A METHOD FOR INSTALLING A COLLAPSIBLE BEVERAGE CONTAINER IN A BEVERAGE DISPENSING SYSTEM

Abstract: A method for installing a collapsible beverage container (28) in a beverage dispensing system (10) comprises the steps of providing the beverage dispensing system including an inner space (32) and defining an concave surface, an open upwardly facing curved rim (62) and a closed downwardly facing end. The rim defines a contact surface (60). The collapsible beverage container (28) defines a cylindrical body (44) fitting inside the inner space, a convex shaped first end (42) and a convex shaped second end. The method further comprises performing the steps of positioning the collapsible beverage container in a sloped first position, pivoting the collapsible beverage container from the first position in a rotational motion around the contact surface (60) to a second position, and sliding the collapsible beverage container on the contact surface and on the concave surface from the second position to a third position inside the receptacle.
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A METHOD FOR INSTALLING A COLLAPSIBLE BEVERAGE CONTAINER IN A BEVERAGE DISPENSING SYSTEM

The present invention relates to an economically shaped beverage dispensing system, a corresponding collapsible beverage container for use with the beverage dispensing system and a method for economically correct installation of a collapsible beverage container into a beverage dispensing system.

Beverage dispensing systems are used in many establishments to provide beverages such as draught beer. Such beverage dispensing systems are mostly used for professional establishments such as in bars or restaurants, however, increasingly also for private users such as in private homes. In many beverage dispensing systems such as e.g. the DraughtMaster™ produced by the applicant company the beverage is typically provided in a plastic or metallic beverage container or keg. The beverage container is typically positioned upright, i.e. the beverage outlet is facing upwardly, and the beverage is drawn from the beverage container through an ascending pipe. The beverage is usually expelled from the beverage container to a tapping head by a pressure fluid, typically compressed gas. To avoid direct contact between the pressure fluid and the beverage, a collapsible beverage container may be used. The use of collapsible beverage containers usually including pre-carbonated beverage is well-known in the art of beverage dispensing. When using a collapsible beverage container the pressure fluid acts on the outside of the beverage container, decreases the volume of the beverage container and thereby forcing the beverage out of the beverage container. The upright position, in connection with an ascending pipe will not constitute any problem in connection with rigid containers, however, when using collapsible beverage containers there may be a risk that the beverage container may collapse into the ascending pipe during dispensing if the beverage container collapses into the ascending pipe, the ascending pipe may break or jam during dispensing, and as a result leave residual beverage inside the beverage container. Such residual beverage constitutes a loss, since the beverage container must then be disposed and replaced. Further, the walls of the beverage container may rupture when rammed by the ascending pipe. Such rupture may cause leakage of beverage into the beverage dispensing system, escape of pressure fluid and occasionally explosion. Thus, ascending pipes in connection with collapsible beverage containers constitute a problem.

The problem in connection with ascending pipes may be solved by dispensing the beverage having the beverage container arranged in an upside down position, i.e. having the beverage outlet facing downwards. By positioning the beverage container in an upside down position in the beverage dispensing system the ascending pipe may be excluded. Thereby the risk of leaving any residual beverage in the beverage container is eliminated since the beverage container may collapse completely without blocking the beverage outlet.
irrespective of the orientation of the beverage container, i.e., irrespective of whether the beverage container is used in an upright orientation or in an upside-down orientation, the step of arranging the beverage container in the beverage dispensing system may require a lot of effort of the operator, since beverage containers used in professional beverage dispensing systems are very heavy due to the amount of beverage such as an amount of 5, 10, 15, 20, 25, 30 or even 40-50 litres, i.e. 5, 10, 15, 20, 25, 30 or even 40-50 kilos of beverage. Too small beverage containers would be uneconomical and lead to frequent changing of the beverage container, which takes up time for the operator and prevents dispensing over a certain time period. Consequently, there is a need for technologies for ergonomic installing and positioning of beverage containers in the beverage dispensing system.

The installation procedure of a new beverage container should preferably be made quickly and efficiently in order to shorten the time period in between the dispensing operations. Additionally, the installation procedure should be easy and simple to avoid any failures during installation. Further, the installation procedure must be safe and healthy for the operator. Dangerous installation procedures may lead to serious accidents including personal injury, which may result from e.g. dropping the beverage container or trying to lift the heavy beverage container in an uncontrolled way. Unhealthy installation procedures also include economically unhealthy installation procedures such as lifting the beverage container in an economically unsafe way. Such economically unsafe installation procedures may cause injuries to the operator such as strain injuries or other painful injuries causing extended recovery periods.

Collapsible beverage containers used for the beverage dispensing purpose are typically blow-moulded in one piece from a pre-form. The shape of the mould largely determines the shape of the beverage container. Typically, the shape of the beverage container is cylindrical and any edges are typically rounded, e.g., to form a substantially circular cross section. The blow moulding technology makes it very difficult to make any changes of the beverage container such as providing handles or the like directly onto the beverage container. Thus, any modifications for improving the ergonomics of the installation procedure must necessarily be made in connection with the beverage dispensing system.

The above problem has been identified in the prior art. WO02/085774 discloses a device for lifting plastic carboys through the use of a mechanical elevator. WO2004/099060, filed by the applicant company, discloses a method for dispensing a beverage from a collapsible container by using an increased pressure. WO2007/0 19851, also filed by the applicant company, discloses a method of guiding a dispensing line through a beverage dispenser. WO2007/0 19853, also filed by the applicant company, discloses an assembly for dispensing beverage, the assembly including a pressurized chamber, WO2008/053564 discloses a liquid dispensing apparatus having a pivotable cradle engaging a liquid container, and, WO2006/263 188 discloses an apparatus for dispensing water having a cradle.
Further, GB 2457754, relating to a vessel holding apparatus, discloses a support member which is capable of holding a vessel in a tilted condition. However, the document does not disclose any dispenser and does not allow a vessel to be installed in an ergonomic way.

In addition to the above prior art, the applicants own published international application, publication number WO2010/020644, which relates to a system and method of economically installing a beverage container in an economically correct beverage dispensing system. The economically correct beverage dispensing system comprises a receptacle for accommodating a beverage container, and a handle located in front of the receptacle. The handle is used as a support for the beverage container and according to the method, the beverage container is pivoted around the support and slid into the receptacle.

The above method significantly simplifies the installation of beverage containers of all sizes. However, the need of a handle in front of the receptacle causes a problem for beverage dispensing systems having an integrated tapping head with tapping handle. Beverage dispensing systems having an integrated tapping head are very popular with some professional beverage dispensing establishments which are not willing to invest in a full scale beverage dispensing system such as smaller bars and restaurants. They are further popular with private users. The problem herein lies in that such small beverage dispensing systems typically have the tapping head, tapping handle and drip tray mounted immediately in front of the receptacle adapted to receive the beverage container. Consequently, there is no more space for accommodating a handle for supporting the beverage container. Further, since such beverage dispensing systems are often located directly on a bar counter or on a table in view of the guests of the beverage dispensing establishment or the visitors of a private home, they therefore need to give the visitors and users a pleasant optical impression. Having a handle extending from the housing may disturb the optical impression.

It is thus an object of the present invention to provide technologies for installing a beverage container in a beverage dispensing system in a quick and efficient way and at the same time ergonomically safe for avoiding personal injuries, without the need of a separate handle.

The above need and the above object together with numerous other needs and objects, which will be evident from the below detailed description, are according to a first aspect of the present invention obtained by a method for installing a collapsible beverage container in a beverage dispensing system comprising performing the steps of:

i) providing the beverage dispensing system located on a horizontal surface, the beverage dispensing system defining an inner space extending between an open upwardly facing curved rim defining a contact surface, a closed downwardly facing end located remotely from the rim, and an inner concave surface between the rim and the closed end, the concave surface defining between the rim and the closed end a slope in relation to the horizontal surface of between 5° and 85°, and
ii) providing the collapsible beverage container, the collapsible beverage container defining a cylindrical body fitting within the inner space, a convex shaped first end defining a first contact area, and a convex shaped second end defining a second contact area, the second contact area having a curvature corresponding to the curvature of the contact surface, and performing the steps of:

   ii) positioning the collapsible beverage container in a sloped first position such that the first contact area is contacting the horizontal surface and the second contact area is contacting the contact surface,

   iv) pivoting the collapsible beverage container from the first position in a rotational motion around the contact surface to a second position in which the convex shaped first end is elevated while the second contact area remains contacting the contact surface, and

   v) sliding the collapsible beverage container on the contact surface and on the concave surface from the second position to a third position inside the inner space, in which the convex shaped second end is positioned juxtaposed the closed downwardly facing end.

The method according to the first aspect of the present invention may be used in connection with beverage containers positioned upright, or alternatively upside-down as in this context, the terms upright, upside-down, top and bottom, etc refer to the orientation of the relevant entity such as the beverage container or the inner space prior to use, i.e. as far as the beverage container is concerned, the orientation while transporting the beverage container to the location for dispensing the beverage from the beverage container by means of the beverage dispensing system The beverage dispensing system comprises a receptacle which is defining the inner space.

The horizontal surface may be a part of the beverage dispensing system and e.g. constitute a drip tray or the like. Alternatively, the horizontal surface may be separate from the beverage dispensing system and e.g. be constituted by the upper surface of the bar counter. It is contemplated that the horizontal surface must merely extend in a horizontal direction and must not be perfectly horizontal.

The sloped first position is typically a position in which the longitudinal axis of the cylindrical body of the beverage container is deviating up to 45 degrees from the vertical orientation such as typically an angle relative to the vertical orientation of the order of 10-45 degrees such as 10-20, 20-30, 30-45 degrees. In the second position, the longitudinal axis of the cylindrical body of the beverage container should preferably coincide with or parallel with the longitudinal axis defined by the slope of the concave surface, however, in specific applications, the longitudinal axis of the cylindrical body of the beverage container will deviate as much as 15 degrees, 0-5, 5-10, 10-15 degrees from the orientation of the slope of the concave surface. It is a characteristic feature of the present invention that the transition from the sloped first position to the second position is performed while maintaining linear or facial contact between the second contact area and the contact surface and optionally providing a mutual shifting of the second contact area and the contact surface.
The contact surface located at the rim and the concave surface should be smooth in order not to damage the beverage container at the second contact area while elevating or while sliding. The concave surface of the beverage dispensing system and the cylindrical body of the beverage container should have corresponding curvatures for guiding the beverage container and to allow the beverage container to slide into the inner chamber in a controlled and stable way. The applicant company has found out that the concave surface should optimally have the above-mentioned slope in order to be economically beneficial. A horizontally oriented concave surface will only allow the user to pivot the beverage container to an angle where the cylindrical body of the beverage container is substantially horizontal, preventing or at least significantly hindering the sliding of the beverage container into the inner space. Conversely, a vertically oriented concave surface will require the user to pivot the beverage container to an angle where the cylindrical body of the beverage container is substantially vertical, thereby causing the beverage container to enter the inner space in free fall, with only very limited guidance and control by the concave surface.

The initial position of the beverage container is sloped, i.e. tilted. The horizontal surface and the contact surface hold the beverage container. In the initial position, the beverage container thus forms an angle in relation to the horizontal surface. The beverage container may be delivered from a storage facility and placed in the initial position by the user, preferably manually or alternatively by using a crane. The initial position is preferably a stable position, i.e. not requiring any additional support from e.g. the user. The beverage container may then be left in the initial position unattended until the installation procedure starts. The curvature of the contact surface prevents any sideward or downward movement of the beverage container, thus ensuring the stable position.

Starting the installation procedure, the beverage container is preferably rotated or pivoted by grabbing the convex shaped first end and lifting it to an elevated position. Alternatively, a crane may be used for the lifting. The elevated position corresponds to the second position, i.e. a certain pivoting angle of the beverage container in relation to the horizontal plane. In the second position, most of the weight of the beverage container is supported by the contact surface. In the second position, the beverage container is assuming a position substantially in registration with the rim and the inner space such that the beverage container slides into the inner space to the third position within the beverage container. When a proper second position is achieved, the outer surface of the beverage container may slide on the contact surface of the rim such that the collapsible beverage container is received within the inner space. When the beverage container enters the inner space, the beverage container will be further guided by the concave surface to achieve a correct position within the inner space. A perfect alignment is thus not necessary in the second position. When the beverage container has travelled a certain distance into the inner space, the concave surface alone may guide the beverage container, and the contact surface may stop contacting the beverage container. The exact travelling path of the beverage container from the second position to the third position depends on the dimensions of the inner space and of the dimensions of the beverage container.
The hands of the user may be kept at the convex shaped first end for allowing a high angular momentum to be applied by the user. A high angular momentum implies that a smaller lifting force is needed as compared to a situation in which the entire collapsible beverage container is lifted without any supplementary support, thus the work of the user may be considered economically correct. Additionally, the user never has to support or carry the whole weight of the beverage container since it is being partly supported by the contact surface at all time. Further, the hands of the user are positioned in a safe distance from the rim.

In the step of sliding the collapsible beverage container on the contact surface and on the concave surface of the inner space from the second position to the third position, it may be relevant to use a mechanical shock absorber such as a foamed material pad or a synthetic or natural rubber pad positioned at the closed downwardly facing end of the receptacle serving to prevent the collapsible beverage container from being mechanically deteriorated as the collapsible beverage container is impacting the closed downwardly facing end when reaching the third position.

In a further embodiment according to the first aspect of the present invention, the inner space defines a container connector at the closed downwardly facing end, the convex shaped first end constituting a convex shaped bottom, the convex second end constituting a convex shaped top, and the convex shaped top having an outlet connector centrally fixated thereto adjacent to the second contact area. In step iv), the outlet connector of the collapsible beverage container facing the rim in the second position and in step v) the outlet connector contacting and sealing against the container connector in the third position. Consequently, according to this embodiment, the collapsible beverage container is positioned upside down in the third position received within the inner space.

In a further embodiment according to the first aspect of the present invention, the outlet connector comprises an outlet flange for establishing a third contact area for contacting the contact surface while rotating the collapsible beverage container from the first position to the second position. Preferably, the outlet flange is shaped as an outwardly oriented flange for allowing the second and third contact area to contact the contact surface by different contact angles, so that any slippage between the second contact area and the contact surface is prevented. The contact surface may then be accommodated between the second contact area of the convex shaped second end and the third contact area of the outlet flange.

In a further embodiment according to the first aspect of the present invention, the slope in relation to the horizontal surface is between 10° and 80°, more preferably between 20° and 70°, such as 25°, 30°, 35°, 40°, 45°, 50°, 55°, 60° or 65°, and most preferably 45°. It has been found out by the applicant company that a pivot angle of the cylindrical body of the beverage container of about 45° is economically beneficial and allows a smooth and controlled sliding of the beverage container into the inner space. The pivoting angle of the cylindrical body of the beverage container should at least
substantially coincide with or parallel with the longitudinal axis defined by the slope of the concave surface.

In a further embodiment according to the first aspect of the present invention, the rim comprises a cut-out section, the cut-out section dividing the contact surface for establishing two juxtaposing contact surfaces for contacting two corresponding second contact areas. By having a cut-out section in the rim, e.g., an openable wall of the housing or the like, the single contact surface may be split into two juxtaposing or opposing contact surfaces. In this way an increased stability in the sideward direction and the risk that the beverage container will roll off the rim during pivoting is prevented, or at least significantly hindered.

In a further embodiment according to the first aspect of the present invention, the concave surface defines a tubular surface. In some embodiments, it may be preferred to completely enclose the beverage container during sliding to prevent that the beverage container is sliding off the concave surface.

In a further embodiment according to the first aspect of the present invention, step v) further comprises sliding the collapsible beverage container from the second position to the third position by utilizing the gravitational force acting on the collapsible beverage container. In a preferred embodiment, the slope angle is large enough and the materials chosen for the concave surface and the beverage container exhibit a surface roughness small enough for the beverage container to slide into the inner space by gravitational force when the beverage container has been pivoted to an angle at least substantially coinciding with or parallel with the longitudinal axis defined by the slope of the concave surface.

In a further embodiment according to the first aspect of the present invention, a pressure chamber in the inner space is achieved by providing a pressure lid, the pressure lid cooperating with and sealing against the rim. Typically, after the beverage container has come to rest inside the inner space, the pressure lid is attached to the rim and the inner space is pressurized.

In a further embodiment according to the first aspect of the present invention, the collapsible beverage container constitutes a multilayer container. As an alternative or in combination with the above, the container may be a multilayer container where pressure fluid is introduced in the space between the layers.

The above need and the above object together with numerous other needs and objects, which will be evident from the below detailed description, are according to a second aspect of the present invention obtained by a method for installing a collapsible beverage container included in a package in a beverage dispensing system comprising the steps of:
providing the beverage dispensing system located on a horizontal surface, the beverage dispensing system defining an inner space extending between an open upwardly facing curved rim defining a contact surface, a closed downwardly facing end located remotely from the rim, and an inner concave surface between the rim and the closed end, the concave surface defining between the rim and the closed end a slope in relation to the horizontal surface of between 5° and 85°, and

providing the package including the collapsible beverage container, the collapsible beverage container defining a cylindrical body fitting inside the inner space, the package defining sets of oppositely positioned rectangular sidewalls and oppositely positioned rectangular top and bottom walls connected to the sidewalls through rectilinear edges, at least the top wall being openable, a first contact area being defined by a bottom edge of the package at one sidewall of the package and a second contact area being defined by the one sidewall adjacent to the openable top wall, the collapsible beverage container defining a cylindrical body, a convex shaped first end and a convex shaped second end, the collapsible beverage container fitting inside the package having the cylindrical body supported by the oppositely positioned rectangular sidewalls and having the convex shaped first end supported by the bottom of the package and having the convex shaped second end positioned below the openable top wall and being exposable by the opening of the openable top wall, and performing the steps of:

opening the openable top wall of the package,
positioning the open package including the beverage container, in a sloped first position such that the first contact area is contacting the horizontal surface and the second contact area is contacting the contact surface,
pivoting the package from the first position in a rotational motion around the contact surface to a second position in which the bottom of the package is elevated while the second contact area remains contacting the contact surface, the openable top wall facing the rim in the second position, and
sliding the collapsible beverage container out from the package on the concave surface to a position inside the inner space in which the convex shaped second end is positioned juxtaposed the closed downwardly facing end.

For an even more convenient installation of the beverage container into the beverage dispensing system, the beverage container may remain in the package until sliding into the inner space it is evident that the method according to the second aspect of the present invention may have any of the features of the method according to the first aspect.

The above need and the above object together with numerous other needs and objects, which will be evident from the below detailed description, are according to a third aspect of the present invention obtained by a beverage dispensing system for use in carrying out the methods according to any of the first and second aspects according to the present invention with a beverage container, the
beverage dispensing system being located on a horizontal surface, the beverage dispensing system defining an inner space extending between an open upwardly facing curved rim defining a contact surface, a closed downwardly facing end located remotely from the rim, and an inner concave surface between the rim and the closed end, the concave surface defining between the rim and the closed end a slope in relation to the horizontal surface of between 5° and 85°.

It is further evident that the beverage dispensing system according to the third aspect of the present invention may be used with any of the methods according to the first and second aspect of the present invention, including any of the above described features.

The above need and the above object together with numerous other needs and objects, which will be evident from the below detailed description, are according to a fourth aspect of the present invention obtained by a collapsible beverage container for use with a beverage dispensing system according to the third aspect of the present invention, the beverage container defining a cylindrical body for fitting inside an inner space of the beverage dispensing system, the beverage container having a convex shaped bottom defining a first contact area, a convex shaped top and an outlet connector centrally fixated to the convex shaped top, the convex shaped top defining a second contact area adjacent the outlet connector, the second contact area having a curvature corresponding to the curvature of a contact surface of a beverage dispensing system.

The collapsible beverage container may be provided with a convex shaped bottom to be able to pivot against the contact surface, i.e. assume the sloped initial position. The convex shaped top is used to position the beverage container in a correct initial position in relation to the contact surface. The term convex should be understood to mean a half spherical shape or the like such as a half ellipsoid shape. The beverage container and especially the convex shaped bottom and top should be made rigid enough to be able to support the weight of the beverage container. By collapsible is meant that the beverage container has a beverage space which may reduce its volume during dispensing such that pressure fluid is not in direct contact with the beverage. The beverage container may either be longer than the inner space, or alternatively equal to or shorter than the inner space.

It is further evident that the beverage dispensing system according to the fourth aspect of the present invention may be used together with the system according to the third aspect of the present invention, including any of the above described features.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Fig. 1 is a perspective view of a beverage dispensing system according to the present invention.

Fig. 2 is a partially sectional perspective view of a beverage dispensing system according to the present invention.
Fig. 3a-3c are illustrations of various embodiments of a cooling element according to the present invention.

Fig. 4a - 4f are a series of illustrations showing the installation of a new beverage container into a beverage dispensing system according to the present invention.

Fig. 5a-5c are a series of illustrations showing an embodiment of the ergonomic installation of a beverage container according to the present invention.

Fig. 6a-6c are a series of illustrations showing an embodiment of the ergonomic installation of a beverage container contained within a package.

Fig. 7a-7b are a series of illustrations showing the installation and subsequent tapping of a beverage container in a beverage dispensing system according to the present invention.

Fig. 8a-8b are a series of illustrations showing a beverage dispensing system with a separate tapping rod according to the present invention.

Fig. 9a-9b are a series of illustrations showing a beverage dispensing system having a supplementary cooling lid in addition to a cooling element.

**DETAILED DESCRIPTION OF THE DRAWINGS**

Fig. 1 shows a beverage dispensing system 10 according to the present invention. The beverage dispensing system 10 comprises a base plate 12, preferably located on a flat, horizontal surface. A housing part 14 extends upwardly from the rear part of the base plate 12. The front part of the base plate 12 forms a drip tray 20. The housing part 14 is extending towards the front part of the base plate 12, above the drip tray 20, in an angle of app. 45°. A lid 16 is located at the top of the housing part 14 opposite the base plate 12. The front part of the housing part 14, which is facing the drip tray 20 of the base plate 12, defines a front housing part 18. The front housing part 18 extends above the drip tray 20 which is located at the front part of the base plate 12. The front housing part 18 further comprises a tapping head 22 located near the lid 16. The tapping head 22 comprises a tapping handle 24 extending from the upper part of the tapping head and a beverage outlet 26 located opposite the tapping handle 24 and facing towards the drip tray 20 of the base plate 12. The tapping handle 22 further comprises a tapping valve (not shown). The tapping valve (not shown) is connected to the tapping handle 24 and the beverage outlet 26. The tapping handle 24 is normally oriented in a vertical position constituting a non-beverage dispensing position where the tapping valve (not shown) is closed. When a user desires to tap beverage, the tapping handle 24 is temporarily swung towards a horizontal position constituting a beverage dispensing position where the tapping valve (not shown) is open, causing the beverage to flow out of the beverage outlet 26.

Fig. 2 shows a partially sectional perspective view of the beverage dispensing system 10 of Fig. 1. From the present view it can be seen that an inner space 32 is defined within the housing part 14, the lid 16, the front housing part 18 and the base plate 12. A filled beverage container 28 is accommodated within the inner space 32. The beverage container 28 has a volume of about ten
litres and fills a large portion of the inner space 32. The beverage container 28 rests on a cooling element 30 located within the inner space 32. The cooling element 30 is connected to a combined cooling pressurisation device 34 by a cooling pipe 36. The beverage container 28 comprises a connecting flange 38 which is oriented towards the base plate 12 when the beverage container 28 is installed into the inner space 32. A tapping line 40 extends between the connecting flange 38 and the tapping valve (not shown) located within the tapping head 22. The combined cooling and pressurisation device 34 provides cooling to the cooling element 30 as well as pressurisation to the inner space 32. The combined cooling and pressurisation device 34 may optionally cool the inner space 32, however, the inner space 32 may be cooled by the cooling element 30 as well. It is further possible to employ a separate cooling device and a separate pressurization device in place of the combined cooling and pressurization device 34.

Fig. 3a shows a first embodiment of a cooling element 30. The beverage container 28 defines a beverage container bottom 42 located opposite the connecting flange 38. The beverage container 28 further defines a cylindrical container wall 44 connecting the beverage container bottom 42 and the connecting flange 38. The cooling element 30 defines a contact cooling surface 46 having a curvature corresponding to the cylindrical container wall 44 of the beverage container 28 and adapted to receive the cylindrical container wall 44 by a tight fit of a section of the cylindrical container wall 44. The cooling element 30 is preferably made of a metal such as aluminium or any similar material having a high thermal conductivity. The cooling element 30 according to the present embodiment comprises a Peltier element which is electrically connected to a combined cooling and pressurisation device 34 via electrical wires 36. The combined cooling and pressurisation device 34 provides electrical current to the Peltier element for causing a cooling effect.

Fig. 3b shows a further embodiment of a cooling element 30". The cooling element 30" has a shape corresponding to the cooling element 30 of Fig. 3a, however, instead of a Peltier element, the cooling element 30" comprises a cooling inlet 48. The combined cooling and pressurisation device 34" comprises a cooling pipe 36" which is inserted into the cooling inlet 48 of the cooling element 30" for supplying a coolant to the cooling element 30". The combined cooling and pressurisation device 34 consequently comprise a compressor (not shown) for cooling the coolant.

Fig. 3c shows a further embodiment of a cooling element 30". The cooling element 30" of Fig. 3c is similar to the cooling element 30" of Fig. 3b, however, instead of a cooling inlet 48, the cooling pipe 36" is fixedly connected to the cooling element 30 and forms a mesh or web inside the cooling element 30 for achieving an optimal distribution of coolant throughout the contact cooling surface 46 of the cooling element 30''.

Fig. 4a shows a side view of the beverage dispensing system 10. It can be seen that the housing part 14 is extending upwardly from the base plate 12 and further extending above the drip tray 20 and defining an angle relative to the base plate 12 of about 45°.
Fig. 4b shows a side view of the beverage dispensing system 10 when the front housing part 18 has been lowered towards the base plate 12. Normally, when the beverage dispensing system 10 is operational, the front housing part 18 defines an upright position along with the housing part 12. When a new beverage container (not shown here) is about to be installed into the beverage dispensing system 10, the front housing part 18 may be pivoted towards the base plate 12 into a substantially horizontal position as shown by the arrow. When the front housing part 18 has been pivoted, the tapping head 22 is located adjacent the base plate 12.

Fig. 4c shows a side view of the beverage dispensing system 10 after the front housing 18 has been pivoted towards a horizontal position. By pivoting the front housing part 18 towards the base plate 12, the removal of the lid 16 is thereafter allowed. The lid 16 is mounted by means of a bayonet mount and to remove the lid 16 it is rotated about 1/4 of a turn and lifted outwardly. The lid 16 defines an interior top cavity 50 which is facing towards the housing part 14.

Fig. 4d shows a side view of the beverage dispensing system 10 when a new beverage container 28 is inserted into the housing part 14. When the lid 16 has been removed, access is provided to the inner space (not shown here). The beverage container 28 should be inserted having the connecting flange 38 facing towards the base plate 12 and the beverage container 28 defining an angle of about 45° in relation to the base plate 12.

Fig. 4e shows a side view of the beverage dispensing system 10 when the beverage container 28 has been inserted into the inner space (not shown here). When the beverage container is installed into the inner space inside the housing part 14, the lid 16 may be reconnected to the housing part 14 and the front housing part 18 may be pivoted towards its upright position. The beverage container bottom 42 is then accommodated inside the top cavity 50 of the lid 16.

Fig. 4f shows a side view of the beverage dispensing system 10 when in use. By placing a beverage glass 52 onto the drip tray 20 of the base plate 12 and swinging the tapping handle 24 from the substantially vertical position constituting the non-beverage dispensing position in a direction away from the lid 16 and towards a substantially horizontal position constituting a beverage dispensing position, beverage will flow out of the beverage outlet 26 and into the beverage glass 52.

Fig. 5a shows the beverage dispensing system 10 including a housing part 14 without the lid 16. As previously discussed, the housing part 14 is extending towards the front part of the base plate 12, above the drip tray 20, in an angle of approx. 45°. Presently, the front housing part 18 has been lowered into its substantially horizontal position and is defining an optional support block 56. The beverage container 28 has been removed from its package 54 and positioned tilted about 45° in relation to the horizontal plane in a stable first installation position. The beverage container 28 comprises a beverage container bottom 42 which is convex so that the beverage container 28 may be easily
pivoted into the first installation position in the present embodiment, the beverage container bottom 42 is resting against the support block 56 and against the front housing part 18, however, in an alternative embodiment, the beverage container bottom 42 may be resting against the front housing part 18, the base plate 12 or any substantially horizontal plane, depending on the dimensions of the beverage container and the beverage dispensing system 10. Using a support block 56 may be advantageous since it will prevent slippage of the beverage container bottom 42.

The housing part 14 comprises an upwardly oriented rim 62 through which the inner space 32 of the housing part 14 is accessible. The rim 62 comprises a contact surface 60, which is oriented towards the drip tray 20. The beverage container 28 further comprises a beverage container top 58 which is rounded and comprises centrally located connecting flange 38. The connecting flange 38 comprises a container outlet for the beverage stored in the beverage container 28. The beverage container top 58 and the connecting flange 38 are resting against the contact surface 60 of the rim 62 of the housing part 14. The contact surface 60 is shaped having a curvature to provide a stable positioning of the beverage container 28 and prevent movement of the beverage container 28 both in the direction towards the housing part 14 and in the sideward directions.

The beverage container 28 is of the collapsible type and may have a volume of typically around ten litres for allowing about 20 servings of the beverage before needing to install a new beverage container 28. Typical height of the beverage container 28 for the beverage dispensing system 10 is between 0.25m and 0.5m, preferably 0.35m.

Fig. 5b shows the beverage dispensing system 10 during ergonomic installation of the beverage container 28. By lifting the beverage container bottom 42, the beverage container 28 may be pivoted in a rotational motion around the contact surface 60 to an elevated position. Preferably the user, being either a private user or a professional beverage dispensing operator such as a bartender or barmaid, performs the lifting. Alternatively, when using large and heavy beverage containers, a lifting device such as a crane may be used to lift the beverage container bottom 42 of the beverage container 28 in order to avoid personal injuries. Yet alternatively, if the beverage container 28 is positioned contacting a properly shaped support block 56 of the front housing part 18, the beverage container bottom 42 may be pivoted by simply pivoting the front housing part 18 up towards its vertical orientation. During the pivoting operation, the contact surface 60 remains in contact with the beverage container top 58. The contact surface 60 simplifies the rotational movement of the beverage container 50. The curvature of the contact surface 60 and the corresponding curvature of the beverage container top 58 and the connecting flange 38 of the beverage container 28 prevent any sideward movement of the beverage container 28. The connecting flange 38 is used to grasp the contact surface 60 of the rim 62 at a higher angle along the contact surface 60 to avoid slipping of the beverage container 50.
When the beverage container bottom 42 is further elevated and the beverage container 28 is further pivoted, the contact surface 60 of the rim 62 will be supporting most of the weight of the beverage container 28. The beverage container 28 then primarily rests on the beverage container top 58 and occasionally against the connecting flange 38 if needed for the pivoting stability. Accordingly, the beverage container top 58 and the connecting flange 54 must be made rigid enough to support the weight applied upon them. Preferably, the two above-mentioned parts may be reinforced to avoid any risk of breakage, such as by using a double or dual-layered container. A double-layered container has an inner collapsible beverage container which is protected by an outer rigid container. Having such a double-layered beverage container will in some embodiments make the lid 16 unnecessary, since the pressurized fluid is then kept in the space between the outer container and the inner beverage bag.

A breakage of the connecting flange 38 or the beverage container top 58 at the intermediate position shown in Fig. 5b may lead to an uncontrolled drop of the beverage container 28 towards the ground resulting in possible damage of equipment or personal injury to the user.

Favourably, the beverage dispensing system 10 includes a piercing element 64 at the end of the tapping line 40. The tapping line 40 and the piercing element 64 are fixated inside the housing remote from the rim 62, and may be replaced when needed. The container outlet at the connecting flange 38 of the beverage container 28 comprises a corresponding pierceable membrane (not shown). Alternatively, the beverage container 28 may be delivered having a tapping line 40 and a tapping valve (not shown) already connected to the container outlet at the connecting flange 38.

Fig. 5c shows the beverage dispensing system 10 when the beverage container 28 is installed into the inner space 32. By continuing the rotational movement of the beverage container 28 and required providing a horizontal transitory force onto the beverage container 28 in a direction towards the rim 62, the rounded beverage container top 58 will commence a sliding motion on the contact surface 60 of the rim 62 and slide into the inner space 32. The user should for safety reasons avoid any contact with the rim 62 of the beverage dispensing system, the beverage container top 58 and the connecting flange 38 when the beverage container 28 is about to slide in direction towards the inner space 32, since it may result in possible injuries to the user.

It should be noted that the beverage container 28 must not be in perfect registration with the rim 62 of the beverage dispensing system. It is sufficient if the connecting flange 54 is in registration with the rim 62, since the positioning of the beverage container 28 will be corrected after the sliding motion has started and the beverage container 28 will continue by its own motion into the inner space 32 of the beverage dispensing system 10. The beverage container 28 is directed by the curvature of the contact surface 60 and as the beverage container 28 enters the inner space 32, the beverage container 28 is guided by the rim 62 and the beverage container top 58 of the beverage container 50 for a correct positioning. Thus, the beverage container 28 may enter the inner space 32 being slightly
out of registration. The inner walls of the housing part 14 defining the inner space 32 and the contact cooling surface 46 will orient the beverage container 28 such that the connecting flange 54 is positioned in front of the piercing element 64.

Inside the inner space 32, the beverage container 28 slides on a concave surface 46'. The concave surface 46' should have a concave shape having a curvature corresponding to the curvature of the cylindrical container wall 44. The concave surface 46' is preferably identical with the previously described concave contact cooling surface 46, however, in some embodiments a separate contact cooling surface 46 may be used, or the contact cooling surface may be a part of the inner walls of the housing part 14.

Upon reaching the resting position at the bottom end of the inner space 32, remote from the rim 62, the connecting flange 38 of the beverage container 28 is connected fluid-tightly to the piercing element 64 of the tapping line 40 inside the inner space 32. The beverage container 28 will protrude slightly outside the inner space 32. After the beverage container 28 has reached its resting position, the lid 16 may be replaced and locked pressure-tightly onto the rim 62 of the beverage dispensing system 10. Thereby the installation procedure is concluded, and after the inner space 32 has been pressurized, the beverage may be dispensed from the beverage dispensing system 10 by swinging the tapping handle 24.

In order to prevent that the beverage container 28 is deteriorated by impact to the beverage container 28 at the time the beverage container 28 reaches its resting position at the bottom end of the inner space 32, a shock absorber may be provided inside the inner space 32, such as a foamed plastic pad or a natural or synthetic rubber pad, serving to prevent the beverage container 28 from being deteriorated or even broken or smashed.

When the beverage container 28 is emptied, the inner space 32 is depressurized, and the lid 16 is removed. This allows the beverage container 28 to be removed and replaced. The beverage container 28 will typically be completely collapsed and will therefore be easy to remove and dispose.

Fig 6a shows an alternative embodiment of the ergonomic handling according to the present invention, where the beverage container 28 remains located within the package 54 during a part of the installation procedure. The package 54 has a package bottom 54', an openable package top 54" and four parallel sidewalls which have not been assigned reference numerals but which are connecting the package bottom 54' and the package top 54". The package top 54" comprises flaps 54" which serve to seal and close off the package 54 during storage and transportation.

The beverage dispensing system 10 shown in fig 6a comprises a housing part 14 having a rim 62' being similar to the previous embodiments shown above. The rim 62' differs from the above described rims in that the contact surface 60' of the rim 62' is defining a plane outer contact surface
as distinct from the rounded contact surface of the previous embodiment of the dispensing unit shown in figs 5a-5c. The contact surface 60' corresponds to the package top 54". The package 54 may thus be positioned in a pivoted orientation where the package top 54" is resting against the contact surface 60'. The package bottom 54' remains contacting the front housing part 18 or alternatively the base plate 12.

Fig 6b shows the alternative embodiment of the ergonomic handling according to the present invention when the package bottom 54' has been elevated and the package 54 including the beverage container 28 has been pivoted around the contact surface 60'. The beverage container 28 may slide from inside the package 54 towards the rim 62' and further into the inner space 32 of the housing part 14 while the package 54 remains in its elevated position as shown in Fig. 6a.

Fig 6c shows the alternative embodiment of the ergonomic handling according to the present invention when the beverage container 28 has been installed. After the beverage container 28 has reached its final position, the package 54 may be disposed and the lid 16 may be replaced.

Fig 7a shows the installation of the beverage container 28 into the beverage dispensing system 10. In a first step the beverage container 28 is introduced through the rim 62 into the inner space 32 and the connecting flange 38 connects to the piercing element (not shown). In a second step the lid 16 is attached to the housing part 14 while the beverage container 28 is resting on the contact cooling surface 46 of the cooling element 30. In a third step, the front housing part 18 is pivoted back to the vertical orientation, thereby enabling beverage dispensing operations.

Fig 7b shows the dispensing of beverage by swinging the tapping handle 24 of the beverage dispensing system 10. When the beverage container 28 has been installed into the beverage dispensing system 10 and the inner space 32 has been pressurized, the beverage dispensing system 10 is ready for use. By swinging the tapping handle 24 from a substantially vertical orientation constituting the non-beverage dispensing position, towards a substantially horizontal orientation constituting the beverage dispensing position, the tapping valve (not shown) inside the tapping head 22 will open and beverage will be expelled from the beverage container 28, via the dispensing line 40, the dispensing valve and through the beverage outlet 26. The beverage is preferably collected in a beer glass 52 positioned below the beverage outlet 26.

The beverage container 28 is blow-moulded of flexible polymeric material, typically plastics such as PET or PP. The present beverage container 28 has a height of about 0.35m, and a diameter being about the same as the height. As the beverage is being expelled from the beverage container 28, the pressure in the inner space 32 drives the beverage outwardly and at the same time compressing the beverage container into a collapsing state as shown. The figure is showing the beverage container in a state where about 50% of the beverage volume has been dispensed. The beverage container 42 will collapse from an elevated position of the beverage container bottom 42 or cylindrical wall 44 and
downwardly in the direction towards the connecting flange 38. It should be noted that the beverage surface will always be substantially horizontal due to the influence of the gravity, and the beverage container 28 will form itself to match the beverage surface. Due to local differences in the material strength of the beverage container, a slightly uneven surface may form as the beverage container 28 is compressed, as indicated in the figure.

The applicant company has found out that by positioning the outlet at the connecting flange 38 below the rest of the beverage container 28, the gravitational force will aid in the expelling of the beverage, and an ascending pipe may be omitted. Further, to allow the contact cooling surface 46 to contact the cylindrical container wall 44 even when a substantial amount of beverage has already been dispensed, the contact cooling surface 46 should be located as low as possible as well. In the present embodiment, the contact cooling surface 48 constitutes a slope having an angle of about 45° relative to the horizontal plane for allowing at least 50% of the beverage volume to be dispensed without the cylindrical container wall 44 losing any contact with the contact cooling surface 46 and at the same time allowing dispensing even of the last portion of beverage, since the container outlet and connecting flange 38 are located in a low position. It is further contemplated that the cooling element 30 and the contact cooling surface 46 may be slightly inwardly bent to extend inwardly at the beverage container top 58 for contacting a portion of the beverage container top 58 in the vicinity of the transition between the beverage container top 58 and the cylindrical container wall 44 for allowing a larger contact cooling surface 48 and act as an appropriate stop quoin when the beverage container 28 is sliding into the housing part 14. The cooling element 30 should, however, not form a constriction preventing the connecting flange 38 to pass, thus, the size of the connecting flange 38 effectively sets the limit for the inward extension of the cooling element 30.

Fig. 8a shows a side sectional view of a further embodiment of a beverage dispensing system 10'. By comparison with the previous embodiment, the beverage dispensing system 10' lacks the front housing part including the tapping head and instead features a separate tapping rod 66 including a tapping head 22', a tapping handle 24' and a beverage outlet 26. The tapping head 22' is located at the top of the tapping rod 66. The separate tapping rod 66 is extending upwardly from the base plate 12 in front of the housing part 14'. A dip tray 20' is located below the beverage outlet 26'. The figure shows the installation of a new beverage container 28 into the housing part 14 and the subsequent positioning of the lid 16 onto the housing part 14.

Fig. 8b shows a side sectional view of the beverage dispensing system 10' when assembled and ready for beverage dispensing. By operating the tapping handle 24' of the tapping rod 66, beverage will flow out of the beverage outlet 26'. It is contemplated that the tapping rod 66 may be located on a separate base plate a certain distance from the housing part 14, e.g. the tapping rod 66 may be placed on a bar counter, while the housing part 14 is located below the bar counter.
Fig. 9a shows a side sectional view of yet a further embodiment of a beverage dispensing system 10". The beverage dispensing system 10" comprises a lid 16' including an auxiliary cooling element 68 which has a shape adapted to fit tightly to the beverage container bottom 42 and thus provide additional cooling to the beverage container 28.

Fig. 9b shows a side sectional view of the beverage dispensing system 10" when assembled and ready for beverage dispensing. The auxiliary cooling element 68 is pressing tightly against the beverage container bottom 42 thereby providing an additional contact cooling surface 70. It is contemplated that for some embodiments, it may be sufficient to only use the auxiliary cooling element 68, thereby dispensing with the cooling element 30.

It is obvious to a person skilled in the art that numerous alternative embodiments according to the present invention exist.
**LIST OF PARTS WITH REFERENCE TO THE FIGURES**

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<thead>
<tr>
<th>Part Number</th>
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</tr>
<tr>
<td>12</td>
<td>base plate</td>
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<tr>
<td>14</td>
<td>housing part</td>
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<tr>
<td>16</td>
<td>lid</td>
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<tr>
<td>18</td>
<td>front housing part</td>
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<tr>
<td>20</td>
<td>drip tray</td>
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<tr>
<td>22</td>
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<tr>
<td>24</td>
<td>tapping handle</td>
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<tr>
<td>26</td>
<td>outlet</td>
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<tr>
<td>28</td>
<td>collapsible beverage container</td>
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<tr>
<td>30</td>
<td>cooling element</td>
</tr>
<tr>
<td>32</td>
<td>inner space</td>
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<tr>
<td>34</td>
<td>combined cooling and pressurisation device</td>
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<tr>
<td>36</td>
<td>cooling conduit</td>
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<tr>
<td>38</td>
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<tr>
<td>40</td>
<td>tapping line</td>
</tr>
<tr>
<td>42</td>
<td>beverage container bottom</td>
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<tr>
<td>44</td>
<td>cylindrical container wall</td>
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<tr>
<td>46</td>
<td>concave contact cooling surface</td>
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<td>48</td>
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<td>50</td>
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<td>52</td>
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<td>54</td>
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<td>62</td>
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<td>auxiliary cooling element</td>
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<tr>
<td>70</td>
<td>additional contact cooling surface</td>
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Claims

1. A method for installing a collapsible beverage container in a beverage dispensing system comprising performing the steps of:
   i) providing said beverage dispensing system located on a horizontal surface, said beverage dispensing system defining an inner space extending between an open upwardly facing curved rim defining a contact surface, a closed downwardly facing end located remote from said rim, and an inner concave surface between said rim and said closed end, said concave surface defining between said rim and said closed end a slope in relation to said horizontal surface of between 5° and 85°, and
   ii) providing said collapsible beverage container, said collapsible beverage container defining a cylindrical body fitting within said inner space, a convex shaped first end defining a first contact area, and a convex shaped second end defining a second contact area, said second contact area having a curvature corresponding to the curvature of said contact surface, and performing the steps of:
      iii) positioning said collapsible beverage container in a sloped first position such that said first contact area is contacting said horizontal surface and said second contact area is contacting said contact surface,
      iv) pivoting said collapsible beverage container from said first position in a rotational motion around said contact surface to a second position in which said convex shaped first end is elevated while said second contact area remains contacting said contact surface, and
      v) sliding said collapsible beverage container on said contact surface and on said concave surface from said second position to a third position inside said inner space, in which said convex shaped second end is positioned juxtaposed said closed downwardly facing end

2. A method for installing a collapsible beverage container included in a package in a beverage dispensing system comprising the steps of:
   providing said beverage dispensing system located on a horizontal surface, said beverage dispensing system defining an inner space extending between an open upwardly facing curved rim defining a contact surface, a closed downwardly facing end located remote from said rim, and an inner concave surface between said rim and said closed end, said concave surface defining between said rim and said closed end a slope in relation to said horizontal surface of between 5° and 85°, and
   providing said package including said collapsible beverage container,
   said collapsible beverage container defining a cylindrical body fitting inside said inner space, said package defining sets of oppositely positioned rectangular sidewalls and oppositely positioned rectangular top and bottom walls connected to said sidewalls through rectilinear edges, at least said top wall being openable, a first contact area being defined by a bottom edge of said package at one sidewall of said package and a second contact area being defined by said one sidewall adjacent to said openable top wall, said collapsible beverage container defining a cylindrical body, a convex
shaped first end and a convex shaped second end, said collapsible beverage container fitting inside
said package having said cylindrical body supported by said oppositely positioned rectangular
sidewalls and having said convex shaped first end supported by the bottom of said package and
having said convex shaped second end positioned below said openable top wall and being
exposable by the opening of said openable top wall,
and performing the steps of:
  opening said openable top wall of said package,
  positioning said open package including said beverage container, in a
  sloped first position such that said first contact area is contacting said horizontal surface and said
  second contact area is contacting said contact surface,
  pivoting said package from said first position in a rotational motion
  around said contact surface to a second position in which the bottom of said package is elevated
  while said second contact area remains contacting said contact surface, said openable top wall
  facing said rim in said second position, and
  sliding said collapsible beverage container out from said package
on said concave surface to a position inside said inner space in which said convex shaped second
end is positioned juxtaposed said closed downwardly facing end

The method according to any of the preceding claims, wherein said inner space
defining a container connector at said closed downwardly facing end, said convex shaped first end
constituting a convex shaped bottom, said convex second end constituting a convex shaped top, and
said convex shaped top having an outlet connector centrally fixated thereto adjacent to said second
contact area, in step iv), said outlet connector of said collapsible beverage container facing said rim
in said second position and in step v) said outlet connector contacting and sealing against said
container connector in said third position

The method according to claim 3, wherein said outlet connector comprises an outlet
flange for establishing a third contact area for contacting said contact surface while rotating said
collapsible beverage container from said first position to said second position

The method according to any of the preceding claims, wherein said slope in relation to
said horizontal surface is between 10° and 80°, more preferably between 20° and 70°, such as 25°,
30°, 35°, 40°, 45°, 50°, 55°, 60° or 65°, and most preferably 45°.

The method according to any of the preceding claims, wherein said rim comprises a
cut-out section, said cut-out section dividing said contact surface for establishing two juxtaposing
contact surfaces for contacting two corresponding second contact areas.

The method according to any of the previous claims, wherein said concave surface
defines a tubular surface
8 The method according to any of the previous claims, wherein step v) further comprises sliding said collapsible beverage container from said second position to said third position by utilizing the gravitational force acting on said collapsible beverage container.

9 The method according to any of the previous claims, wherein a pressure chamber in said inner space is achieved by providing a pressure lid, said pressure lid cooperating with and sealing against said rim.

10 The method according to any of the previous claims, wherein said collapsible beverage container constitutes a multilayer container.

11 A beverage dispensing system for use in carrying out the methods according to any of the claims 1-10 with a beverage container, said beverage dispensing system being located on a horizontal surface, said beverage dispensing system defining an inner space extending between an open upwardly facing curved rim defining a contact surface, a closed downwardly facing end located remote from said rim, and an inner concave surface between said rim and said closed end, said concave surface defining between said rim and said closed end a slope in relation to said horizontal surface of between 5° and 85°.

12 A beverage dispensing system according to claim 11, further comprising any of the features according to claim 3-10.

13 A collapsible beverage container for use with a beverage dispensing system according to claim 12, said beverage container defining a cylindrical body for fitting inside an inner space of said beverage dispensing system, said beverage container having a convex shaped bottom defining a first contact area, a convex shaped top and an outlet connector centrally fixated to said convex shaped top, said convex shaped top defining a second contact area adjacent said outlet connector, said second contact area having a curvature corresponding to the curvature of a contact surface of a beverage dispensing system.

14 A collapsible beverage container according to claim 13 wherein said collapsible beverage container constitutes a multilayer container.
A. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>26 August 2009 (2009-08-26) page 12, paragraph 2 - page 14, paragraph 1 figures 7, 8, 10 page 1, paragraph 1</td>
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<td>22 February 2007 (2007-02-22) page 25, line 19 - page 26, line 27 figures 8, 9</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

**Special categories of cited documents:**

- 'A' document defining the general state of the art which is not considered to be of particular relevance
- 'E' earlier document but published on or after the international filing date
- 'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- 'O' document referring to an oral disclosure, use, exhibition or other means
- 'P' document published prior to the international filing date but later than the priority date claimed
- 'T' later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- 'X' document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- 'Y' document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- 'Z' document member of the same patent family

Date of the actual completion of the international search: 27 December 2010

Date of mailing of the international search report: 14/01/2011

Name and mailing address of the ISA: European Patent Office, P.B. 5818 Patentlaan 2 NL- 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-2016 Authorized officer: Schultz, Tom

Form PCT/ISA/2/10 (second sheet) (April 2005)
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