A beverage product includes a container having an interior volume and a frangible block of a frozen beverage material formed in the interior volume. The beverage product can further include a liquid beverage material disposed in the interior volume. In use, the frangible block of a frozen beverage material can be broken prior to consuming the beverage. The container can be made of a resilient material so as to allow the frangible block of a frozen beverage material to be broken. Another aspect of the present invention provides a vending machine capable of dispensing beverage products having frangible blocks of a frozen beverage material formed therein.
BEVERAGE PRODUCT AND METHODS AND DEVICES FOR PRODUCING BEVERAGE PRODUCTS

BACKGROUND OF THE INVENTION

[0001] A wide variety of beverages sold in cans or bottles are currently available to consumers. In addition to traditional soft drinks such as soda, fruit juices, lemonade, and iced tea, newer beverages like sports drinks and energy drinks are becoming increasingly popular. Furthermore, bottled water products such as spring water, mineral water, and filtered water have also become enormously popular.

[0002] The great demand for these products has led to increased competition. Advertising is the primary technique for producers to promote their products, but extensive advertising is expensive. While various attempts have been made at making beverage products more desirable through attractive container designs, the fact is that container design is somewhat limited due to standardized container requirements for shipping, storing, and vending purposes. Thus, other than the taste and quality of the beverage itself, there is little currently available to distributors to distinguish their products from those of their competitors.

SUMMARY OF THE INVENTION

[0003] One aspect of the present invention provides a beverage product including a container having an interior volume and a frangible block of a frozen beverage material formed in the interior volume. The beverage product can further include a liquid beverage material disposed in the interior volume. In use, the frangible block of a frozen beverage material can be broken prior to consuming the beverage. The container can be made of a resilient material so as to allow the frangible block of a frozen beverage material to be broken.

[0004] One possible method for producing such a beverage product includes injecting beverage material in liquid form into the container and then causing the beverage material to freeze into a block that occupies only a portion of the interior volume in cross-section with respect to the longitudinal axis.

[0005] Another aspect of the present invention provides a vending machine including a refrigerated compartment with a number of beverage products having frangible blocks of a frozen beverage material formed therein stored in the refrigerated compartment. The vending machine further includes means for dispensing the beverage products.

DESCRIPTION OF THE DRAWINGS

[0006] The subject matter that is regarded as the invention is particularly pointed out and distinctly claimed in the concluding part of the specification. The invention, however, may be best understood by reference to the following description taken in conjunction with the accompanying drawing figures in which:

[0007] FIG. 1 is a perspective view of one embodiment of a beverage product.

[0008] FIG. 2 is a longitudinal section view of the beverage product of FIG. 1.

[0009] FIG. 3 is a cross-sectional view taken along line 3-3 of FIG. 2.

[0010] FIG. 4 is a longitudinal section view of a beverage container showing one embodiment of a means for forming a block of frozen beverage material in the container.

[0011] FIG. 5 is a perspective view of another embodiment of a beverage product.

[0012] FIG. 6 is a longitudinal section view of the beverage product of FIG. 5.

[0013] FIG. 7 is a perspective view of yet another embodiment of a beverage product.

[0014] FIG. 8 is a longitudinal section view of the beverage product of FIG. 7.

[0015] FIG. 9 is an isometric view of one embodiment of a vending machine.

[0016] FIG. 10 is a schematic view of the vending machine of FIG. 9.

[0017] FIG. 11 is a schematic view of another embodiment of a vending machine.

DETAILED DESCRIPTION OF THE INVENTION

[0018] Referring to the drawings wherein identical reference numerals denote the same elements throughout the various views, FIGS. 1-3 show a beverage product 10 in accordance with one embodiment of the present invention. The beverage product 10 comprises the combination of a beverage and a container 12 for holding the beverage. As will be described in more detail below, the beverage contained in the container 12 comprises one or more components or beverage materials.

[0019] In one possible configuration, the container 12 is a bottle having a substantially cylindrical body portion 14 formed by a cylindrical sidewall 15 defining an interior volume 16 and a central, longitudinal axis 18. The body portion 14 is closed at one end by a base 20 and has a neck 22 formed on the other end. The neck 22 terminates in an opening 24 that provides ingress and egress to and from the interior volume 16. The container 12 can be, but is not necessarily, of a one-piece construction. The opening 24 can be closed off with any suitable closure, such as a threaded cap 26 attached via external threads 28 formed on the outside of the neck 22 adjacent to the opening 24. It should be appreciated that the body portion 14 is not limited to a cylindrical configuration and can be any closed geometric form. The sidewall 15 is similarly not limited to a single curved wall but can alternatively comprise a series of joined wall segments. Also, the body portion 14 need not necessarily be symmetric about the longitudinal axis 18.

[0020] The container 12 can be made of any suitable material. For reasons discussed below, the container 12 is preferably made from a sturdy, resilient material so as to be capable of withstanding shock without permanent deformation or rupture. One suitable material is polyethylene terephthalate (PETE), a thermoplastic polymer resin commonly used in containers for foods, beverages and other liquids. Furthermore, the container 12 can be transparent, semi-transparent (clear or tinted) or opaque. Also, one or more labels (not shown) can be affixed to the container 12.

[0021] The beverage product 10 includes a beverage contained in the container 12. One component of the beverage is a block of a frozen beverage material 30 formed in the interior volume 16. Another possible component of the beverage is a liquid beverage material 32, which fills or partially fills the portion of the interior volume 16 not occupied by the block of frozen beverage material 30.

[0022] The block of frozen beverage material 30 is preferably formed with a frangible geometry so as to be easily breakable. A frangible geometry can be accomplished by forming the block 30 so that it occupies only a portion of the
interior volume 16 in cross-section with respect to the longitudinal axis 18. That is, the frangible block 30 does not completely fill the interior volume 16 in cross-section, thereby leaving a void (which can hold liquid beverage material). This way, the block 30 has a relatively small lateral dimension and is easy to break. In the illustrated embodiment, the block of frozen beverage material 30 is an annular sleeve formed on, and conforming to, the inside surface of the sidewall 15. Such a sleeve has a center bore defining an open void and a relatively thin wall to facilitate breakage.

The annular sleeve geometry of the block of frozen beverage material 30 shown in FIGS. 1-3 can be achieved through a variety of techniques. For instance, beverage material in liquid form can be injected into the container 12 via the opening 24. The container 12 is then spun about the longitudinal axis 18 while being exposed to freezing temperatures. The centrifugal force generated by spinning the container 12 forces the liquid beverage material away from the axis of rotation and against the inner surface of the sidewall 15. The beverage material thus freezes in the annular configuration. FIG. 4 illustrates one forming technique using a specially designed spray head 34 that is fluidly connected to a source 36 of beverage material. The spray head 34 is approximately equal in length to the container body portion 14 and has a plurality of nozzles 38 formed therein along its length and pointing in all directions. Pressurizing means 40, such as a pump, are provided for pressurizing the beverage material. In use, the spray head 34 is inserted through the opening 24 into the interior volume 16 so as to be substantially aligned along the longitudinal axis 18. Liquid beverage material is sprayed from the nozzles 38 onto the inner surface of the sidewall 15, while the container 12 is subjected to freezing temperatures, thereby causing the beverage material to freeze on the sidewall 15 and create the annular block 30. The container 12 can be rotated about the longitudinal axis 18 relative to the spray head 34 during the spraying and freezing.

Another possible technique would be to insert a device such an expandable mandrel or inflatable bladder through the opening 24 and then expand the device in the interior volume 16. The device in its expanded state would substantially conform to the shape of the interior volume 16, but be slightly smaller so as to define an annular gap or space between the device and the inner surface of the sidewall 15. Liquid beverage material would then be introduced into the annular gap and frozen. After the beverage material was frozen, the device would be contracted and removed from the container 12, leaving an annular block of frozen beverage material 30.

Turning now to FIGS. 5 and 6, an alternative frangible geometry for the block of frozen beverage material 30 is shown. In this case, the block of frozen beverage material 30 is a relatively thin, elongated slab defining a segment of the cylinder defined by the body portion 14. This block of frozen beverage material 30 has a curved surface conforming to the inside surface of the sidewall 15 and a relatively flat surface defined by a chord of the body portion cylinder and facing the interior volume 16. This slab configuration can be prepared by injecting an appropriate amount of liquid beverage material into the interior volume 16, orienting the container 12 horizontally so that the liquid beverage material occupies a cylindrical segment of the interior volume 16, and freezing the liquid beverage material.

Many different combinations of beverage materials can be used to produce various beverages including drinking water, carbonated beverages, non-carbonated beverages, alcoholic and non-alcoholic beverages. For example, both the frozen beverage material and the liquid beverage material could be a flavored beverage such as soda (cola, root beer, etc.), fruit juice, vegetable juice, coffee, tea, sport drinks, energy drinks, cider, lemonade, etc. In another example, the frozen beverage material could be ice (i.e., frozen water) and the liquid beverage material could be any beverage. In yet another example, the frozen beverage material could be a flavored beverage in a concentrated form (e.g., soda syrup, juice concentrates, extracts, etc.) and the liquid beverage material could be a diluent such as water, spring water, mineral water, carbonated water, soda water, seltzer, and the like. In still another example, the frozen beverage material and the liquid beverage material could comprise the ingredients of an alcoholic beverage such as a cocktail or mixed drink. For instance, the frozen beverage material could be a mixer or a combination of mixers (e.g., tonic, club soda, sour mix, grenadine, ginger ale, Bloody Mary mix, etc.), and the liquid beverage material could be the appropriate alcoholic component or components. In one other example, the frozen beverage material could be a frozen diary product such as ice cream, frozen yogurt, ice milk, or sherbet, and the liquid beverage component could be milk (plain or flavored) to produce a milk shake or a soda such as root beer or cola to produce a float. These are just some examples of possible combinations of beverage materials.

The beverage product 10 can be sold or distributed to consumers with both the frozen beverage material 30 and the liquid beverage material 32 in the container 12. Alternatively, the beverage product 10 can be sold or distributed to consumers with just the frozen beverage material 30 in the container 12, leaving it to the consumer to add the liquid beverage material. Thus, as used herein, a "beverage product" can refer to either a container with just the frozen beverage material or a container with both the frozen and liquid beverage materials.

While the frozen beverage material could be used to chill the liquid beverage (much like ice cubes in a conventional drink), one preferred mode of use is to mix or combine the frozen and liquid beverage materials to make a composite beverage. Over time, the frozen beverage material 30 will tend to thaw and mix with the liquid beverage material 32. This process can be facilitated by breaking the block of frozen beverage material 30 into a number of small pieces. For instance, if the container 12 is made of a resilient material (i.e., a material capable of withstanding shock without permanent deformation or rupture) as discussed above, then the container 12 could be struck one or more blows so as to break up the block of frozen beverage material 30 into pieces. This can be accomplished by striking the container 12 by hand or with an implement or by striking the container 12 against a hard surface. The frangible geometry of the block of frozen beverage material 30 facilitates breakage in this manner. The frozen block 30 can be broken either before or after the liquid beverage material 32 is added to the container 12. The container 12 can be shaken after block breakage to facilitate mixing of the frozen and liquid components.

As mentioned above, the container 12 is not limited to conventional cylindrical bottle geometries. Furthermore, the container 12 can have one or more design forms or molds 42 formed in the sidewall 15, as shown in FIGS. 7 and 8. The mold 42 comprises a cavity formed on the interior surface of the sidewall 15 (thus presenting a protrusion on the outer
surface of the sidewall 15). To create the block of frozen beverage material in this container 12, beverage material in a liquid state is introduced into the container 12 and allowed to collect in the mold 42. This beverage material is then frozen, and the resulting block 30 assumes the shape of the mold 42.

[0030] The mold 42 can be given virtually any shape or design. For example, the mold 42 could be shaped to depict a cartoon character, a person, an animal, a landmark building, a landscape, a symbol, a logo, or a graphic. Moreover, the mold 42 could comprise a series of cavities defining simple block shapes to produce ice cube-shaped blocks of frozen beverage material. In this case, the protrusion on the outer surface of the sidewall 15 could be configured as a handgrip. Because of the sidewall protrusion caused by the mold 42, the longitudinal axis 18 is not necessarily an axis of symmetry. The frozen block 30 could be broken into pieces as described above, or could be simply popped out of the mold 42 and used as an ice cube floating in the liquid beverage material 32.

[0031] In another aspect of the invention, beverage products 10 can be sold or distributed to consumers via vending machines. Referring to FIGS. 9 and 10, one embodiment of a suitable vending machine 44 is shown. The vending machine 44 includes a housing 46 having a front panel 48. The vending machine 44 is controlled by a controller 50 (FIG. 10) located inside the housing 46. Consumers interact with the controller 50 through an input panel 52, which includes a plurality of selection buttons and indicator lights and is located on the front panel 48. The vending machine 44 also includes a payment device 54 located on the front panel 48, which consumers can use to pay for selected purchases. The payment device 54 can comprise any suitable means for making payment, which can include one or more of a coin slot for receiving coin currency, a bill validator for receiving paper currency, and a credit card reader for accepting payment by credit/debit cards. A change return slot is also typically included. A display 56 can be included for providing information such as how much money is needed for a purchase.

[0032] Inside the housing 46 is a refrigerated compartment 58 with storage racks for holding a number of the containers 12. The compartment 58 is preferably thermally insulated and includes a refrigeration system for keeping the containers 12 at a freezing temperature. The refrigerated compartment 58 is thus able to store a number of containers 12 having blocks of a frozen beverage material 30 formed therein. The compartment 58 can be stocked with containers 12 having pre-frozen blocks of a frozen beverage material 30. That is, containers 12 in which the frozen beverage material 30 was frozen at another site prior to transport to the vending machine 44. Alternatively, the refrigerated compartment 58 could be stocked with containers 12 partially filled with a beverage material in liquid form, which would be subsequently frozen into blocks of frozen beverage material 30 due to the freezing temperatures in the refrigerated compartment 58. In this case, the controller 50 would prevent the vending machine 44 from vending beverage products 10 until freezing was complete. Freezing would be determined using any suitable means, such as a timer or an appropriate sensor. In either case, the compartment 58 can be stocked with containers having a variety of flavors.

[0033] The vending machine 44 further includes a delivery mechanism 60 for conveying a container 12 from the refrigerated compartment 58 to a product delivery port 62 located on the front panel 48. A view panel 64 can be provided on the front panel 48 to allow consumers to observe the product delivery operation. The delivery mechanism 60 can be any suitable means for delivering containers, many of which are known in the vending machine art.
a valve) and flexible tubing 102, which permits vertical motion of the injection tube 90. The flow control device 100 is controlled by the controller 74 to deliver a predetermined amount of liquid beverage material to the injection tube 90, which in turn injects the liquid beverage material into the container 12.

Beverage products 10 are preferably sealed when dispensed from the vending machine 72. This is typically accomplished with a cap, such as the cap 26 described above. The containers 12 are normally stored in the refrigerated compartment 80 with caps on. In this case, the vending machine 72 includes a suitable mechanism for removing the cap prior to injection of liquid beverage material via the injection tube 90. The cap is then replaced (i.e., screwed back onto the container 12) after the liquid beverage material has been added and before the beverage product 10 is delivered to the product delivery port 82. Alternatively, the containers 12 could be stored in the compartment 80 without caps. Then, after liquid beverage is injected into the container 12 at the filling station 86, a cap is attached prior to dispensing the beverage product 10. A supply of caps is stored in the vending machine 72 for this purpose. Another possibility would be to provide the containers with caps having a push-pull spout formed therein. With such caps, commonly called “sports caps,” the spout can be pulled open to allow flow therethrough and pushed closed to prevent flow. In this case, the vending machine 72 would have a mechanism for pulling the spout open to allow liquid beverage to be injected through the spout into the container 12, and then close the spout after liquid beverage material has been added.

The vending machine 72 further includes a second delivery mechanism 104 for conveying a container 12 from the filling station 86 to the product delivery port 82. The first and second delivery mechanisms 84, 104 can be any suitable means for delivering containers, many of which are known in the vending machine art. A view panel (not shown in FIG. 11) can be provided on the housing to allow consumers to observe the filling and/or product delivery operations.

In operation, a consumer makes a suitable payment through the payment device 78 and makes his or her product selection using the input panel 76. In response, the controller 74 activates the first delivery mechanism 84 toeffect delivery of the appropriate container 12 from the refrigerated compartment 80 to the filling station 86. At the filling station 86, the filling mechanism 88 adds fluid beverage to the container 12, and the container 12 is sealed closed. Next, the controller 74 activates the second delivery mechanism 104 to effect delivery of the appropriate container 12 from the filling station 86 to the product delivery port 82. In this embodiment, the vending machine 72 dispenses a beverage product 10 comprising both the frozen beverage material 30 and the liquid beverage material 32 in a container 12.

While specific embodiments of the present invention have been described, it should be noted that various modifications thereto can be made without departing from the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. A beverage product comprising:
   a container having an interior volume; and
   a frangible block of a frozen beverage material formed in said interior volume.

2. The beverage product of claim 1 further comprising a liquid beverage material disposed in said interior volume.

3. The beverage product of claim 1 wherein said container defines a longitudinal axis and said frangible block of frozen beverage material occupies only a portion of said interior volume in cross-section with respect to said longitudinal axis.

4. The beverage product of claim 3 further comprising a liquid beverage material filling at least a portion of said interior volume not occupied by said frangible block of frozen beverage material.

5. The beverage product of claim 3 wherein said block of frozen beverage material is an annular sleeve formed on an inside surface of said container.

6. The beverage product of claim 3 wherein said block of frozen beverage material is a relatively thin, elongated slab.

7. The beverage product of claim 1 wherein said container is made of a resilient material.

8. The beverage product of claim 1 wherein said container has a mold formed in a sidewall thereof.

9. A method of producing a beverage product, said method comprising:
   providing a container having an interior volume and defining a longitudinal axis;
   injecting beverage material in liquid form into said container, and
   causing said beverage material to freeze into a block that occupies only a portion of said interior volume in cross-section with respect to the longitudinal axis.

10. The method of claim 9 wherein causing said beverage material to freeze includes spinning said container about said longitudinal axis while exposing said beverage material to freezing temperatures.

11. The method of claim 9 wherein injecting beverage material includes using a spray head to spray beverage material onto an inner surface of said container.

12. A method of using a beverage product including a frangible block of a frozen beverage material formed inside a container, said method comprising breaking said frangible block of a frozen beverage material prior to consuming said beverage material.

13. The method of claim 12 wherein breaking said frangible block of a frozen beverage material includes striking one or more blows to said container.

14. The method of claim 12 further comprising adding a liquid beverage material to said container.

15. The method of claim 14 further comprising shaking said container after breaking said frangible block of a frozen beverage material to facilitate mixing said frozen and liquid beverage materials.

16. A vending machine comprising:
   a refrigerated compartment;
   a number of beverage products having frangible blocks of a frozen beverage material formed therein stored in said refrigerated compartment; and
   means for dispensing said beverage products.

17. The vending machine of claim 16 wherein said means for dispensing includes a delivery mechanism for conveying beverage products from said refrigerated compartment to a product delivery port.

18. The vending machine of claim 17 further comprising:
   a reservoir of liquid beverage material; and
   means for dispensing liquid beverage material from said reservoir.

19. The vending machine of claim 18 wherein said means for dispensing dispenses controlled volumes of liquid beverage material.

20. The vending machine of claim 16 further comprising means for adding liquid beverage material to a beverage product before dispensing said beverage product.