A cap for a container includes a depressible structure arranged such that, when the depressible structure is depressed, the depressible structure applies force onto a first compartment, thereby rupturing the first compartment and dispensing a first ingredient into a second compartment of the container. The depressible structure can include a pliant material. Also described is a solid material shaped to concentrate force applied by the depressible structure at a first location of the first compartment to facilitate rupturing the first compartment. Additionally described is an ingredient that includes an effervescent material.
CAP AND INGREDIENT FOR
MULTI-COMPARTMENT CONTAINER
CROSS-REFERENCE TO RELATED
APPLICATIONS

[0001] This application claims priority to U.S. provisional
application Ser. No. 61/757,528, titled "CAP AND INGREDIENT
FOR TWO-COMPARTMENT CONTAINER," filed
Jan. 28, 2013 which is hereby incorporated by reference in its
entirety.

BACKGROUND

[0002] 1. Field of Invention

[0003] This techniques described herein relate to multi-
compartment containers that can maintain similar or dissimi-
lar ingredients in separate compartments until such time as
the consumer, clinician or other user chooses to blend the
ingredients. The techniques described herein relate in particular
to a cap or enclosure mechanism that can be placed on a
container to create a multi-compartment container. The multi-
compartment container keeps various ingredients separate
until the consumer, clinician or other user activates or deploys
the mechanism and introduces the ingredients in the cap to the
ingredients in the container.

[0004] 2. Discussion of the Related Art

[0005] Packages have been developed to keep ingredients
separated from a second set of ingredients until the consumer
desires to mix them. This can be useful in cases where one
ingredient would react with another ingredient and affect
the usefulness or the characteristic of either the dry or liquid
ingredient. Beverages and bottle caps have been described
having two compartments for maintaining such a separation.

[0006] Various cap enclosures and dual compartment con-
tainers have been described in which a set of dry ingredients
is released into a set of liquid ingredients.

[0007] The concept of a removable seal is outlined in U.S.
Pat. Nos. 5,000,314 and 5,370,222. This concept requires a
user to separate the two compartments from one another prior
to releasing one component into a second. Other devices can
be used in a manner where ingredients can be mixed without
opening the container and exposing either dry or liquid ingre-
dients to the environment or the consumer.

[0008] Some early interactive dispensing systems for
bottles have used bottle caps with a compartment that is
partially defined by a depressible plunger that can create an
opening to the bottle when pressed and allow dry materials
to fall into a liquid. This idea was described in U.S. Pat. No.
2,813,649, as well as U.S. Pat. No. 4,315,570, U.S. Pat. No.
4,865,189, U.S. Pat. No. 5,417,321, U.S. Pat. No. 5,863,126,

[0009] The plunger that creates an opening often has prob-
lems associated with seepage of liquid or moisture into the
dry compartment and the use of a rubber stopper or seal
was developed to help overcome the tight tolerances needed
during manufacture of such a cap/enclosure compartment. U.S.
Pat. Nos. 3,924,741 and 4,727,985 describe the use of rubber
stoppers at the end of a depressible plunger.

[0010] Even with improvements in manufacturing capa-
bilities, many of these devices could not keep ingredients of
the cap enclosure from being exposed to moisture from the
liquid ingredients in the bottle. There were then developed
packages having a seal between the cap and the bottle, where
the plunger would break open or puncture the frangible seal
and allow the dry ingredients into the bottle. Early develop-
ments are described in U.S. Pat. No. 3,156,369, U.S. Pat. No.
3,404,811, and U.S. Pat. No. 3,406,872. More recent develop-
ments are described in U.S. Pat. No. 6,152,296, U.S. Pat.
No. 6,435,341 and U.S. published patent application 2010/
0200437.

to pierce a frangible seal. Alternatively, a depressible dome
could be used to push a frangible layer against the cutting
layer to break a seal and release a dry tablet into a liquid, as
shown in U.S. Pat. No. 6,679,375.

[0012] However, these developments led to the knowledge
that typical cap enclosure materials do not prevent moisture
from penetrating the material and entering the dry material
compartment. This resulted in the use of foils which may be
imperious to moisture and oxygen.

[0013] U.S. Pat. No. 4,103,772, U.S. Pat. No. 4,757,916,
U.S. Pat. No. 6,513,650, and U.S. Pat. No. 6,786,330 dem-
onstrate a foil seal that is broken by puncture.

[0014] As an alternative to plunger type dispensing caps,
screw caps that open doors or cut membrane seals have been
described. One development was a trap door type dispensing
system that is opened upon a screwing action of the cap. This
is described in U.S. Pat. No. 4,793,475, U.S. Pat. No. 5,419,
445, U.S. Pat. No. 5,839,573, U.S. Pat. No. 6,113,257 and
U.S. Pat. No. 6,820,740.

[0015] Similar to the seal piercing plunger cap enclosures,
there are screw caps that cut a frangible seal upon twisting a
7,427,005 demonstrate this concept.

[0016] A more elegant engineering design allows the use of
pressure to break a frangible seal. The use of this design in a
cap enclosure to create a two compartment cap/bottle pack-
age is shown in U.S. Pat. No. 2,487,236. Other patents, such
as U.S. Pat. No. 3,415,360, have built on this design using
built in constructs to help focusing where the pressure is
located. Other similar patents describe multiple chambers for
holding several different ingredients, as shown in U.S. Pat.
5,884,759 shows a design in which the dry ingredient com-
partment is made part of the bottle instead of the cap enclo-
sure.

[0017] Yet as with the plunger caps enclosures, it was dis-
covered that many materials do not prevent moisture from
penetrating into the dry compartment. This led to develop-
ment of pressure release compartments that used a foil seal or
an entire compartment created by a metal foil. Patent docu-
ments describing using foil compartments that use pressure
include U.S. Pat. No. 3,762,540, U.S. Pat. No. 6,386,358,
U.S. Pat. No. 8,016,104, and U.S. published patent application
2012/0067901. With respect to bottle enclosures, a dispens-
ing cap is described in U.S. published patent application
2006/0070996.

[0018] Tablets in bottle caps have been described in several
of the above patents, including U.S. Pat. No. 2,487,236,
which shows a diagram of a pellet that breaks through a
frangible layer due to external pressure. But little is described
of the tablet’s nature or shape that would make it useful in
breaking a frangible layer or in dissolving or interacting with
the liquid in the second compartment.

SUMMARY

[0019] Some embodiments relate to a cap for a container.
The cap includes a cap body structured to attach the cap to the
container. The cap body includes a first material. The cap also includes a first compartment for a first ingredient. The cap further includes a depressible structure arranged such that, when the depressible structure is depressed, the depressible structure applies force onto the first compartment, thereby rupturing the first compartment and dispensing the first ingredient into a second compartment of the container. The depressible structure includes a second material more pliant than the first material.

[0030] FIG. 5 shows a compartment 5 for containing an ingredient, such as a tablet 13 having a diamond shape.

DETAILED DESCRIPTION

[0031] Described herein is an improved cap and a multi-compartment container (e.g., a two-compartment container) formed by attaching the cap to the container. In some embodiments, the cap includes a cap body, a compartment for an ingredient to be dispensed, and a depressible structure of a material that is more pliant than the cap body. When the depressible structure is depressed, it applies force onto the compartment, thereby rupturing the compartment and dispensing the ingredient into a second compartment of the container. Such a structure can improve the ease of use for the consumer by making the depressible structure easy for a person to push.

[0032] FIG. 1 shows a cap for a container, according to some embodiments. The cap may be designed to attach to any suitable type of container, such as a bottle, package, pouch, carton, jar, pack, box, can, or any other type of container. The techniques described herein are not limited to the type of container to which the cap is designed to attach. In some embodiments, the container may contain any type of ingredient. In some embodiments, the ingredient may be liquid (e.g., water) or any other type of wet ingredient that may be consumed by a person, for example. However, the techniques described herein are not limited as to the ingredient(s) included in the container and/or the cap.

[0033] As shown in FIG. 1, the cap has a cap body 2 and a depressible structure 1. As shown in FIG. 1, the depressible structure 1 may be bonded to the cap body 2. The depressible structure 1 and the cap body 2 may overlap to ensure a strong bond and reduce or eliminate any leaks between the two structures.

[0034] The cap body 2 may be formed by relatively rigid material and may include attachment structures 12 designed to attach the cap to a container. Attachment structures 12 may provide a strong seal with the container to prevent leakage. Attachment structures 12 may include threads for allowing the cap to be screwed onto the container, plug seals, tamper rings, and/or any other suitable cap attachment features. The techniques described herein are not limited as to the attachment structures 12 used to attach the cap to the container. In some embodiments, the cap body 2 may be formed of a relatively hard, rigid plastic material, such as polypropylene, polyethylene, polyvinyl chloride or polyester, by way of example. However, the techniques described herein are not limited to particular materials for cap body 2.

[0035] In some embodiments, the depressible structure 1 may be formed of a material that is more pliant than that of the cap body 2. In some embodiments, the depressible structure 1 may be formed of a plastic material, e.g., a soft plastic material, such as a vulcanizate or elastomer of plastic. For example, in some embodiments the soft plastic material may be a vulcanizate or elastomer of the plastic forming the cap body 2, such as a vulcanizate or elastomer of polypropylene, polyethylene, polyvinyl chloride or polyester. In some embodiments, the cap body 2 and/or the depressible structure 1 may be formed of a material other than plastic, as the techniques described herein are not limited to particular materials for depressible structure 1 and cap body 2.

[0036] FIG. 2 shows a compartment 5 that may be included in the cap and which may contain an ingredient 6 that may be dispensed, such as a liquid or a moisture-sensitive dry ingredient, for example. Ingredient 6 may be a single ingredient or a blend of different ingredients. The ingredient 6 may include any type of ingredient that may be consumable by a person,
including moisture-sensitive freeze-dried components such as live organisms in stasis (e.g., bacteria, yeast) and/or vitamins, amino acids, herbs, etc., by way of example. In some embodiments, the ingredient 6 may include one or more components designed to be consumed to enhance the health of a person. However, the techniques described herein are not limited as to the type of materials included in ingredient 6.

Further, the techniques described herein are not limited as to the shape or consistency of the ingredient 6, as ingredient 6 may be provided in any suitable form such as a tablet and/or a powder, for example.

[0037] As shown in FIG. 2, the compartment 5 may provide an enclosure with one or more barrier layers that protects the ingredient 6 from moisture and/or oxygen in the container or the environment. The enclosure may be formed of a structure that may be referred-to as a “blister.” FIG. 2 shows that the barrier structure may include a lower barrier layer 4 and an upper barrier layer 3. The upper and lower barrier layers may be bonded together, as illustrated in FIG. 2, to form an enclosure that is protected from moisture and/or oxygen and/or another gas or gaseous compound. In some embodiments, lower barrier layer 4 and/or upper barrier layer 3 may include a metal foil (e.g., aluminum foil) which may be optionally coated with any number of lacquers and/or a plastic layer(s). The upper barrier layer 3 may be shaped, as it may include soft foil and/or plastic layers that ensure the foil does not break when stretched into a shape. In some embodiments, the upper barrier layer 3 may have a dome shape, as shown in FIG. 2. The lower barrier layer 4 may be a sheet of foil to make it easier to rupture. The lower barrier layer 4 may be protected with one or more lacquer layers so that the lower barrier layer 4 remains fragile and also provides a protective barrier from any environmental conditions such as moisture and/or oxygen and/or another gas or gaseous compound in the container does not degrade, through oxidation or other process, the metal foil and compromise the integrity of the compartment 5. In some embodiments, the lower barrier layer 4 may include a plurality of lacquer layers and/or laminates to improve protection from such conditions.

[0038] FIG. 3 illustrates the cap of FIG. 1 including the compartment 5 of FIG. 2. As shown in FIG. 3, the compartment 5 may fit within the cavity formed by the depressible structure 1 (e.g., a domed cavity). The compartment 5 may be bonded to the cap body 2 at a flat area 7 of the cap body, for example. As shown in FIG. 3, the depressible structure 1 may mimic the shape of the compartment 5 to minimize the amount of air between the enclosure 5 and the depressible structure 1 and create additional pressure to burst the lower barrier layer 4 when the depressible structure 1 is depressed.

[0039] As shown in FIG. 4, when the cap is attached to the container 11, a two-compartment container is formed. Applying pressure 8 to the depressible structure 1 depresses the depressible structure 1 and applies force onto the compartment 5, causing the fragile lower barrier layer 4 to rupture and dispense the ingredient 6 into another compartment of the container 11. The rupturing of the lower barrier layer 4 is illustrated by the ruptured region 9 in FIG. 4. The ingredient 6 may be dispensed into the liquid or other ingredient 10 without requiring opening the bottle or removing the cap in any way. When the liquid or other ingredient 10 and the ingredient 6 are combined, the resulting product (e.g., a consumable beverage) may then be ready for consumption.

[0040] In some embodiments, the ingredient 6 may be included in a solid material (e.g., a tablet or other vehicle) that is shaped to concentrate pressure at a location on the lower barrier layer 4 of compartment 5. In some embodiments, the solid material may be shaped to concentrate pressure at one point on the lower barrier layer 4 so that the lower barrier layer 4 will rupture in the middle in a highly repeatable manner. Such a design can prevent a problem whereby the ingredient 6 may be held up in the cap instead of being dispensed into the container 11, as designed. One example of a suitable shape for the solid material to concentrate pressure at a point is a diamond shape. FIG. 5 illustrates a compartment 5 including a tablet 13 having a diamond shape, according to some embodiments. In some embodiments, the solid material may have a diamond shape, an anvil shape, or any other shape with an angled, sharp edge. However, the techniques described herein are not limited in this respect, as a solid material of any suitable shape or a powder may be used as a vehicle for the ingredient 6.

[0041] In some embodiments, the ingredient 6 may include an effervescent material that effervesces when released into the liquid of the container. This may allow a person to know when the ingredient 6 has been added to the ingredient of the container, 11, and may create a unique appearance. In many cases an effervescent material may include calcium carbonate. However, any suitable type of effervescent material may be used. In some embodiments, an effervescent material may be included in the shaped material (e.g., a tablet) that has an angled, sharp edge to facilitate rupturing the compartment 5. Such an ingredient may be used in combination with the above-described depressible structure.

[0042] Various aspects of the present invention may be used alone, in combination, or in a variety of arrangements not specifically discussed in the embodiments described in the foregoing and is therefore not limited in its application to the details and arrangement of components set forth in the foregoing description or illustrated in the drawings. For example, aspects described in one embodiment may be combined in any manner with aspects described in other embodiments.

[0043] Also, the invention may be embodied as a method, of which an example has been provided. The acts performed as part of the method may be ordered in any suitable way. Accordingly, embodiments may be constructed in which acts are performed in an order different than illustrated, which may include performing some acts simultaneously, even though shown as sequential acts in illustrative embodiments.

[0044] Use of ordinal terms such as “first,” “second,” “third,” etc., in the claims to modify a claim element does not by itself connote any priority, precedence, or order of one claim element over another or the temporal order in which acts of a method are performed, but are used merely as labels to distinguish one claim element having a certain name from another element having a same name (but for use of the ordinal term) to distinguish the claim elements.

[0045] Also, the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of “including,” “comprising,” or “having,” “containing,” “involving,” and variations thereof herein, is meant to encompass the items listed thereafter and equivalents thereof as well as additional items.

What is claimed is:

1. A cap for a container, the cap comprising:
   a cap body structured to attach the cap to the container,
   the cap body comprising a first material;
   a first compartment for a first ingredient; and
a depressible structure arranged such that, when the depressible structure is depressed, the depressible structure applies force onto the first compartment, thereby rupturing the first compartment and dispensing the first ingredient into a second compartment of the container, wherein the depressible structure comprises a second material more pliant than the first material.

2. The cap of claim 1, wherein the first material comprises a hard plastic material and the second material comprises a soft plastic material.

3. The cap of claim 2, wherein the hard plastic material comprises polypropylene, polyethylene, polyvinyl chloride or polyester.

4. The cap of claim 3, wherein the soft plastic material comprises a vulcanize or an elastomer of the hard plastic material.

5. The cap of claim 1, wherein the depressible structure has a dome shape.

6. The cap of claim 1, wherein the first compartment comprises a barrier to protect the first compartment from moisture, a gas and/or a gaseous compound.

7. The cap of claim 6, wherein the barrier comprises a metal foil.

8. The cap of claim 7, wherein the barrier comprises a plurality of metal foils that are sealed to form the first compartment.

9. The cap of claim 8, wherein at least one of the plurality of metal foils is coated with a lacquer.

10. The cap of claim 1, wherein the first compartment comprises a solid material and/or a powder having the first ingredient.

11. The cap of claim 9, wherein the first ingredient is a dry ingredient that is sensitive to moisture.

12. The cap of claim 11, wherein the first material comprises a hard plastic material, wherein the second material comprises a soft plastic material, wherein the soft plastic material comprises a vulcanize or an elastomer of the hard plastic material, wherein the depressible structure has a dome shape, wherein the first compartment comprises a barrier to protect the first compartment from moisture and/or oxygen, wherein the barrier comprises at least one metal foil, and wherein the first compartment comprises a solid material and/or a powder having the first ingredient.

13. The cap of claim 1, wherein the first compartment comprises a solid material having the first ingredient, wherein the solid material is shaped to concentrate force applied by the depressible structure at a first location of the first compartment to facilitate rupturing the first compartment.

14. The cap of claim 1, wherein the first compartment comprises the first ingredient, and wherein the first compartment comprises an effervescent material.

15. A cap for a container, the cap comprising: a cap body structured to attach the cap to the container; a first compartment comprising a solid material; and a depressible structure arranged such that, when the depressible structure is depressed, the depressible structure applies force onto the first compartment, thereby rupturing the first compartment and dispensing the solid material into a second compartment of the container, wherein the solid material is shaped to concentrate force applied by the depressible structure at a first location of the depressible structure to facilitate rupturing the first compartment.

16. The cap of claim 15, wherein the solid material is shaped to concentrate force at a point.

17. The cap of claim 15, wherein the solid material comprises a tablet with an angled, sharp edge.

18. A cap for a container, the cap comprising: a cap body structured to attach the cap to the container; a first compartment comprising a first ingredient; and a depressible structure arranged such that, when the depressible structure is depressed, the depressible structure applies force onto the first compartment, thereby rupturing the first compartment and dispensing the first ingredient into a second compartment of the container, wherein the first ingredient comprises an effervescent material.

19. The cap of claim 18, wherein the effervescent material comprises calcium carbonate.

20. The cap of claim 18, wherein the first compartment comprises a solid material having the first ingredient, the solid material being shaped to concentrate force at a first location of the first compartment to facilitate rupturing the first compartment.