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(54) **Beverage package**

Behälter für Getränke

Conditionnement pour boissons

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EP-A- 0 520 602
GB-A- 1 266 351

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Description

TECHNICAL FIELD & BACKGROUND ART

The present invention relates to a beverage package and a method of forming such a package. More particularly it concerns beverages containing gas, such as carbon dioxide and/or nitrogen, in solution and packaged in a sealed container which, when opened for dispensing or consumption, causes gas to be evolved or liberated from the beverage to form, or assist in the formation of, a head of froth on the beverage. The beverages to which the invention relates may be alcoholic or non-alcoholic; primarily the invention was developed for fermented beverages such as ale, lager, stout or other beer and cider but may be applied with advantage to so-called soft drinks and beverages, or alcoholic drinks such as spirits, liquers, wine and the like.

Beverage packages are known which comprise a sealed container having a primary chamber containing the beverage having gas in solution and forming a primary headspace comprising gas at a pressure greater than atmospheric and in which a secondary chamber containing gas at a pressure greater than atmospheric has a restricted orifice which communicates with the beverage in the primary chamber. Upon opening the package to dispense the beverage, the primary headspace is opened to atmospheric pressure and this creates a pressure differential within the container which causes gas in the secondary chamber to be ejected by way of the restricted orifice into the beverage in the primary chamber. The ejection of the gas from the secondary chamber and through the restricted orifice causes gas in solution in the beverage to be evolved for froth formation. An example of a beverage package having the latter characteristics is disclosed in our British Patent No. 1,266,351 (where the gas ejection from the secondary chamber may be through a non-return valve).

In the known beverage packages of the kind discussed above the restricted orifice is located at or towards the bottom of the beverage in the primary chamber. When the package is opened and gas is ejected through the restricted orifice, gas in solution is initially evolved in the region of the beverage which is local to the restricted orifice and this evolution of gas develops or grows rapidly to rise or surge throughout the volume of beverage in the primary chamber to develop a head of froth which is retained when the beverage is dispensed from the container. For some beverages, particularly those containing carbon dioxide in solution (with or without nitrogen gas in solution) it is possible for a major part, if not all, of the gas in solution to be evolved from the beverage shortly after the gas has been ejected from the secondary chamber on opening the package. As a consequence, when the beverage is dispensed from the container into a drinking glass for consumption, it is possible that the absence, or low level, of gas in solution in the beverage will impart undesirable characteristics to the beverage (albeit that such beverage may have a good quality head of froth). This is particularly the case for so-called light beers or lagers where it is preferred that a reasonable volume of gas, usually carbon dioxide, is retained in solution in the beverage as dispensed in a drinking glass so that such gas can evolve naturally to rise as minute bubbles within the beverage and the latter retains a "sparkle" which is considered desirable aesthetically and can add to the consumer's enjoyment and "mouth feel" of the beverage. It is an object of the present invention to provide a beverage package of the kind generally discussed which alleviates the aforementioned disadvantage of excessive liberation of gas in solution so that the beverage when dispensed will retain a desirable "sparkle" without detracting from the desirable characteristics required for froth development in forming a head on the beverage. A beverage package by which the aforementioned desirable sparkle may be retained is the subject of our European Patent EP-A-0 520 602 (having an earlier priority date but a later publication date than the priority date of the present Application) in which the secondary chamber has extending upwardly therefrom a tube within the beverage in the primary chamber. The tube is arranged so that, on opening the package, gas and/or beverage is ejected from the secondary chamber into beverage in the tube causing gas in solution to be evolved from that beverage in the tube to form froth on the beverage in the primary chamber. The tube serves, in effect, to restrict the volume of beverage in the package from which gas is evolved upon opening of the package to what is, usually, a minor proportion of the total volume of such beverage whilst after the opening gas can continue to evolve from the remaining proportion of the volume of beverage to provide the required "sparkle".

STATEMENT OF INVENTION & ADVANTAGES

According to the present invention there is provided a beverage package comprising a sealed container having a primary chamber containing beverage having gas in solution therewith and forming a headspace comprising gas at a pressure greater than atmospheric; a secondary chamber formed by a hollow insert located in the primary chamber at or towards the bottom of the primary chamber and containing gas at a pressure greater than atmospheric for communication with beverage in the primary chamber by way of an aperture and an upwardly extending tubular extension carried by the insert, the package being openable to open the primary chamber to atmospheric pressure and said opening creating a pressure differential causing gas under pressure from the secondary chamber to be introduced by way of the aperture into the beverage in the primary chamber for said introduction to liberate gas from solution in the beverage to form froth in the primary headspace and wherein said liberation of gas is restricted to a minor proportion of the volume of beverage in the primary chamber; the insert comprises a base part located

at or towards the bottom of the primary chamber and the tubular extension is carried by the base part, said base part and tubular extension together forming the secondary chamber; the aperture is located on the tubular extension in the beverage at a position nearer to the surface of the beverage than to the bottom of the beverage in the primary chamber for said liberation of gas to be restricted to beverage in the primary chamber disposed within a minor depth of the beverage from the surface thereof.

Beverage packages are well known, for example as disclosed in our British Patent No. 1,266,351, in which in response to a pressure differential developed on opening of the package, gas under pressure from a secondary chamber is injected into beverage in the primary chamber for the purpose of liberating gas from solution in beverage in the primary chamber. This ejection is effected from the secondary chamber through an aperture and in the prior proposals such aperture is located at or towards the bottom of the beverage in the primary chamber. As a consequence high energy from the gas injection liberates gas from solution in the beverage initially in the region of the aperture and this seeds the further liberation of gas from the beverage so that a surge of gas bubbles develops and grows rapidly to rise, predominantly, throughout the volume of beverage in the primary chamber. By the present invention the aperture is located in the beverage in the primary chamber nearer to the surface of that beverage than to the bottom of the beverage and as a consequence the aforementioned liberation of gas from solution in the beverage by the rising surge of gas bubbles from the aperture restricts the gas liberation to a minor proportion of the volume of beverage in the container. Typically the minor proportion of beverage from which gas is liberated will be less than 30% of the total volume of beverage within the container. The result of such restricted gas liberation is that a major proportion of the volume of beverage in the container will retain gas in solution - this is particularly so for carbon dioxide. Therefore when the beverage is dispensed from the container into a drinking glass for consumption, gas may continue to evolve from solution to maintain "sparkle" and other characteristics considered desirable for the beverage product.

Usually the insert will be formed of plastics. Conveniently the base part of the insert is located within the container through an open top thereof during formation of the beverage package and subsequently the extension part can be fitted and sealed to the base part within the primary chamber. The aperture of the insert is likely to be restricted sufficiently to alleviate flow of beverage from the primary chamber into the secondary chamber when the contents of the sealed package are in equilibrium. However, in a preferred insert structure the aperture has a non-return valve associated therewith which restrains entry of beverage into the secondary chamber and which is responsive to the pressure differential (developed when the package is opened to open the primary headspace to atmospheric pressure) to permit the injection of gas under pressure from the secondary chamber into the upper region of beverage in the primary chamber for froth development. The latter form of insert may be received within an open topped container during formation of the package with the aperture closed so that the secondary chamber is sealed and contains gas at a pressure greater than atmospheric; following charging of the container with its beverage and subsequent sealing of the container, the sealed package may be processed (for example as a result of the package being heated for pasteurising the beverage, so that the structure of the insert is modified, for example by thermal distortion of plastics material from which the insert is formed) to ensure that when the sealed package is opened and the pressure differential applied, communication is effected, possibly by way of a known non-return valve in the insert, between the secondary chamber and the beverage in the primary chamber.

DRAWING

One embodiment of a beverage package constructed in accordance with the present invention will now be described, by way of example only, with reference to the accompanying illustrative drawing, which shows a section through the package.

DETAILED DESCRIPTION OF DRAWING

The beverage package illustrated comprises a conventional form of container such as a light metal can 1 having an externally concave circular base 2 on which the package will normally stand, a cylindrical side wall 3 and a circular top 4 which will usually be seamed to the side wall 3 to seal the container. The top 4 will be openable, typically by a ring pull, displaceable tab or other conventional means for the purpose of dispensing beverage contents of the container.

In the present example, the beverage for the package may be considered as a light beer or lager having in solution a mixture of carbon dioxide and nitrogen gases, typically the carbon dioxide content will be 1.25 to 6.0 gramms per litre and the nitrogen gas content will be 3% to 5% vols./vol. The term "vols./vol." is well known in the art but a definition of it may be found in our British Patent No. 1,588,624. The container 1 forms a primary chamber 5 and prior to fitting and sealing the top 4 and with the container in an upstanding condition, an insert 6 is inserted into the primary chamber through the open top of the container and located on the base 2 at the bottom of the primary chamber 5.

The insert 6 is conveniently assembled from plastics mouldings to have a hollow generally cylindrical drum part 7 from which extend diametrically opposed flanges 8 and a tubular extension part 9 which projects upwardly from the drum part 7 towards the open top of the container. The insert 6 is fitted within the container so that the flanges 8 frictionally engage with the cylindrical side walls 3 to retain the insert at the bottom of the

primary chamber. It will be appreciated however that alternative means of retaining the insert 6 at the bottom of the container may be provided, for example by suction or magnetically. The hollow drum part 7 and extension part 9 of the insert form a secondary chamber 10 which is to communicate with the primary chamber 5 by way of an aperture or port 11 at the upper end of the extension part 9.

The secondary chamber 10 contains gas, usually nitrogen, at a pressure greater than atmospheric. Pressurisation of the secondary chamber 10 may be effected in either of two ways as will be discussed hereinafter.

After the insert 6 has been fitted within the open topped container, the primary chamber 5 is charged with the beverage 20 containing gas in solution and thereafter the container is closed and sealed by the top 4 so that a primary headspace 21 in the primary chamber of the container is at a pressure greater than atmospheric. Pressurisation of the headspace 21 may be achieved in conventional manner, for example by dosing the primary chamber with liquid nitrogen immediately prior to the top 4 being fitted and sealed. In the sealed package and as will be seen from the drawing, the aperture 11 is submerged in the beverage 5 and is located much nearer to the surface 22 of the beverage than it is to the bottom of the primary chamber 5; in practice the aperture 11 is likely to be submerged to a depth at which approximately 10% to 20% of the volume of beverage 20 in the primary chamber is located above that aperture.

When the sealed package is opened, for example by a ring pull (not shown) in the top 4 to dispense the beer 20, the primary headspace 21 is opened to atmospheric pressure and rapidly depressurises. As a consequence, a pressure differential is developed whereby the pressure of gas in the secondary chamber 22 exceeds the pressure in the headspace 21. This causes the gas in the secondary chamber 10 to be injected through the aperture 11 into the beer 20. As a consequence of this injection, and in a manner well known in the art, gas is liberated from solution in the beverage 20 to provide a surge of gas bubbles which develops, predominantly, throughout the beverage 20 above the aperture 11 and rises to develop froth in the headspace 21. By locating the aperture 11 at a relatively shallow depth beneath the surface 22 of the beverage 20, gas from solution, particularly carbon dioxide, is liberated to form froth in the headspace 21 from a minor proportion, say less than 20%, of the total volume of beer 20 in the container. Therefore when the beer 20 is poured from the container into a drinking glass shortly after opening the can, the froth developed by the evolution of gas from part only of the beverage may provide a desirable head on the beer in the glass. However, adequate gas is maintained in solution in the beer in the glass for such gas to evolve gradually and naturally and present a slight effervescent effect or "sparkle" to the body of the beer - this is considered most desirable for aesthetic quality in lager or light beer and may also enhance the flavour characteristics and mouth feel of the beer.

Gas under pressure may be provided in the secondary chamber 10 where that secondary chamber is in constant communication by way of the aperture 11 with the primary chamber 5 by locating and maintaining the insert 6 in the open topped container in a gas environment where the pressure is greater than atmospheric and this environment is maintained to pressurise the secondary chamber during charging of the primary chamber with beverage and sealing the open top of the container. With this technique the aperture 11 should form a restriction which ensures that any beer which may flow from the primary chamber through the restricted aperture 11 into the secondary chamber 10 (during charging of the container with beverage, during the period in which the contents of the sealed package come into equilibrium, and during general handling and storage of the sealed package) is negligible. With such a proposal in which the secondary chamber 10 is pressurised within the open topped container and prior to charging the container with beer 20, the insert 6 may, for ease of mechanical handling, be assembled within the open topped container by first fitting the base part 7 of the insert within the container and subsequently fitting and sealing the extension part 9 to the base part 7 within the container. As an alternative possibility the insert 6 as received by the primary chamber 5 may have its secondary chamber 10 sealed and containing gas, typically nitrogen gas, at a pressure greater than atmospheric. With this latter proposal the port 11 will initially be closed but arranged to open, following charging of the primary chamber 5 with beer 20 and subsequent pressurisation of the headspace 21 and sealing of the container with the top 4, by appropriate processing of the sealed package. For example, the sealed package may be subjected to heat during pasteurisation of the beverage 20 and such heat may cause a change in the characteristics of the plastics material of the extension part 9 which results in automatic opening of the port 11. A further possibility for this latter technique where the insert 6 as received by the open topped container has its secondary chamber 10 sealed and containing gas under pressure, is for the port 11 to be closed by the upper end of a projection indicated at 30 extending upwardly within the extension part 9, conveniently projecting from a bottom wall of the drum part 7. The projection 30 closes the port 11 to seal the secondary chamber 10 throughout the period during which the container is charged with beverage and sealed. However, during subsequent processing of the sealed package, for example by subjecting the package to heat as aforementioned, the characteristics of the plastics insert 6 change to the extent that the free end of the projection 30 co-operates with the port 11 to form a non-return valve which is responsive to the pressure differential developed between the pressure of gas in the secondary chamber 10 and that in the headspace 21 (when the top 4 is opened to open the headspace to atmospheric

pressure). The non-return valve presented by the projection 30 and port 11 normally restrains beer from entering the secondary chamber 10 through the port 11. On opening of the container the plastics material of the extension part 9 (or insert generally) may flex in response to the pressure differential that is developed and relative to the projection 30 so that gas under pressure is injected from the secondary chamber 10 through the port 11 into the upper region of the beer 20 in the primary chamber 5 for froth development.

Although in the drawing the aperture 11 is shown as being directed towards the surface 22 of the beer 20 it will be appreciated that this aperture may be arranged to provide the gas injection into the beer in any direction as preferred and probably depending upon the depth at which the port 11 is submerged within the beer 5, for example where the aperture 11 is located immediately below the surface 22 of the beer 20 it is likely that the port 11 will be arranged to inject gas towards the cylindrical side wall of the container or even downwardly into the beverage to alleviate loss of energy from the gas injection into the headspace 21.

Claims

1. A beverage package comprising a sealed container (1) having a primary chamber (5) containing beverage (20) having gas in solution therewith and forming a headspace (21) comprising gas at a pressure greater than atmospheric; a secondary chamber (10) formed by a hollow insert (6) located in the primary chamber (5) at or towards the bottom (2) of the primary chamber (5) and containing gas at a pressure greater than atmospheric for communication with beverage (20) in the primary chamber (5) by way of an aperture (11) and an upwardly extending tubular extension (9) carried by the insert (6), the package being openable to open the primary chamber (5) to atmospheric pressure and said opening creating a pressure differential causing gas under pressure from the secondary chamber (10) to be introduced by way of the aperture (11) into the beverage (20) in the primary chamber (5) for said introduction to liberate gas from solution in the beverage (20) to form froth in the primary headspace (21) and wherein said liberation of gas is restricted to a minor proportion of the volume of beverage (20) in the primary chamber (5), wherein the insert (6) comprises a base part (7) located at or towards the bottom (2) of the primary chamber (5) and the tubular extension (9) is carried by the base part (7), said base part (7) and tubular extension (9) together forming the secondary chamber (10) and wherein the aperture (11) is located on the tubular extension (9) in the beverage (20) at a position nearer to the surface of the beverage (20) than to the bottom (2) of the beverage (20) in the primary chamber (5) for said liberation of gas to be restricted to beverage (20) in the primary chamber disposed within a minor depth of the beverage from the surface thereof.

2. A package as claimed in claim 1 in which said minor proportion of beverage (20) is less than 30% of the beverage in the primary chamber (5).

3. A package as claimed in claim 2 in which said minor proportion of beverage (20) is less than 20% of the beverage in the primary chamber.

4. A package as claimed in any one of the preceding claims in which the aperture (11) has a non-return valve (30) associated therewith which restrains entry of the beverage (20) into the secondary chamber (10) through said aperture (11) and which valve (30) is responsive to said pressure differential to permit the injection of gas under pressure from the secondary chamber (10) into the beverage (20) in the primary chamber (5).

5. A package as claimed in any one of the preceding claims in which said aperture (11) is disposed to direct the injection of gas from the secondary chamber (10) upwardly into the beverage (20) in the primary chamber (5).

Patentansprüche

1. Getränkeverpackung, die aus einem versiegelten Behälter (1) mit einer Primärkammer (5) besteht, die ein Getränk (20) mit einem damit in Lösung befindlichen Gas enthält und einen Kopfraum (21) bildet, der ein Gas unter einem Druck größer als der atmosphärische Druck aufweist; einer Sekundärkammer (10), die durch einen hohlen Einsatz (6) gebildet ist, der in der Primärkammer (5) an oder gegen den Boden (2) der Primärkammer (5) angeordnet ist und ein Gas unter einem Druck größer als der atmosphärische Druck für eine Verbindung mit dem Getränk (20) in der Primärkammer (5) unter Vermittlung einer Öffnung (11) enthält sowie eine nach oben verlaufende rohrförmige Verlängerung (9), die von dem Einsatz (6) getragen ist, wobei die Verpackung für eine Öffnung der Primärkammer (5) zu dem atmosphärischen Druck hin zu öffnen ist und diese Öffnung einen Druckunterschied schafft, welcher das unter Druck stehende Gas für eine Einführung über die Öffnung (11) in das Getränk (20) von der Sekundärkammer (10 in die Primärkammer (5) veranlaßt, damit durch diese Einführung das in dem Getränk (20) in Lösung befindliche Gas freigesetzt wird, um in dem primären Kopfraum (21) einen Schaum zu bilden, wobei die Freisetzung von Gas auf einen kleinen Anteil des Volumens des Getränks (20) in der Primärkammer (5) beschränkt wird und der Einsatz (6) aus einem Basisteil (7) besteht, der an oder gegen den Boden (2) der Primärkammer (5) angeordnet ist, wobei die rohrför-

mige Verlängerung (9) durch den Basisteil (7) getragen wird, der Basisteil (7) und die rohrförmige Verlängerung (9) zusammen die Sekundärkammer (10) bilden und die Öffnung (11) an der rohrförmigen Verlängerung (9) in dem Getränk (20) in einer Position näher an der Oberfläche des Getränks (20) als an dem Boden (2) des Getränks (20) in der Primärkammer (5) angeordnet ist, damit die Freisetzung von Gas auf das Getränk (20) in der Primärkammer beschränkt wird, welches innerhalb einer geringen Tiefe des Getränks von seiner Oberfläche aus angeordnet ist.

2. Verpackung nach Anspruch 1, bei welcher der geringe Anteil des Getränks (20) weniger als 30 % des Getränks in der Primärkammer (5) beträgt.

3. Verpackung nach Anspruch 2, bei welcher der geringe Anteil des Getränks (20) weniger als 20 % des Getränks in der Primärkammer beträgt.

4. Verpackung nach einem der vorhergehenden Ansprüche, bei welcher die Öffnung (11) ein damit verbundenes Rückschlagventil (30) aufweist, welches den Eintritt des Getränks (20) in die Sekundärkammer (10) über die Öffnung (11) zurückhält, wobei das Ventil (30) auf den Druckunterschied anspricht, um das Versprühen von Gas unter Druck aus der Sekundärkammer (10) in das Getränk (20) in der Primärkammer (5) zu erlauben.

5. Verpackung nach einem der vorhergehenden Ansprüche, bei welcher die Öffnung (11) für eine Ausrichtung des Versprühens von Gas von der Sekundärkammer (10) nach oben in das Getränk (20) in der Primärkammer (5) angeordnet ist.

Revendications

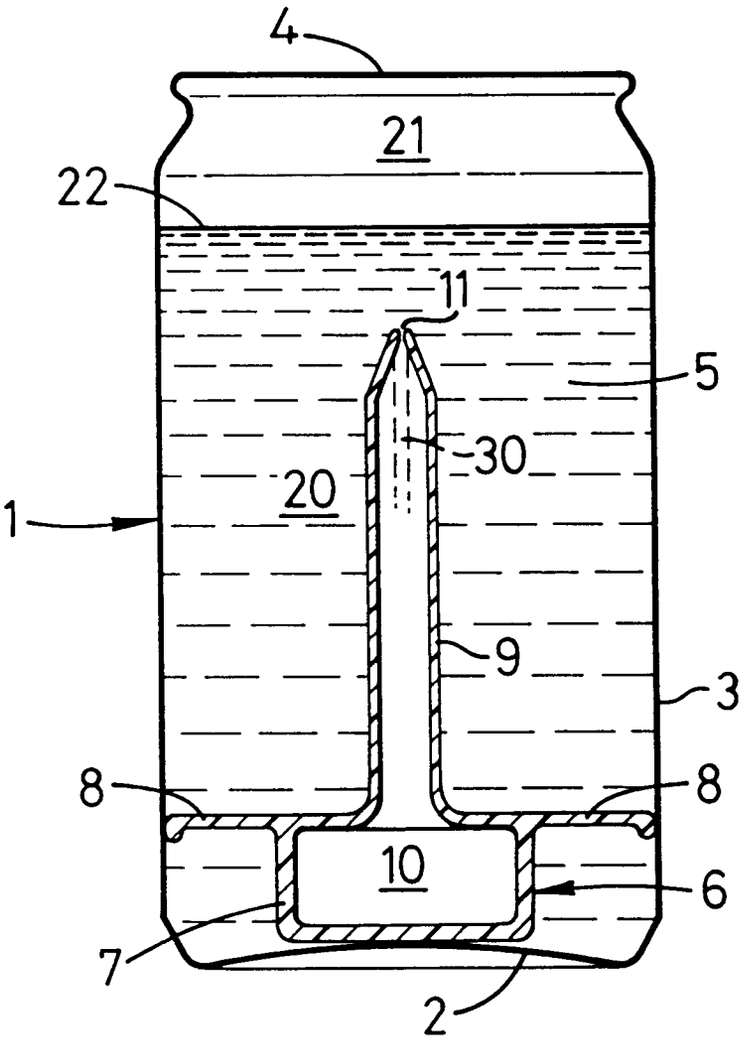
1. Emballage pour boisson comprenant un récipient scellé (1) ayant une chambre primaire (5) contenant une boisson (20) ayant du gaz en solution dans celle-ci et formant un espace de tête (21) contenant du gaz à une pression supérieure à la pression atmosphérique ; une chambre secondaire (10) formée par une pièce d'insertion creuse (6) placée dans la chambre primaire (5) à l'endroit ou près du fond (2) de cette chambre primaire (5) et contenant du gaz à une pression supérieure à la pression atmosphérique pour communiquer avec la boisson (20) contenue dans la chambre primaire (5), par une ouverture (11) et une extension tubulaire s'étendant vers le haut (9), portée par la pièce d'insertion (6), l'emballage pouvant être ouvert pour ouvrir la chambre primaire (5) à la pression atmosphérique, et cette ouverture créant une différence de pression amenant le gaz sous pression provenant de la chambre secondaire (10) à être introduit, par l'ouverture (11), dans la boisson (20) contenue dans la chambre primaire (5), de façon que cette introduction libère le gaz de la solution dans la boisson (20) pour former de la mousser dans l'espace de tête primaire (21), et cette libération de gaz étant restreinte à une moindre proportion du volume de boisson (20) dans la chambre primaire (5),
dans lequel
la pièce d'insertion (6) comprend une partie de base (7) placée à l'endroit ou près du fond (2) de la chambre primaire (5), et l'extension tubulaire (9) est portée par la partie de base (7), cette partie de base (7) et l'extension tubulaire (9) formant ensemble la chambre secondaire (10), tandis que l'ouverture (11) est placée sur l'extension tubulaire (9) dans la boisson (20), dans une position plus proche de la surface de la boisson (20) que du fond (2) de la boisson (20) dans la chambre primaire (5), de façon que cette libération du gaz soit restreinte à la boisson (20) contenue dans la chambre primaire en étant disposée à une moindre profondeur de la boisson par rapport à la surface de celle-ci.

2. Emballage selon la revendication 1,
dans lequel
la proportion minimum de boisson (20) est inférieure à 30 % de la boisson contenue dans la chambre primaire (5).

3. Emballage selon la revendication 2,
dans lequel
la proportion minimum de boisson (20) est inférieure à 20 % de la boisson contenue dans la chambre primaire.

4. Emballage selon l'une quelconque des revendications précédentes,
dans lequel
l'ouverture (11) comporte un clapet anti-retour (30) associé à celle-ci pour restreindre l'entrée de la boisson (20) dans la chambre secondaire (10) en passant à travers l'ouverture (11), et la soupape (30) répond à la différence de pression pour permettre l'injection de gaz sous pression de la chambre secondaire (10) dans la boisson (20) contenue dans la chambre primaire (5).

5. Emballage selon l'une quelconque des revendications précédentes,
dans lequel
l'ouverture (11) est disposée de manière à diriger l'injection du gaz à partir de la chambre secondaire (10) de façon que cette injection soit dirigée vers le haut dans la boisson (20) contenue dans la chambre primaire (5).


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