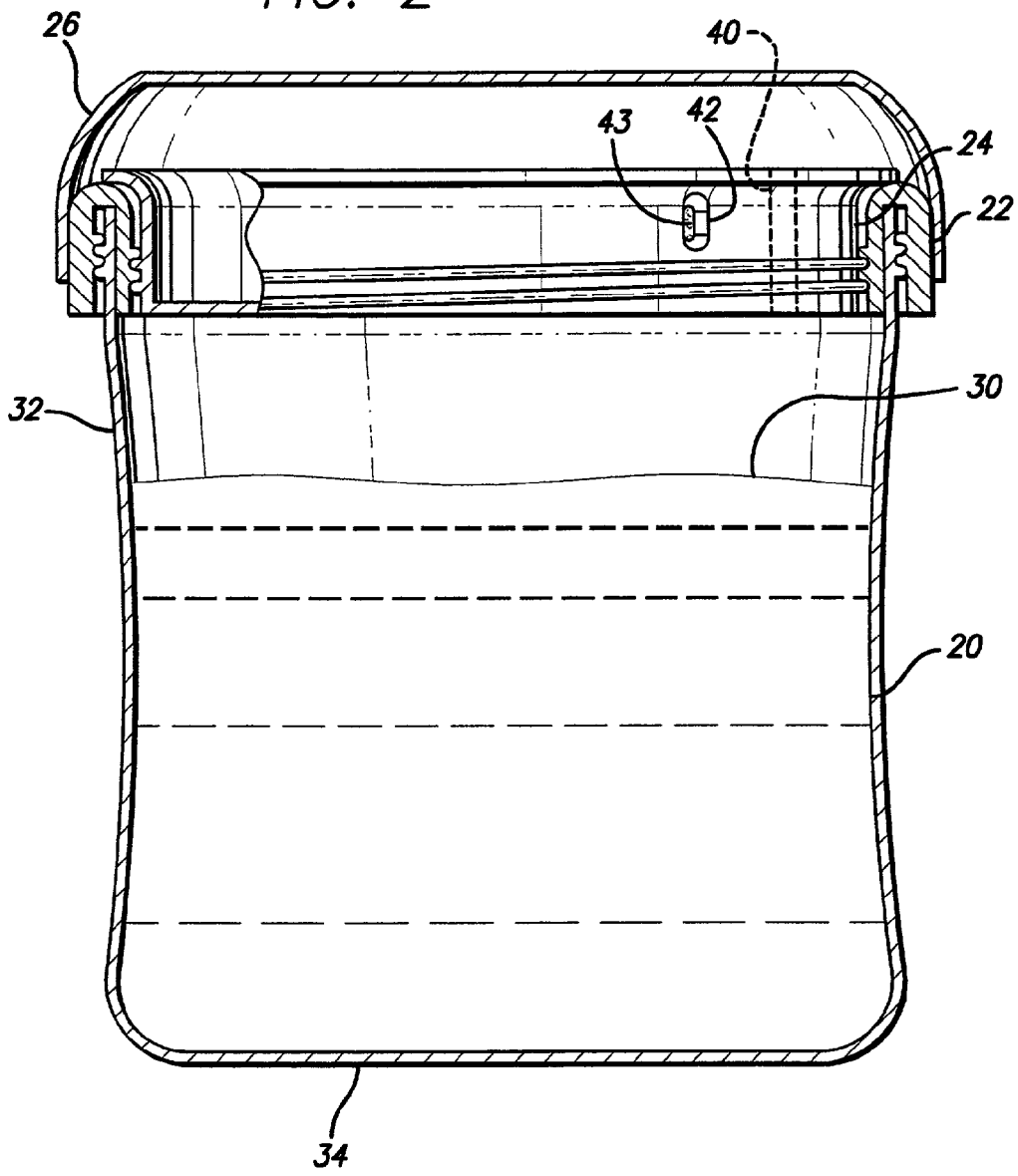


FIG. 3

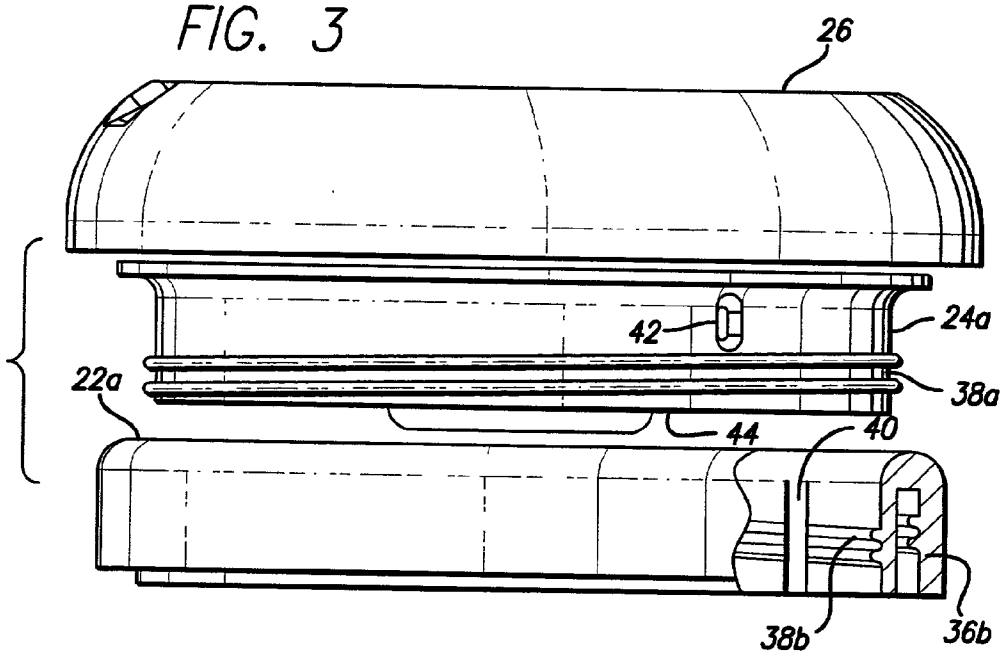
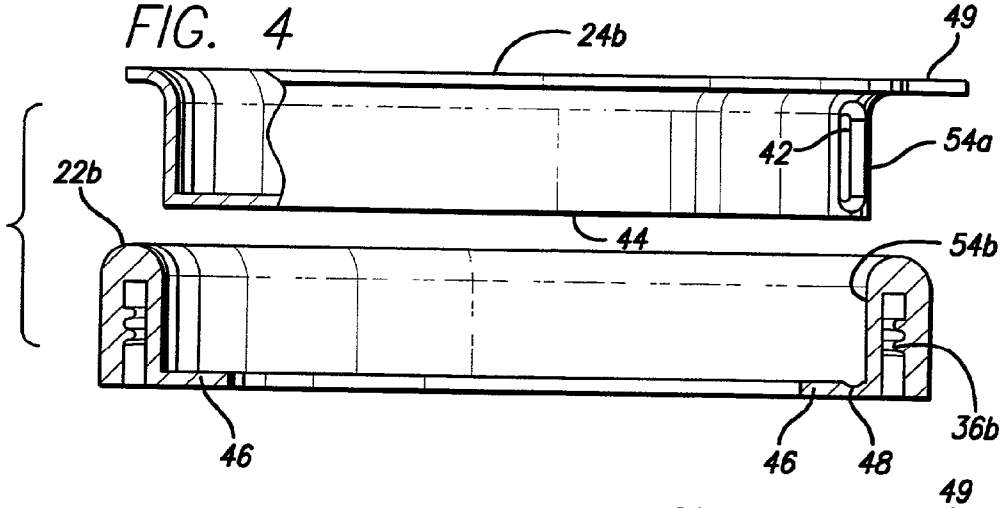


FIG. 4



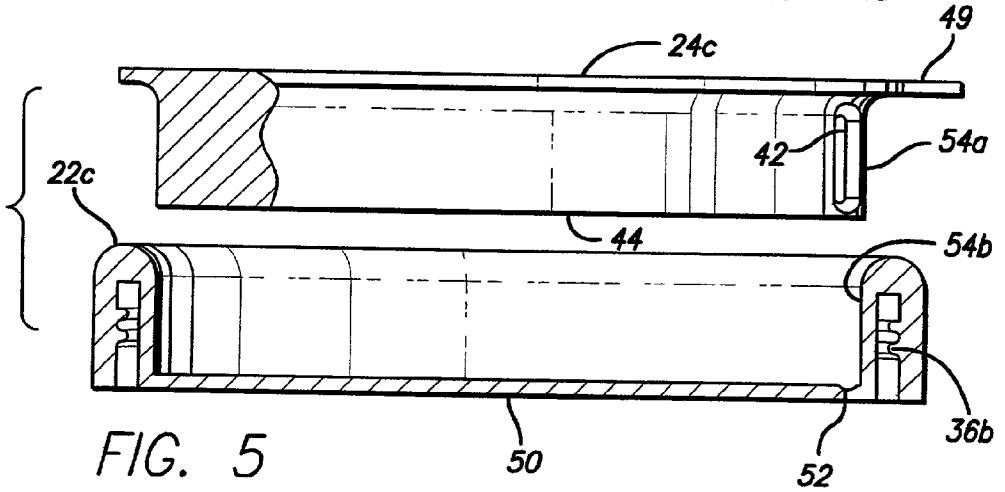


FIG. 5

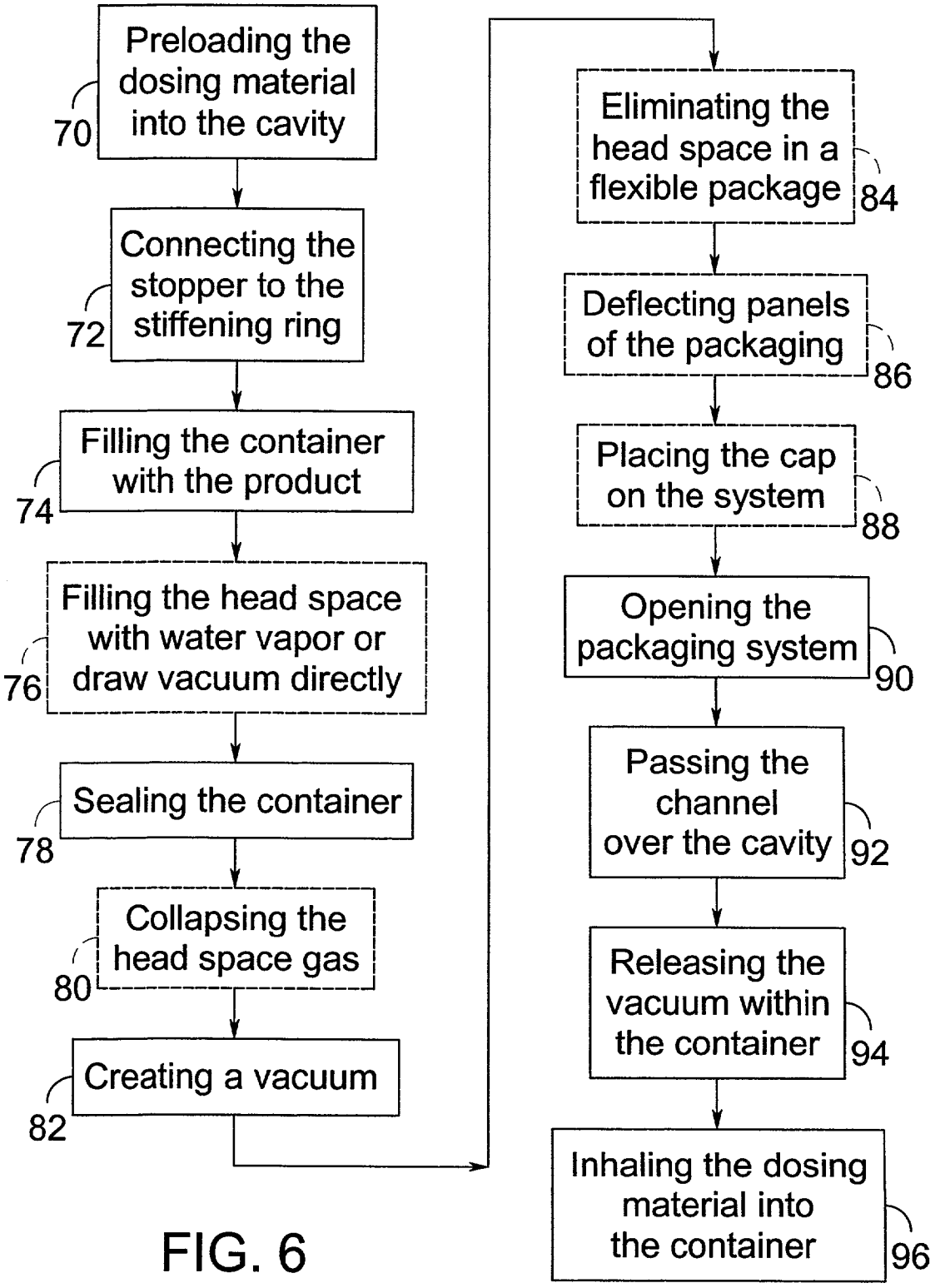

Preloading the dosing material into the cavity
70
Connecting the stopper to the stiffening ring
72
Filling the container with the product
74
Filling the head space with water vapor or draw vacuum directly
76
Sealing the container
78
Collapsing the head space gas
80
Creating a vacuum
82
Eliminating the head space in a flexible package
84
Deflecting panels of the packaging
86
Placing the cap on the system
88
Opening the packaging system
90
Passing the channel over the cavity
92
Releasing the vacuum within the container
94
Inhaling the dosing material into the container
96

FIG. 6

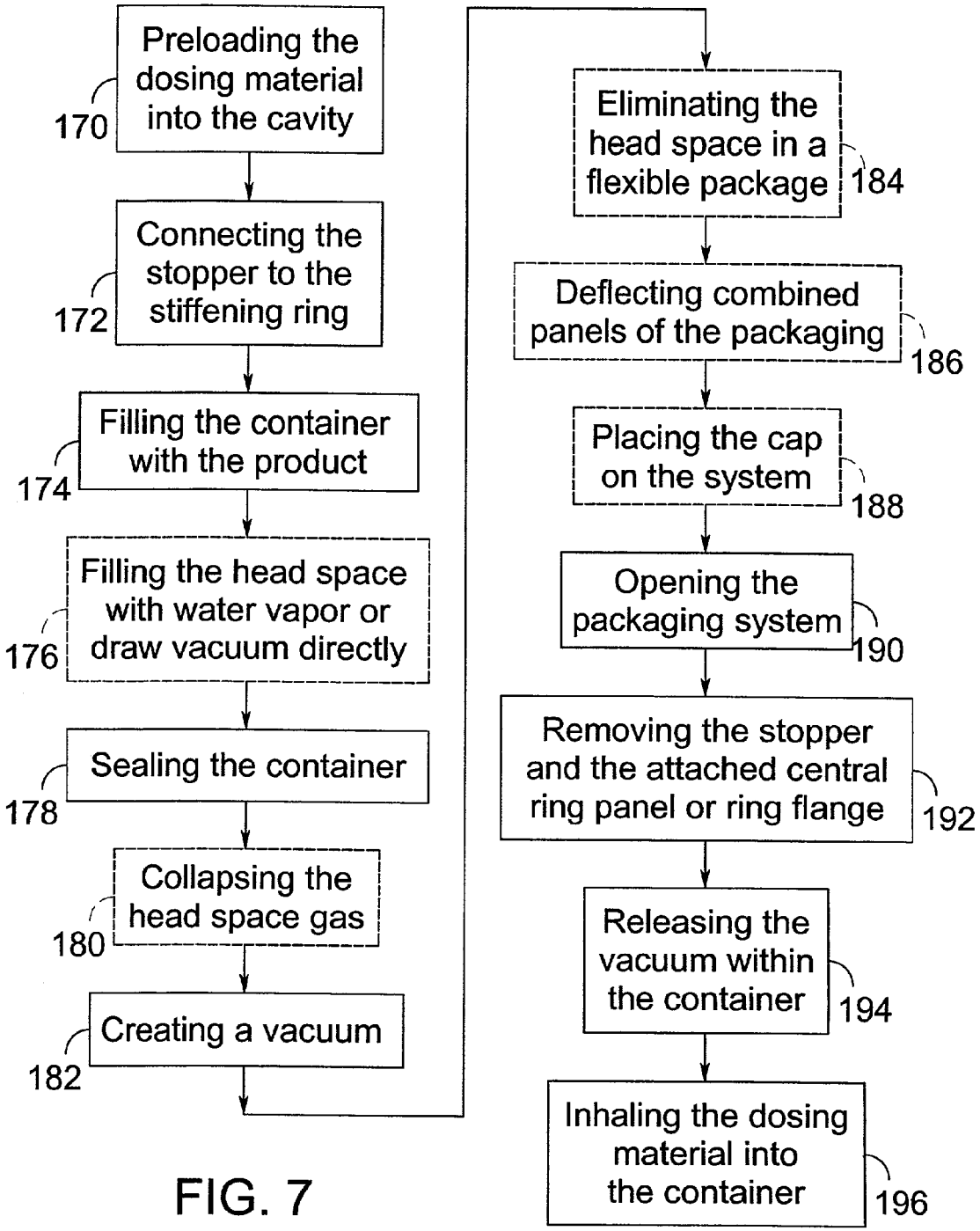

Preloading the dosing material into the cavity
170
Connecting the stopper to the stiffening ring
172
Filling the container with the product
174
Filling the head space with water vapor or draw vacuum directly
176
Sealing the container
178
Collapsing the head space gas
180
Creating a vacuum
182
Eliminating the head space in a flexible package
184
Deflecting combined panels of the packaging
186
Placing the cap on the system
188
Opening the packaging system
190
Removing the stopper and the attached central ring panel or ring flange
192
Releasing the vacuum within the container
194
Inhaling the dosing material into the container
196

FIG. 7

DECANTING AND DOSING CLOSURE SYSTEM

[0001] The present application is based on, and claims priority from, provisional application serial No. 60/300,254, filed Jun. 22, 2001, and is hereby incorporated herein by reference.

BACKGROUND OF INVENTION

[0002] The present invention relates to a packaging system, and more particularly to a decanting and dosing closure system.

[0003] As recognized in U.S. Pat. No. 3,458,076 to Babcock (the "Babcock reference"), in merchandising of certain products, it is frequently desirable to supply two companion products to the consumer in a single package that are kept separate until just before use. For example, some companion products can be kept for extended periods of time if kept separately, but lose certain desirable characteristics within a short period of time if they are combined. Another example is when the consumer would visually appreciate the reaction between the companion products as they are combined. The solution presented in the Babcock reference was a clever combination of a pair of containers in which the inner container telescoped within the outer container. When the closure that seals the combined packaging is opened, it forces the inner container to drop down completely within the outer container, thereby allowing the contents to combine.

[0004] U.S. Pat. No. 5,950,819 to Sellars (the "Sellars reference") is also directed to a container within a container solution. The Sellars reference is directed to a storage, admixing, and dispensing system in which a first vessel retains a first substance and a second vessel contains a second substance. A support structure including a resilient material push button is coupled to and seals the first vessel and the second vessel. By pushing the push button, the second vessel is released from the support structure, and pushed into the first vessel so that the first and second substances are combined.

[0005] U.S. Pat. No. 6,152,296 to Shih (the "Shih reference") describes an additive holder that offers an alternative solution to the problem of supplying two companion products to the consumer in a single package that are kept separate until just before use. Specifically, the Shih reference discloses a closing in which the user removes an end cap and depresses a handle to cause the additive to be mixed with the contents of the main bottle. Depressing the handle causes the bottom of the additive container to be pierced by the toothed neck of the tubular member so that the additive is released into the container.

[0006] Other references including U.S. Pat. No. 5,419,445 to Kaesemeyer, U.S. Pat. No. 5,246,142 to DiPalma et al., U.S. Pat. No. 5,772,017 to Kang, and U.S. Pat. No. 4,903,865 to Janowitz disclose similar solution to those discussed above.

[0007] Hot fill and hold is a method by which material is put into a container hot (e.g. temperature of 180° F.). The head space becomes filled with water vapor as the container is sealed or capped. Eventually, the head space gas condenses to water to eliminate the head space in a flexible container by distorting the walls or to create a vacuum (a negative internal pressure) in a rigid container. Certain flexible containers (e.g. those made of plastics, laminate films, and metal foils) and rigid containers (e.g. those made of glass or rigid metal) may be used for this process. This method of filling a container is particularly suitable for canning foods, sterilizing liquids for storage, sterilizing pharmaceuticals, or beverage packaging.

[0008] Another method by which material may be put into a container is a vacuum fill process. When using this process, the material is put into the container cold. The container is then sealed or capped under vacuum or negative pressure. As with the hot fill and hold method, the head space is eliminated in a flexible container by distorting the walls or a vacuum is created in a rigid container.

[0009] If a flexible container is not properly designed, the container deforms in unacceptable ways, both from an aesthetic and performance perspectives. Some flexible containers are made in panels so that the designer can predetermine where the container will collapse. Using panels also allows energy to be stored so that the head space can be recreated or restored when the container is opened.

[0010] There are many container production techniques now available. For exemplary purposes only, several container production techniques suitable to the present invention will be discussed individually.

[0011] In a standard blow molding production technique (also known as stretch blow molding), hot plastic in a hollow molten tube or "parison" is turned into a container. The two halves of a mold close on the hollow hot tube. Then a combination of mechanical stretching and/or compressed air blows up the parison like a balloon, forcing it outward to conform to the inside shape of the mold. After cooling, a hollow container emerges. Standard blow molding is particularly suitable for producing containers with small openings (5 mm-60 mm in diameter).

[0012] A blow and trim production technique may be used to create containers having bigger openings (greater than 70 mm). The process for stretch blow molding is the same as cited above with the modification that the top of the dome is cut off to create a large opening to the container. When using this process, a set of threads may be added to the container below the upper rim by molding them into the container rather than making the threads part of the original parison. As the second set of threads may be at a wider portion of the container, trimming the portion of the container just above the set of threads below the rim allows the creation of a container with a wide opening. If a container formed by stretch blow molding is to be used in a hot fill and hold process, the walls of the opening of the container must made thicker to prevent the container opening from collapsing under vacuum created by the hot fill and hold process. Another way to prevent the container opening from collapsing is to use a spin welding a ring of heavy material to the opening.

[0013] PET (Polyethylene Terepthalate, a polyester) and CPET (Crystalline PET or heat set PET) are products that can be used in blow molding and blow and trim production techniques. CPET, however, uses modified polymer and heated molds to create containers capable for maintaining their shape at elevated temperatures. The standard PET resin and production method uses a cold mold to form the container. This method is quick, but the resulting container

cannot withstand significant heat used in a hot fill and hold process. If the resulting container is allowed to cool slowly, the molecules become cross-linked or "crystallized."

[0014] A hot fill PET production technique that uses a heat set PET or CPET with a trim operation is similar to the standard CPET production technique except that the dome is cut off the container to produce a jar with a shoulder (as described in relation to the blow and trim production technique described above). Unlike a container blown from a parison, the opening can be larger and can contain less plastic. This lower plastic content makes the container cheaper, but weaker and, therefore, less able to resist distorting forces under hot fill or vacuum conditions.

[0015] Other processes that may be used to create containers include, but are not limited to, injection molding, can making, glass molding, glass blowing, plastic thermo forming, and plastic pressure forming.

BRIEF SUMMARY OF THE INVENTION

[0016] The present invention is directed to a packaging system that has several unique features or purposes that may be present alone or in combination including, but not limited to, dosing, providing an integral spoon or measuring device, using a stiffening ring, container reinforcement, and sieve decanting.

[0017] A closure system of the present invention preferably includes a flexible or rigid container having container mating surface, a stiffening ring having a first ring mating surface and a second ring mating surface, and a stopper having a stopper mating surface. The first ring mating surface is matable to the container mating surface and the second ring mating surface is matable to the stopper mating surface. In one preferred embodiment a dosing cavity is defined in the stopper mating surface. The container may be sealed to have inhalation energy stored therein. When the inhalation energy is released, dosing material within the dosing cavity is inhaled into the container. The inhalation energy is stored as inhalation means such as vacuum or the deflection of at least one panel of the container or the closure system.

[0018] The foregoing and other objectives, features, and advantages of the invention will be more readily understood upon consideration of the following detailed description of the invention, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0019] **FIG. 1** is a expanded view of one preferred embodiment of a decanting and dosing closure system including a container, a stiffening ring, a stopper, and a cap of the present invention.

[0020] **FIG. 2** is a cross-sectional view of one preferred embodiment of an assembled decanting and dosing closure system including a container, a stiffening ring, a stopper, and a cap of the present invention.

[0021] **FIG. 3** is an enlarged view of a first preferred embodiment of a stiffening ring, a stopper with threading, and a cap of the present invention, the stiffening ring having a partial cut-away to reveal its interior construction.

[0022] **FIG. 4** is an enlarged view of a second preferred embodiment of a stiffening ring and a hollow stopper without threading, the stopper having a partial cutaway to reveal its interior construction and the stiffening ring being shown in cross-section.

[0023] **FIG. 5** is an enlarged view of a third preferred embodiment of a stiffening ring and a solid stopper without threading, the stopper having a partial cut-away to reveal its interior construction and the stiffening ring being shown in cross-section.

[0024] **FIG. 6** is a flow chart showing an exemplary method for using the first preferred embodiment of **FIG. 3**.

[0025] **FIG. 7** is a flow chart showing an exemplary method for using the second and third preferred embodiment of **FIGS. 4 and 5**.

DETAILED DESCRIPTION OF THE INVENTION

[0026] The present invention is directed to a packaging system that has several unique features or purposes that may be present alone or in combination including, but not limited to, dosing (which may be accomplished by inhalation due to panel shape restoration or resitution or vacuum), providing an integral spoon or measuring device, using a stiffening ring, container reinforcement, and sieve decanting.

[0027] As shown in **FIGS. 1 and 2**, one preferred embodiment of the present invention includes the elements of a container **20** (e.g. jar, bottle, cup, glass, or other type of flexible or rigid holding package), a stiffening ring **22** (shown as **22***a* in **FIG. 3**, **22***b* in **FIG. 4**, and **22***c* in **FIG. 5**) a stopper **24** (shown as **24***a* in **FIG. 3**, **24***b* in **FIG. 4**, and **24***c* in **FIG. 5**), and a cap **26**. For certain features, some of these elements may be unnecessary. It is also possible that some of the elements may be combined. These elements are discussed individually.

[0028] A container **20** of the present invention, as shown in **FIGS. 1 and 2**, is meant to house "product"**30** such as food (e.g. fruit, yogurt, juices), medicine, liquids, solids, or slurries. It is also possible that the container **20** may be empty.

[0029] One preferred embodiment of a container **20** is a flexible container such as a blown plastic container **20** with walls **32** and a weaker bottom panel **34**. The bottom panel **34** is designed to be deflectable such that the condensation of water vapor at an elevated temperature to liquid water causes bottom panel **34** deflection as the headspace volume goes to zero upon cooling. This is significant because if the bottom panel **34** deflects, no distortion in the walls **32** is caused as the headspace volume goes to zero upon cooling.

[0030] The flexible container **20** may be constructed using such methods as standard blow molding, stretch blow molding, standard PET, hot fill PET, heat set PET, CPET, pressure, or thermoformed plastics, injection molding, and other processes developed to create flexible containers. Flexible containers **20** may also be made of alternative materials (e.g. rubber, laminated plastic, and metal foils) and by alternative methods.

[0031] The container **20** may be made of non-flexible or rigid material such as glass, metal, ceramic, or other rigid materials. A rigid container **20** may be used in embodiments

in which panel deflection is unnecessary or is not necessary because other elements of the system have sufficient deflection or a vacuum causes the container to inhale rather than panel shape restoration.

[0032] In one preferred embodiment, such as one to be used with the elements shown in **FIG. 3, a** set of left-handed threads **36***a* is constructed along the outer diameter of the lip of the container **20**. The left-handed threads **36***a* of the container **20** are designed to mate with the left-handed threads **36***b* of the stiffening ring **22**. With the embodiments shown in **FIGS. 4 and 5**, the direction of the threading **36***a*, **36***b*, may be irrelevant. Further, other types of removable connection means could be used to connect the container **20** to the stiffening ring **22** including, but not limited to threads, lugs, snap rings, or any other suitable sealing mechanism. Still further, in other embodiments, the stiffening ring may be part of the container or may be attached with permanent connection means.

[0033] **FIG. 3** shows a first preferred embodiment of a stiffening ring **22***a* and a stopper **24***a* that mate using thread connection means **38***a*, **38***b*.

[0034] The stiffening ring **22***a* is an actual ring with no central portion. The ring itself, in cross section, is shaped like an upside-down "U." In this embodiment there are two sets of threads: a set of right-handed threads **38***b* along the inner diameter of the inner "U" leg and a set of left-handed threads **36***b* along the inner diameter of the outer "U" leg. The set of right-handed threads **38***b* along the inner diameter of the inner "U" leg preferably has at least one dosing channel **40** defined substantially perpendicularly to the threads **38***b*. The left-handed threads **36***b* along the inner diameter of the outer "U" leg are designed to mate with the left-handed threads **36***a* of the container **20**. The right-handed threads **38***b* along the inner diameter of the inner "U" leg are designed to mate with the right-handed threads **38***a* of the stopper **24***a*.

[0035] The stopper **24***a* is shown as being shaped as an upside-down flattened top hat with a top portion and a brim. The outer diameter of the top portion of the top hat has a set of right-handed threads **38***a* defined thereon. The set of right-handed threads **38***a* along the outer diameter preferably has at least one dosing cavity **42** (for holding dosing material **43** (**FIG. 2**) such as medicine, essential fatty acids, active enzymes, powdered colors, aromas, flavors, or any labile ingredients, defined just above or in the threads **38***b*. The top surface of the top portion of the top hat, the "stopper panel"**44**, preferably is deflectable. This deflectable stopper panel **44** is designed to deflect such that energy is stored when a headspace gas collapses in a container, thus creating additional potential for inhalation into a zero headspace container as the container is opened and the panel shape prior to sealing is restored.

[0036] Using the embodiment of the stiffening ring **22***a* and stopper **24***a* shown in **FIG. 3**, the dosing material **43** is inhaled into product **30** in the container **20** when the channel **40** passes the cavity **42**. For the inhalation feature in this embodiment, it is important that the cavity **42** be askew from the channel **40** when the stiffening ring **22***a*/stopper **24***a* unit is assembled. Registration notches (not shown) or other mechanical means know in the industry may be used for this purpose.

[0037] **FIG. 4** shows a second preferred embodiment of a stiffening ring **22***b* and a stopper **24***b*.

[0038] The stiffening ring **22***b* in this embodiment, like the stiffening ring **22***a* in **FIG. 3**, is shaped like an upside-down "U." In addition, this embodiment of the stiffening ring **22***b* has a ring flange **46** with at least one breakaway feature **48**. The ring flange **46** is constructed annularly along the inner diameter of the of the inner diameter of the inner "U" leg. In this shown embodiment the inner diameter of the inner "U" leg **54***b* is smooth and is designed to mate with the outer diameter of the top portion **54***a* of the stopper **24***b*.

[0039] The stopper **24***b* is shown as being shaped as a hollow upside-down flattened top hat with a top portion, a brim, and a pull tab **49**. The outer diameter of the top portion **54***a* of the top hat is preferably smooth. The outer diameter **54***a* preferably has at least one dosing cavity **42** defined therein. The top surface of the top portion of the top hat, the "stopper panel"**44**, is preferably deflectable. It should be noted that this structure is particularly suitable for housing almost any type contents that, for exemplary purposes only, could be as diverse as a folded spoon, additional additives, or instructions for use.

[0040] When the stiffening ring **22***b* and stopper **24***b* are placed into mating relationship, they may be joined or integrated so as to form a single unit. This may be done through the use of an inductive seal, fusing, adhesive, pressure fitting, and sonic welding. In the shown embodiment, the outer diameter **54***a* of the top portion **54***a* of the stopper **24***b* may be integrated with a portion of the inner diameter of the inner "U" leg **54***b* of the stiffening ring **22***b* to seal off the dosing cavity **42** from external contamination. In other words, only the portion of the inner diameter of the inner "U" leg **54***b* substantially adjacent to the dosing cavity **42** is attached. Also, in the shown embodiment, the outer diameter of the stopper panel **44** of the stopper **24***b* may be integrated with the upper surface of the ring flange **46** of the stiffening ring **22***b*. When the pull tab **39** is pulled, the breakaway feature **48** causes the ring flange **46** to disengage from the stiffening ring **22***b* and be removed with the entire stopper **24***b*.

[0041] In one preferred embodiment, when the stiffening ring **22***b* and stopper **24***b* are an integral unit, the dosing cavity **42** is positioned to be in relatively close relationship with the at least one breakaway feature **48**. The proximity of dosing cavity **42** to the breakaway feature **48** causes the dosing material **43** to be inhaled as the ring flange **46** breaks off the stiffening ring **22***b*.

[0042] In one preferred embodiment, when the stiffening ring **22***b* and stopper **24***b* are an integral unit, the ring flange **46** still allows the stopper panel **44** to deflect such that energy is stored when a headspace gas collapses in a container, thus creating additional potential for inhalation into a zero headspace or vacuum headspace container as the container is opened.

[0043] **FIG. 5** shows a third preferred embodiment of a stiffening ring **22***c* and a stopper **24***c*.

[0044] The stiffening ring **22***c* in this embodiment has a central ring panel **50** or diaphragm with at least one breakaway feature **52**. In one preferred embodiment, this central ring panel **50** is deflectable. The ring itself, in cross section, is shaped like an upside-down "U" and the central ring panel **50** extends completely within the inner diameter of the of the inner "U" leg. In this embodiment the inner diameter of the

inner "U" leg **54***b* is smooth and is designed to mate with the outer diameter of the top portion **54***a* of the stopper **24***c*.

[**0045**] The stopper **24***c* is shown as being shaped as a solid upside-down flattened top hat with a top portion, a brim, and a pull tab **49**. The outer diameter of the top portion **54***a* of the top hat is preferably smooth. The outer diameter **54***a* preferably has at least one dosing cavity **42** defined therein. The top surface of the top portion of the top hat, the "stopper panel"**44**, preferably is deflectable.

[**0046**] When the stiffening ring **22***c* and stopper **24***c* are placed into mating relationship, they may be joined or integrated so as to form a single unit. This may be done through the use of an inductive seal, fusing, adhesive, pressure fitting, and sonic welding. In the shown embodiment, the outer diameter **54***a* of the top portion **54***a* of the stopper **24***c* may be integrated with a portion of the inner diameter of the inner "U" leg **54***b* of the stiffening ring **22***c* to seal off the dosing cavity **42** from external contamination. Also, in the shown embodiment, the outer diameter of the stopper panel **44** of the stopper **24***c* may be integrated with the upper surface of the central ring panel **50** of the stiffening ring **22***c*. When the pull tab **39** is pulled, the breakaway feature **53** causes the central ring panel **50** to disengage from the stiffening ring **22***c* and be removed with the entire stopper **24***c*.

[**0047**] In one preferred embodiment, when the stiffening ring **22***c* and stopper **24***c* are an integral unit, the dosing cavity **42** is positioned to be in relatively close relationship with the at least one breakaway feature **52**. The proximity of dosing cavity **42** to the breakaway feature **52** causes the dosing material **43** to be inhaled as the central ring panel **50** breaks off the stiffening ring **22***c*.

[**0048**] In one preferred embodiment, when the stiffening ring **22***c* and stopper **24***c* are an integral unit, the central ring panel **50** still allows the stopper panel **44** to deflect such that energy is stored when a headspace gas collapses in a container, thus creating additional potential for inhalation into a zero headspace or vacuum headspace container as the container is opened.

[**0049**] It should be noted that alternative embodiments of the stopper **24***a*, **24***b*, **24***c* could have part or all of the upper portion filled so that it is a solid unit (**FIG. 5**), partially filled (not shown) with ribbing, braces, or support structure to reinforce the outer diameter **54***a*, or hollow (**FIG. 4**).

[**0050**] It should be noted that some of the elements of the embodiments shown in FIGS. **3-5** are described in a single manner for convenience. For example, the "left-handed" and "right-handed" threads of **FIG. 3** could have been reversed (and their mating surfaces similarly reversed). Further, although the threads are shown as continuous threads, alternative embodiments could use lugs or retaining snaps. Similarly, as shown in the embodiments of **FIGS. 4 and 5**, in some embodiments threads are not needed and press-fitting, adhering, gasketing, or integral construction could be used in place of the threads.

[**0051**] One feature provided by the stiffening ring **22** is that it allows the container **20** to be blown lighter than would otherwise be possible, thereby creating a cost savings. It also provides an improved lip that assists in the decanting of liquid.

[**0052**] A cap **26** is also included in one preferred embodiment of the present invention. The cap **26** may have an indent suitable to accommodate "cap contents" such as a spoon, folded spoon **60**, measuring device, prize, or any desired content. A label or seal may be placed over the indent to keep the contents therein clean. It should be noted that in alternative embodiments the cap **26** contents could be placed between the cap **26** and the stopper **24**. It should also be noted that the cap **26** and the stopper **24** may be an integral unit. As shown in **FIGS. 4 and 5**, a cap **26** may be omitted entirely.

[**0053**] One of the primary features of the present invention is dosing through the use of inhalation by panel restoration or vacuum. If dosing is a desired feature, dosing material **43** is preloaded into the dosing cavity **42**. Opening the system by removing the stopper **24** causes the system to "inhale" the dosing material **43** into the container **20** where the dosing material **43** can mix with the product **30** therein.

[**0054**] **FIGS. 6 and 7** show two exemplary methods through which the methods of the present invention could be implemented. These methods are meant to be exemplary and are not meant to limit the scope of the invention. For example, steps shown in phantom are considered optional.

[**0055**] Using the embodiment shown in **FIG. 3** according to the process shown in **FIG. 6**, the dosing material **43** is preloaded **70** into the dosing cavity **42**. The stopper **24***a* is then connected **72** to the stiffening ring **22***a* using the mating right-handed threads **38***a*, **38***b*. Although not shown in phantom, it should be noted that these steps may be optional if the dosing material **43** came preloaded in a pre-configured stopper **22***a*/stiffening ring **24***a* unit.

[**0056**] The container **20** is filled **74** with the product **30**. In the preferred embodiment of **FIG. 6**, the product **30** is hot when it is placed in the container **20** because this embodiment anticipates the use of the hot and hold method. An outside source of steam removes then all non-condensable gases **76** thereby filling the head space with water. This step is shown as optional because a vacuum could also be drawn directly.

[**0057**] The container is then capped or sealed **78** so as to create a vacuum within the container **20**. As set forth above, vacuum may be created using methods such as the hot fill and hold method or a vacuum fill may be used **76**. In the shown embodiment of **FIG. 6**, the hot fill and hold method is used. Then the product **30** is sealed in the container **20** using the combined stopper **24**a/stiffening ring **22***a*. It should be noted that other methods or apparatus could be used to seal the container **20**. Eventually, the head space gas collapses **80** to water to create **82** a vacuum and/or eliminate **84** the head space in a flexible container. The deflection **86** of the bottom panel **34** of the container **20** and the deflectable stopper panel **44** of the stopper **24***a* "stores energy" and helps increase the vacuum pressure. It should be noted, however, deflection is optional and rigid components may be used.

[**0058**] The cap **26** may be placed **88** on the combined stopper **24***a*/stiffening ring **22***b* prior to combination being attached to the container **20**, after the combination is attached to the container **20**. The cap **26** may be fused, press fitted, adhered, welded, or otherwise connected to the stopper **24***a*. Alternate embodiments could eliminate the cap **26**

or make the cap **26** and stopper **24***a* an integral unit. As mentioned above, in the preferred embodiment of **FIG. 3**, the left-handed threads **36***b* along the inner diameter of the outer "U" leg are designed to mate with the left-handed threads **36***a* of the container **20**. When the product is placed in the container **20**, the stiffening ring **22***a* mates to the container **20**"left-handed." The consumer, however, would not normally open a container **20** left-handed. Accordingly, when the consumer attempted to open the container **20** right-handed, only the stopper **24***a* (and possibly the cap **26**) can unscrew.

[**0059**] When the consumer opens **90** the packaging system using the right-handed threading **38***a*, **38***b*, the dosing channel **40** would pass **92** the dosing cavity **42**. The vacuum or stored energy of the deflected panel **34** within the container **20** is released **94** as the dosing cavity **42** passes the dosing channel **40**. A dose of a precise small quantity the dosing material **43** is inhaled **96** into the container **20** by the vacuum which is released as the dosing cavity **42** passes the dosing channel **40**. The opening of the closure is intuitive to the consumer; i.e., little or no training or instructions are necessary.

[**0060**] Using the embodiment shown in **FIG. 4** according to the process shown in **FIG. 7**, the dosing material **43** is preloaded **170** into the dosing cavity **42**. The stopper **24***b* is then connected **172** to the stiffening ring **22***b* by insertion and fusing. In one preferred embodiment, when the stiffening ring **22***b* and stopper **24***b* are an integral unit, the dosing cavity **42** is positioned to be in relatively close relationship with at least one breakaway feature **52**. Further, in one preferred embodiment the process of fusing also at least partially attaches the central ring panel **50** to the stopper panel **44**.

[**0061**] Next, container **20** is filled **174** with the product **30**. In the preferred embodiment of **FIG. 7**, the product **30** is hot when it is placed in the container **20** because this embodiment anticipates the use of the hot and hold method. An outside source of steam removes then all non-condensable gases **176**. As set forth above, vacuum may be created using methods such as the hot fill and hold method or vacuum fill. In the preferred embodiment of **FIG. 7**, the hot fill and hold method is used.

[**0062**] The container is then sealed **178** so as to create a vacuum within the container. Then the product **30** is sealed in the container **20** using the combined stopper **24***b*, **24***c*/ stiffening ring **22***b*, **22***c*. It should be noted that other apparatus could be used to seal the container **20**. Eventually, the head space gas collapses **180** to water to create **182** a vacuum and/or eliminate **184** the head space in a flexible container. The deflection **186** of the bottom panel **34** of the container **20** and the combined deflectable stopper panel **44** and central ring panel **50**"stores energy" and helps increase the vacuum pressure. It should be noted, however, deflection is optional and rigid components may be used.

[**0063**] The cap **26** may be placed **188** on the combined stopper **24***b*, **24***c*/stiffening ring **22***b*, **22***c* prior to combination being attached to the container **20**, after the combination is attached to the container **20**. The cap **26** may be fused, press fitted, adhered, welded or otherwise connected to the stopper **24***b*, **24***c*. Alternate embodiments could eliminate the cap **26** or make the cap **26** and stopper **24***b*, **24***c* an integral unit.

[**0064**] In one preferred embodiment, when the stiffening ring **22***b*, **22***c* and stopper **24***b*, **24***c* are an integral unit, the dosing cavity **42** is positioned to be in relatively close relationship with at least one breakaway feature **48**, **52**. Once the stiffening ring **22***b*, **22***c* and stopper **24***b*, **24***c* are an integral unit, the combination of the central ring panel **50** and the stopper panel **44** is designed to deflect such that energy is stored when a headspace gas collapses in a container, thus creating additional potential for inhalation into a zero headspace container as the container is opened.

[**0065**] When the consumer opened **190** the packaging system by removing the stopper **24***b*, the attached central ring panel **50** (which is attached to the stopper panel **44**) would also be removed **192**. Because the breakaway feature **52** would be preferably positioned in relatively close relationship to the dosing cavity **42**, the central ring panel **50** would first come apart near the dosing cavity **42** so as to create the strongest inhalation possible therenear. The vacuum within the container **20** is released **194** as the central ring panel **50** is removed. A dose of a precise small quantity the dosing material **62** is inhaled **196** into the container **20** by the vacuum which is released as the central ring panel **50** is removed. The opening of the closure is intuitive to the consumer; i.e., little or no training or instructions are necessary.

[**0066**] As mentioned above, the features of the invention may be present alone or in combination. Accordingly, embodiments that are not meant to perform a particular function may not have the elements necessary to perform that function. For example, if the dosing function was not desired, the dosing channel and dosing cavity **42** would not be necessary. Another example is if the contents of the container **20** are not meant to be eaten using a spoon, the spoon would not be included. Yet another example is that if the vacuum feature was not to be used or if there was enough deflection in the stopper panel **44**, then the bottom panel **34** would not have to be flexible or, if there was enough deflection in the bottom panel **34**, then the stopper panel **44** would not have to be flexible.

[**0067**] It should also be noted that alternate embodiments may be modified without affecting the scope of the invention. For example, the container **20** may be any size or shape. Another example is that the dosing cavity **42** and dosing channel **40** may be positioned on alternate components. Accordingly, in the structure shown and discussed herein, the dosing cavity **42** may be positioned on the stiffening ring **22** and the dosing channel **40** may be positioned on the stopper **24**. Further, alternate embodiments could have the functions of the stiffening ring **22** provided by the container **20** itself. For example, the dosing channel may be on an inner surface of the lip of the container **20**.

[**0068**] The terms and expressions that have been employed in the foregoing specification are used as terms of description and not of limitation, and are not intended to exclude equivalents of the features shown and described or portions of them. The scope of the invention is defined and limited only by the claims that follow.

What is claimed is:

1. A dosing closure system for maintaining a small quantity of dosing material separate from products in a container, the opening of said container causing said dosing material to enter said product, said system comprising:

(a) closure means for sealing said container;

(b) a dosing cavity defined between said container and said closure means;

(c) said dosing cavity for holding said dosing material; and

(d) inhalation energy stored within said container when said closure means seals said container;

(e) wherein said dosing material is inhaled into said container when said inhalation energy is released by said opening of said container.

2. The system of claim 1, wherein said inhalation energy is stored as an inhalation means, wherein said inhalation means is at least one inhalation means selected from the group consisting of:

(a) deflection of at least one panel of said container;

(b) deflection of at least one panel of said closure means;

(c) panel restoration; and

(d) vacuum.

3. The system of claim 1, said closure means comprising:

(a) a stiffening ring; and

(b) a stopper;

(c) wherein said dosing cavity is defined between said stiffening ring and said stopper.

4. The system of claim 3, wherein said dosing cavity is defined in said stopper.

5. The system of claim 3, wherein said dosing cavity is defined in said stiffening ring.

6. A closure system, said system comprising:

(a) a container having container mating surface;

(b) a stiffening ring having a first ring mating surface and a second ring mating surface;

(c) a stopper having a stopper mating surface;

(d) said first ring mating surface matable to said container mating surface; and

(e) said second ring mating surface matable to said stopper mating surface.

7. The system of claim 6 further comprising a cap.

8. The system of claim 6, wherein said container is rigid.

9. The system of claim 6, wherein said container is flexible.

10. The system of claim 6 further comprising:

(a) a dosing channel defined in said second ring mating surface;

(b) a dosing cavity defined in said stopper mating surface;

(c) said dosing cavity for holding dosing material separate from product in said container;

(d) said container having inhalation energy stored therein;

(e) wherein said inhalation energy is released when said dosing channel comes into contact with said dosing cavity and causes said dosing material to be inhaled into said container.

11. The system of claim 10, wherein said inhalation energy is stored as an inhalation means, wherein said inhalation means is at least one inhalation means selected from the group consisting of:

(a) deflection of a bottom panel of said container;

(b) deflection of at least a portion of said stopper;

(c) deflection of a wall of said container;

(d) panel restoration; and

(e) vacuum.

12. The system of claim 6 further comprising:

(a) said stiffening ring having an annular ring flange along said second ring mating surface;

(b) at least one breakaway feature defined substantially between said annular ring flange and said ring mating surface;

(c) a dosing cavity defined in said stopper mating surface;

(d) said dosing cavity for holding dosing material separate from product in said container;

(e) said container having inhalation energy stored therein;

(f) wherein said inhalation energy is released when said breakaway feature is broken, thereby causing said dosing material to be inhaled into said container.

13. The system of claim 12, wherein said inhalation energy is stored as an inhalation means, wherein said inhalation means is at least one inhalation means selected from the group consisting of:

(a) deflection of a bottom panel of said container;

(b) deflection of at least a portion of said stopper;

(c) deflection of a wall of said container;

(d) panel restoration; and

(e) vacuum.

14. The system of claim 6 further comprising:

(a) said stiffening ring having a central ring panel defined within said second ring mating surface;

(b) at least one breakaway feature defined substantially between said central ring panel and said ring mating surface;

(c) a dosing cavity defined in said stopper mating surface;

(d) said dosing cavity for holding dosing material separate from product in said container;

(e) said container having inhalation energy stored therein;

(f) wherein said inhalation energy is released when said breakaway feature is broken, thereby causing said dosing material to be inhaled into said container.

15. The system of claim 14, wherein said inhalation energy is stored as an inhalation means, wherein said inhalation means is at least one inhalation means selected from the group consisting of:

(a) deflection of a bottom panel of said container;

(b) deflection of at least a portion of said stopper;

(c) deflection of a wall of said container;

(d) panel restoration; and

(e) vacuum.

16. The closure system of claim 6, further comprising:

(a) said first ring mating surface and said container mating surface having first-directional mating means for first-directional mating therebetween; and

(b) said second ring mating surface and said stopper mating surface having second-directional mating means for second-directional mating therebetween.

17. The closure system of claim 16, wherein said mating means are threads.

18. The closure system of claim 16, wherein said first-directional mating is left-handed and said second-directional mating is right-handed.

19. The closure system of claim 16, wherein said first-directional mating is right-handed and said second-directional mating is left-handed.

20. A dosing closure system for maintaining a small quantity of dosing material separate from products in a container, the opening of said container causing said dosing material to enter said product, said system comprising:

(a) said container having container mating surface;

(b) a first mating surface associated with said container;

(c) a second mating surface associated with a stopper;

(d) a dosing cavity defined in said second mating surface;

(e) said dosing cavity for holding said dosing material; and

(f) said container having inhalation energy therein when said first mating surface is mated to said second mating surface;

(g) wherein said dosing material is inhaled into said container when said inhalation energy is released.

21. The system of claim 20, wherein said inhalation energy is stored as an inhalation means, wherein said inhalation means is at least one inhalation means selected from the group consisting of:

(a) deflection of a bottom panel of said container;

(b) deflection of said stopper;

(c) deflection of a wall of said container;

(d) panel restoration; and

(e) vacuum.

22. The system of claim 20 further comprising a dosing channel defined in said first mating surface, wherein said dosing material is inhaled into said container when said inhalation energy is released by said dosing channel contacting said dosing cavity.

23. A method for using a dosing closure system, said system comprising the steps of:

(a) providing a container;

(b) providing a first closure surface associated with said container;

(c) providing a closure system having a second closure surface for removably mating with said first closure surface;

(d) defining a dosing cavity within said second closure surface;

(e) removably interconnecting said first closure surface with said second closure surface to seal said container; and

(f) creating inhalation energy within said container.

24. The method of claim 23 further comprising the steps of:

(a) preloading dosing material into said dosing cavity; and

(b) filling said container with product.

25. The method of claim 23 further comprising the steps of:

(a) preloading dosing material into said dosing cavity;

(b) filling said container with product;

(c) opening said dosing closure system;

(d) releasing said inhalation energy; and

(e) inhaling said dosing material into said container.

26. The method of claim 23 wherein said step of providing a first closure surface associated with said container further comprises the steps of:

(a) providing a stiffening ring having said first closure surface; and

(b) mating said stiffening ring with said container.

27. The method of claim 23 wherein said step of providing a closure system further comprises the steps of providing a stopper.

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